

TRIBULUS



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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.

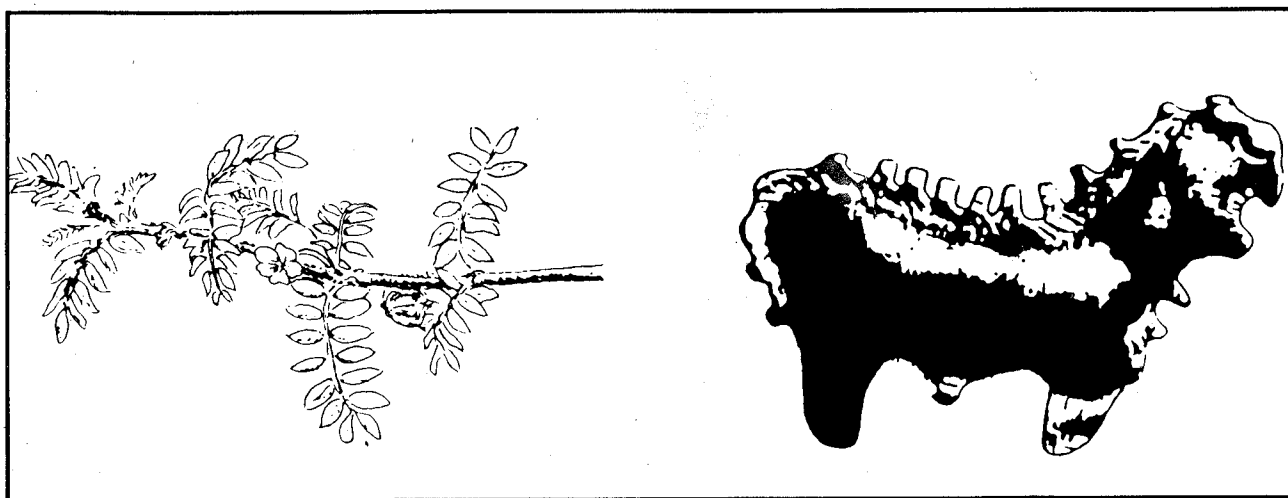
TRIBULUS is published twice a year, in April and October. The aim of the publication is to create and maintain in standard form a collection of recordings, articles and analysis on topics of regional archaeology and natural history, with the emphasis focussing on the United Arab Emirates and adjacent areas. Articles are welcomed from Group members and others, and guidelines are set out below. The information carried is as accurate as the Editorial Committee can determine, but opinions expressed are those of the authors alone.

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P. Hellyer, Managing Editor



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 may be submitted in either English or Arabic. A short abstract should precede the article, with the address(es) of the author(s) at the end. For Arabic contributions, a short summary in English, of not more than 200 words, should also be supplied.

Photographs may be submitted and should be either glossy black-and-white 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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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 29, without whom publication in this format would be impossible.

We also acknowledge the support and encouragement of our Patron, H.E. Sheikh Nahayan bin Mubarak al Nahayan, the U.A.E. Minister of Higher Education and Scientific Research.

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Editorial

In the last issue, I highlighted the environmental effects of the Fujairah oil spill in March 1994. In this issue, Benno Boer and Andrew Griggs of the National Avian Research Centre discuss the impact of the spill on the inter-tidal areas along this relatively short, but varied coastline. Their findings show that high wave energy helped a great deal to reduce the coastal impact of the spill, a phenomenon also noticed in other rough sea environments, like the Shetland Islands.

In comparison, low wave energy environments, such as the northern Arabian Gulf and Prince William Sound, in Alaska, are far more vulnerable to longer-lasting coastal degradation.

While Boer and Griggs warn that the Fujairah spill was a relatively minor one, with only temporary dislocation to the local economy, they warn of the need for a rapid response to any future spill, which could have far greater negative results.

The second issue of the new magazine *Arabian Wildlife* appeared over the summer, and highlighted the work of Marijcke Jongbloed, winner of the first Sheikh Mubarak Annual Prize for Natural History, as founder and prime mover of the Arabian Leopard Trust. Despite Marijcke's base in the UAE, the ALT is concerned with the status of leopards and other cats throughout the peninsula, and it is to be hoped that the Trust's extensive work and the publicity it generates, not least in schools, will help to prevent the sad and continuing trickle of news of sightings of corpses.

Other articles in the magazine cover the extinct Onager of Arabia, an update on dugongs, mountain flowers of the UAE, the birdlife of Al-Ansab Lagoons near Muscat, and a study of the Arabian Houbara project in Saudi Arabia, with which, of course, the Sweihan-based National Avian Research Centre is intimately linked.

Both NARC and its colleagues in the National Commission for Wildlife Conservation and Development in Saudi Arabia are working in tandem to find a long term solution to the problem of maintaining native(migrant) stocks of the Houbara in both countries, while, at the same time, important studies are being undertaken in various parts of the Emirates to restore the natural habitat so as to encourage wild populations to stay longer and, perhaps, to breed. The magazine is well worth obtaining, and can be highly recommended.

The last year or so has seen a substantial amount of continuing scientific research into the archaeology and natural history of the Emirates, and it is pleasing to report the success of the 1994 Abu Dhabi Shorebird Project. 446 birds of 58 different species were ringed by the researchers, and 4 new species recorded for the UAE: the Lesser Noddy, River Warbler, Red-necked Stint and Kittlitz's Plover. The status of resident, migratory and breeding birds in the UAE is now well-surveyed, and perhaps the time is now right for Group members and other volunteers to take up recording of other forms of wildlife. One example could be a revival of the Group's own Dolphin Watch of the early 1980s, to supplement similar work taking place in Oman.

As far as *Tribulus* is concerned, this issue also contains some important articles on archaeology, particularly on the under-explored lower Gulf Coast. The discovery of a pre-Islamic Christian site on Sir Bani Yas is a major find, but continuing surveys throughout this area have turned up, and continue to turn up, a large

number of sites of interest. The Abu Dhabi Islands Archaeological Survey Project, which is responsible for much of the work, started partly due to the enthusiasm of Group members, and to the initial support provided by our patron, Sheikh Nahayan bin Mubarak al Nahayan, and the article reporting on one of its major finds is of great interest.

Tim Goodall reports on the Sabkhat Matti, that area of saline desert bordering Saudi Arabia and Qatar. His work has confirmed previous theories that one or more huge wadi systems flowed from southern Saudi Arabia through this region and into the Gulf in earlier geological times. Of relevance to this theme is James P. Mandaville's article '*Some Historical and Geographical Aspects of a Principal Floristic Frontier*,' (Studies in the Flora of Saudi Arabia, 1984).

Mandaville attempts to delineate Sudanian and Saharo-Arabian vegetation zones in Arabia. He describes the western and central parts of Arabia (the Arabian Shield) as a Sudanian floristic homeland with its close affinity to East African vegetation components, whereas the sedimentary basin to the east, (including the Sabkhat Matti and coastal Abu Dhabi) have since Palaeozoic times been subjected to a series of marine transgressions which have repeatedly obliterated plant life in the region, up to 100 km inland from the present-day coast in places.

Mandaville cites three major wadi systems that once traversed the area, debouching from west to east across the Shield towards the Gulf, of which the central one, the Wadi As-Sabha, ran through the Sabkhat Matti in late Pliocene, possibly early Pleistocene times, bringing elements of Sudanian vegetation with it.

A survey of the Abu Dhabi coastline and islands by the Group Plant Recorder in the early 1980s recorded *Capparis spinosa* both on Jebel Dhanna and on some offshore islands, and it would seem plausible that this example of Sudanian flora could only have come via a wadi system from the Arabian Shield.

Elsewhere, the nearest recorded *Capparis spinosa* in the UAE is on Jebel Hafit and the mountains further north beyond Hatta, which presumably originated across a land bridge from East Africa via Yemen and Oman.

In the light of new desert soil dating techniques, some of which Goodall describes, it may soon be possible to construct a detailed geological history of the whole of the Western Region of Abu Dhabi.

Another paper, by Simon Aspinall, documents the discovery of breeding populations of the Sooty Falcon on some of Abu Dhabi's offshore islands, in numbers which are of international importance. Over the past couple of years, extensive surveying on the little-known islands of the Western Region has produced valuable new information of the Gulf's bird life, and the paper emphasises the significance of our bird colonies. Sadly, at least one of the sites is now being developed, while others are under threat, underlining, yet again, the value of recording as much as possible before development reaches once remote spots.

By so doing, it also makes it easier to argue for, and to defend, those parts of the UAE's natural environment that are of particular significance.

ROB WESTERN

A Pre-Islamic Christian site on Sir Bani Yas

by Dr. G.R.D. King and Peter Hellyer

Between late February and mid-April 1994, the third season of work by the Abu Dhabi Islands Archaeological Survey Project was undertaken, under the patronage of UAE Chief of Staff Lieutenant General Sheikh Mohammed bin Zayed al Nahyan. During the course of the season, excavations continued on the 'Ubaid site on the island of Dalma, while further surveying was also undertaken on the Late Stone Age site on the island of Merawah, as well as on a number of smaller islands in the Western Region of the Emirate of Abu Dhabi, including Ghaghah and Al F'zaiyyah, and at Mantakha As'sirra, near Medinat Zayed, on the mainland, (1).

A second season of excavations was also undertaken on sites on the island of Sir Bani Yas, first identified during a preliminary 1992 survey season, and tentatively dated to a period from the Fifth to Eight Centuries AD.

The Survey Project was established in 1991 on the instructions of UAE President Sheikh Zayed bin Sultan al Nahyan. It is charged with research into the archaeology of the coast and offshore islands in the Western Region of the Emirate of Abu Dhabi.

In 1992, preliminary survey work was carried out on the islands of Dalma, Sir Bani Yas and Merawah.

Excavation commenced in 1993 on Sir Bani Yas on a courtyard building, numbered as Site 3.1 during the 1992 survey, while trial trenches were dug on a complex of walls in the Al Khor area on the east of the island, Site 9.1. Further excavation was undertaken on the latter site during the 1994 season. One unexpected result was the discovery of conclusive evidence of the presence of a Christian community on the island at the time of the coming of Islam.

The excavations, conducted by Field Director J. Elders, assisted by S. Garfy, M. Beech and K. Gundel, focussed on the area where the trial trenches in 1993 had demonstrated the extensive preservation of walls and plastered floors below the surface, and had given some idea of the density of the settlement and its limits, covering an area of at least 200 m by 200 m.

The results of the trial trenches suggested that we were dealing with a large village or small town, which we dated provisionally to around the Fifth to Eighth Century AD on the basis of the pottery recovered. In the light of those results, efforts on Sir Bani Yas during the 1994 spring season were concentrated on Site 9.1, in order to clarify the nature of the buildings, to retrieve dating material, and establish the plan of the settlement.

In addition, it was also decided to open two further sites, described as 2.1 and 2.2 during the 1992 survey, on a plateau to the west of the main site, to identify their purpose, ground-plans, dating and their relationship, if any, to Sites 3.1 (the courtyard house excavated in 1993) and 9.1.

Site 9.1

The structures excavated at site 9.1 proved to be very well preserved, with the architectural remains exposed providing a coherent and clear plan of a total of fifteen rooms and two courtyards, all generally in an excellent state of preservation. A number of doorways were identified, and we noted the same fine plaster finish for walls and floors to which we had become accustomed in

كشفت الحفريات التي قام بها مشروع البحث عن الآثار في جزر أبوظبي في ربيع ١٩٩٤م عن وجود مستوطن في صير بني ياس يرجع تاريخه للفترة قبل الإسلام. وتشير القطع المكسوة بالملصقات التي وجدت في هذا المكان، إلى أن سكانها مسيحيون، وتعتبر هذه هي المرة الأولى لاكتشاف دليل وجود المسيحية قبل الإسلام في دولة الإمارات العربية المتحدة.

1993 during the excavation of the courtyard house at Site 3.1.

Rooms built along the east and north side of the larger courtyard were cleared down to their fine plaster floors, but sand covering the south side of the courtyard will not be removed until the forthcoming 1995 season. Our plan then is to excavate along the south and west side of the courtyard, to determine whether there are other rooms belonging to the same complex.

A smaller secondary courtyard was found on the north side of the excavated rooms. This secondary courtyard seems to have been a functional area, with a trough for animals on its north side. The courtyard was littered with shells and fish-bones, which provided environmental samples providing information on diet. Close by was a small room identified by the presence of a 'tannur,' or bread oven, in a kitchen, which was still richer in bones, shells and other environmental material and dietary evidence.

Identification of the environmental material is being undertaken with the assistance of the University of London, UK, and of the National Avian Research Centre in Abu Dhabi, to provide a better understanding of the diet available to the people of the settlement.

Apart from the kitchen, other rooms excavated were consistently clean. This was also a sustained characteristic of the building excavated at Site 3.1 in 1993. Only a limited amount of pottery was found, but that which was discovered conformed to the same horizon, (ca. 5th - 8th Century AD), to which all other finds to date have belonged. (2). A single glazed vessel and an unglazed vessel was also commonly found in association with each room. Further study of the ceramics still has to be undertaken.

Re-occupation

Two periods of occupation were identified in the secondary, northern courtyard, the first associated with the initial foundation of the structure, the second associated with a re-occupation when the structure had suffered damage and people squatted in the ruins. Preliminary investigation suggests that the re-occupation, probably of relatively short duration, occurred not long after the original structures were abandoned or destroyed.

Decorative Plaster

Among rubble on the east side of the large courtyard, a fine moulded plaster Nestorian Christian cross in raised relief was excavated. A second fragment of decorative plaster was found nearby, with smaller crosses on a geometric background, accompanied by foliage volutes. A third plaster fragment had blind merlons in relief. The second of these plaster fragments is very similar to a fine decorative vine scroll found during the survey at

Site 9.1 in 1992, (published in *Tribulus* Vol 2.2. P. 27).

These finds also relate to a grape cluster in relief in plaster excavated from one of the trial trenches at Site 9.1 in 1993.

Provisionally, all these decorative motifs in plaster may be associated with doorways, and we suggest that they may have been attached to doorframes and lintels.

The structure to which this plaster belongs has not yet been excavated, and will be addressed in 1995. The plaster was found amongst rubble which appeared to have fallen from a wall in the unexcavated structure. Until further excavation is carried out, it is not possible to assess accurately the role of the decorative plaster and the courtyard building excavated during the 1994 season.

The discovery of Christian crosses, however, obviously has a major impact on our understanding of the building or buildings to which they relate. It seems extremely unlikely that they belonged to an ordinary domestic structure. Rather, the presence of crosses suggests the presence of a Christian chapel, church or possibly a more extensive monastic structure at Site 9.1 in the 5th-8th Century period. These points remain to be considered in forthcoming seasons of excavation.

At present, it suffices to comment that the 5th-8th Century AD date of the ceramics found on the site fits well with the suggestion of a Christian presence in the area.

There is textual and archaeological evidence of the presence of the Nestorian Christian Church in the Northern Arabian peninsula, Mesopotamia and Iran during this period. The islands of the Western Region of Abu Dhabi, like Sir Bani Yas, lay within or close to both

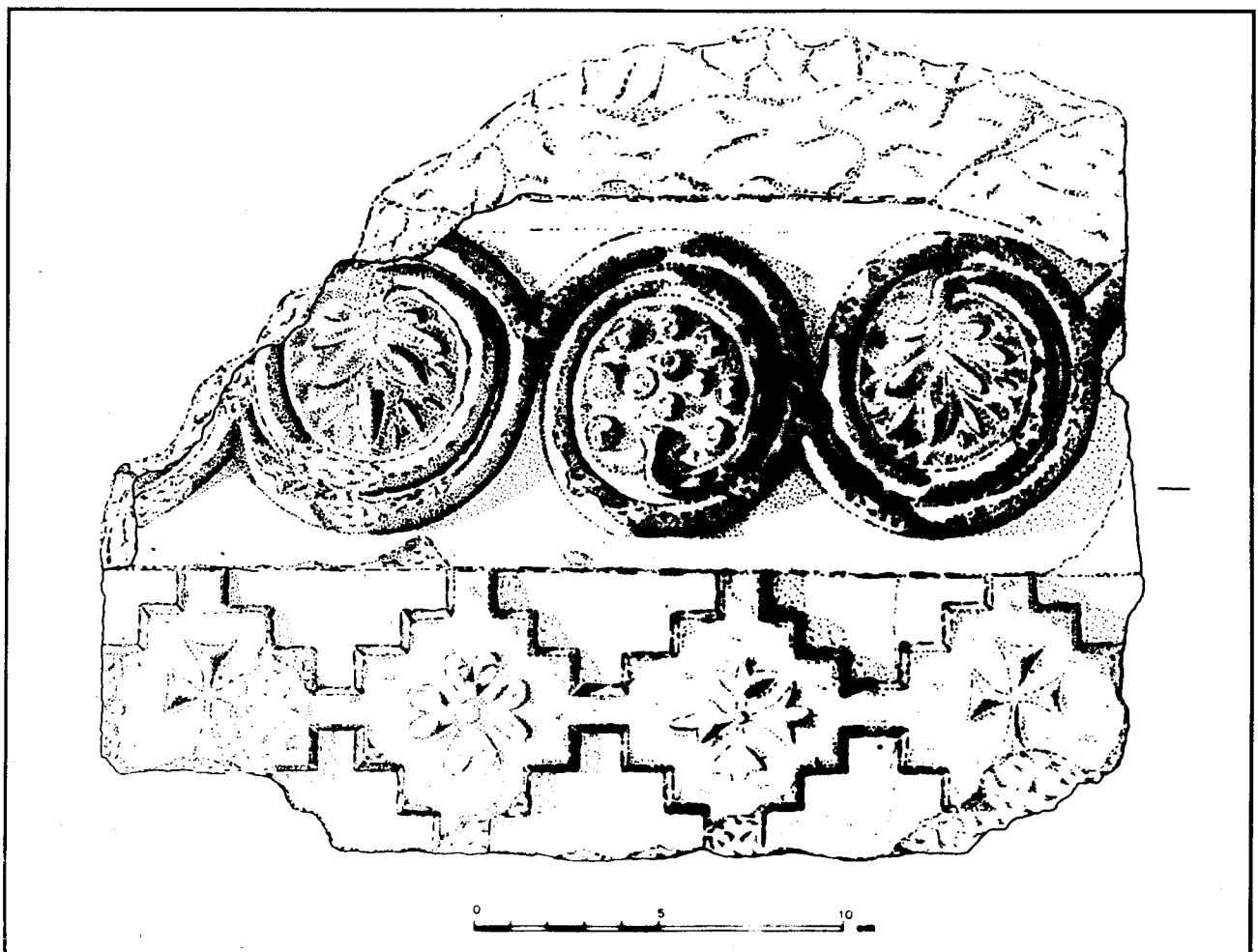
the Nestorian dioceses of Beit Qatraye covering North Eastern and Eastern Arabia, including Qatar, and Beit Mazunaye, (covering Oman and much of the Emirates). The Sir Bani Yas discovery can also be related to the discovery of a church with a fine cross at Failaka, in Kuwait, in 1990 by Vincent Bernard and J.F. Salles. Their stucco crosses are dated to the Fifth-Sixth Centuries AD. The discovery of two churches and crosses at Al Jubail and Thaj in eastern Saudi Arabia has also recently been announced (3), which are also related to the same Nestorian tradition.

The presence of Nestorian bishoprics has also long been known at Samahij (Masmahig) on Bahrain, and at Darin, on Tarut, eastern Saudi Arabia.

Although other Christian churches are known to have established a presence in Arabia in the early centuries of the Christian era, (4), from the design of the decorated plaster, including the crosses, the Christian community responsible for them was probably of the Nestorian Church, which was effectively the native church of the Arabs of Iraq and eastern and central Arabia before the coming of Islam. The most famous adherents of the Nestorian Church in the area were the Bani Lakhmid Arab Kings of Al Hirah, predecessors of the Al Kinda.

The purpose of the structures on the site has yet to be properly understood, and must await further excavation, while the relationship between the courtyard house excavated in 1993, Site 3.1, and similar structures nearby, to the main settlement equally has yet to be determined. Also unclear is the relationship, if any, with the structure excavated at Site 2.1 during the 1994 season.

At Site 2.1, the principal discovery was a *falaj* running



A drawing of one of the Nestorian plaster fragments found on Sir Bani Yas

for a distance of over 12 metres, and consisting of a rectangular stone channel faced with white plaster. It was fed from a rectangular tank, or possibly a well, on higher ground at the head of the *falaj*. The sand below the surface was still damp, which may indicate the presence of a well or tank. The point must be investigated by further excavation.

If it proves to be a well, as we currently suspect, it would be the first ancient water source that we have so far identified on Sir Bani Yas. The apparent lack of a natural water source on the island has thus far been one of the most mystifying problems encountered regarding the Sir Bani Yas sites.

A few metres to the north west of Site 2.1, a second site, 2.2, was also cleared during the 1994 season. It proved to be a large rectangular structure, with floors and walls faced with the same plaster as buildings at Sites 9.1 and 3.1, with a large doorway. The building, apparently partly robbed in antiquity, appears to be larger than the small rooms adjoining the courtyard complex at Site 9.1, and it may have had a communal or ceremonial function of some kind. Nearby scatters of potsherds can be dated to the same Fifth-Eighth Century AD period as other sites in the area, suggesting that the building is of contemporary with Sites 3.1 and 9.1, although this point requires further elucidation.

There are extant textual references to the presence of Christians in Oman, and possibly at Dibba, in the northern Emirates, in the pre-Islamic period, and through until the Seventh Century AD. There is also an uncorroborated tradition among a section of the Manasir tribe, of Western Abu Dhabi, that some of the tribe, at least, were Christians prior to the coming of Islam (5). The Sir Bani Yas discovery, however, represents the first archaeological evidence of the presence of Christians in the Emirates during the period preceding the coming of Islam.

The Abu Dhabi Islands Archaeological Survey Project is sponsored by a number of major local companies, sev-

eral of whom are also Corporate members of the Emirates Natural History Group, including the Abu Dhabi National Oil Company, ADNOC, Emirates Airlines, the Abu Dhabi Company for Onshore Oil Operations, ADCO, British Petroleum, the Abu Dhabi Petroleum Ports Operating Company, ADPPOC, ADDCAP, computer firm ICL, Union National Bank, Emirates Insurance Company, Dhabi Contracting, New Medical Centre, Jashanmalls and Emirates PhotoMarketing, (Kodak). The spring 1994 season was organised with the support and encouragement of Mohammed Al Bowardi, the Manager of the Office of Lieutenant General Sheikh Mohammed bin Zayed. To all of them, we are most grateful.

References:

1. Czastka, J., and Hellyer, P., "An archaeological survey of the Mantakha As'sirra in Abu Dhabi's Western Region," in *Tribulus*, Vol. 4.1. P. 9-12.
2. Tonghini, C., in "The Abu Dhabi Islands Archaeological Survey 1993 (ADIAS) Report on the Field Survey and Excavations." Unpublished report, P. 14-21
3. Langfeldt, J.A., "Recently discovered early Christian monuments in Northeastern Arabia," in *Arabian Archaeology and Epigraphy*, Vol. 5.1, P. 32-60.
4. Potts, D.T., "The Arabian Gulf in Antiquity," Vol. 2. P. 32-61
5. Hellyer, P., *An Introduction to the History of Abu Dhabi*, in prep.

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Results of the 1994 archaeological season in Mileiha

by Dr. Michel Mouton

During March and April of 1994, the French Archaeological mission in Sharjah continued its work in the Mileiha area. The mission's research programme is under the provision of the French Minister of Foreign Affairs, affiliated with the U.R.A. 913 of the CNRS, and is undertaken in collaboration with the University of Lyon 2, and the Department of Antiquities and Heritage of Sharjah. The team consisted of researchers from the CNRS, the Maison de l'Orient in Lyon, the Laboratory of Geochemistry and Petrography in Nancy, the Antiquities Service of Poland, as well as graduate students from various countries (France, Canada, the U.K., and Spain). Accommodation in Sharjah was provided by the Department of Antiquities and Heritage. The team also received sponsorship from the companies TOTAL and SUBTEC.

The objectives of the 1994 season were to continue the excavation of the Mileiha fort, dating to the first centuries of the Christian era, to study an area inhabited in the latest period of occupation, and to excavate and

في أوائل عام ١٩٩٤ استكملت بعثة الآثار الفرنسية عملها في إمارة الشارقة للكشف عن حصون قديمة عمرها حوالي ٢٠٠٠ سنة في منطقة مليحة بالقرب من الزيد والتي تشير إلى دلائل وجود قوة سياسية عظيمة في المنطقة من الـ ٣٠٠ سنة الأولى من الحقبة الأولى للمسيحية.

study several metallurgical workshops. A sounding was also carried out on a building previously excavated by the Iraqi expedition in 1973 to verify the date and function of the structure. A specialist in Antique Arabian coinage (Olivier Callot, CNRS Lyon) studied the Sharjah Museum coin collection, and coins found in the Mileiha excavations. A zoologist (Marjan Mashkour-Pelle; Museum of Natural History, Paris) sampled the microfauna, and studied the camel burials excavated in Mileiha by Dr Sabah Jassem, archaeologist for the Department of Antiquities and Heritage of Sharjah.

The fort

Built of mudbrick, the Mileiha fort is a large structure (55 metres long), that has been worked on since 1992. It is bisected by the Dhaid-Al Madam road, and until last year only the western half of the building had been excavated. This year, the eastern half of the fort was

opened, and the earliest levels of the structure were dug. The central part of the fort remains buried under the road, and cannot be excavated until the road is moved, hopefully in the next couple of years. The fort is more or less square in shape, and is flanked by eight towers, four abutting its corners, and one in the middle of each wall. The exterior wall and those of the towers are two metres thick, which attests to the defensive nature of the building, and would allow a high elevation. The central tower in the eastern wall is much larger than the others, and forms the main entrance of the fort. The entrance is a double one, with the tower acting as a guard room, bordered by benches, which contained fragments of marble and limestone masonry, finely shaped and sometimes decorated, which probably ornamented the doorway.

The interior of the fort consists of a central courtyard, fringed by a range of rooms built against the main defensive wall. The walls of these rooms are thick enough to have supported a second storey. The excavation of each of these rooms revealed the diverse nature of activities going on in the fort, showing that it was not only a refuge in times of danger, but was also a habitation. Certain rooms were used for storage, and contained a number of large storage jars measuring 1-2 metres in diameter, which were found shattered *in situ*. Amphoras from the Eastern Mediterranean, one of which bears a Latin *graffito*, as well as grinding stones which would have been used to process large quantities of grain, were also found in the storerooms. Other rooms contained small pots, jars, and animal bones, and seem to be related to domestic activities (butchery, cooking etc.). One of the rooms was covered in small fireplaces. Numerous bronze slags and iron hammerscales were found in relation to fireplaces in several rooms. The bronze metallurgy must be related to the minting activity that we know was going on in the fort because of the discovery of fragments of three coin moulds. The hammerscales indicate that the iron would probably have been used in the manufacture of armaments. The finest pottery and richest finds occurred in the rooms closest to and partially covered by the road. It is likely that the living areas are the rooms presently hidden by the road.

Construction of the fort occurred sometime in the First Century A.D., but it was used during three phases of occupation. The study of the pottery and other material is not advanced enough to provide an exact chronology for these occupations, but an early look at the pottery shows that the fort was occupied quite late, possibly until the 3rd C. A.D. or later. Evidence for this tentative dating is provided by the presence of fine orange painted ware, originating in Iran, which has never been found on sites dating to earlier than the 3rd C. A.D., and some coarse vessels whose forms resemble those found in pre-Islamic levels at Sohar in Oman, a site probably only occupied from the 3rd C. A.D. onward. The Mileiha fort was used as a residence, unlike the later fort at Ad Door, which seems to have been only a refuge in case of attack. Its construction attests to a strong political presence in the area in the first centuries of the Christian era, and was a symbol of the power held by the ruler of Mileiha. The economic and political importance of Mileiha are confirmed by the presence of a mint in the building.

The Occupation Area

Work was undertaken in an occupation area near the fort to better understand the latest phase of occupation of the site. The only area where this phase is preserved is situated to the north-east of the fort, as anything that may have previously existed closer to the fort has been disrupted or destroyed by cultivation, and construction of the main road. An area of 1300 sq. m. was excavated, revealing four houses dating to the most recent period of the site. Although the houses themselves are very badly deteriorated, they yielded an abundance of material. Only one of the houses was fully excavated. It consisted of four main rooms, built in 2 ranges side by side, bordered to the east and to the south by enclosed courtyards. The larger of these outside courtyards contains two small rooms, built against the courtyard wall. This large house is thus formed by eight different areas. A small alleyway separates it from a second house to the east, constructed of the same manner of adjoining rooms. The eastern part of this building has been entirely destroyed by erosion. The living rooms of this house have well-made plaster floors, while the exterior spaces have a level of sand upon which mudbrick fireplaces were built. To the south, a few rooms of a two more houses were excavated. However it was impossible to continue as the rest of these houses lie under an Islamic graveyard.

A great quantity of pottery was found, broken but generally complete, in the occupation layers of the houses, similar to the material found at the fort: large black storage jars, glazed vessels imported from Mesopotamia, and straight-necked jars with red painted decoration.

In earlier periods, dwellings were spaced quite far apart. These houses, however, are constructed very close to each other, showing an interesting change in the settlement pattern. It would seem that in the first centuries AD there existed a real urban settlement radiating from the fort, not extending very far, but with quite a dense concentration of houses.

Other houses are visible in the vicinity of the excavated houses, and we hope to be able to study more of the habitations in this area.

Other work carried out.

Soundings were undertaken on the site of a house partially excavated by the Iraqi Archaeological Expedition in 1973. The original results of their dig were destroyed when cultivation of the area began, just before the advent of the Department of Antiquities and Heritage of Sharjah. The soundings were carried out to discover whether or not the building was fortified, and to date the structure now that we have a more precise chronology for the Recent Pre-Islamic Period in the Emirates, established on the basis of the excavations of Mileiha. The soundings showed that the house did not have towers protruding at its corners. The material found is contemporary with that of the fort and the houses excavated this year, that is to say dating to the most recent period of the site. As we were able to see this year, the cultivation did not completely destroy the remains of this structure; the walls are still preserved to 70-80 cm high. Also, since the building appears to have burned, it is likely that it would yield many interesting finds, such as the 106 burnt beads found in one of the

rooms. It might be interesting to fully excavate the site, and to preserve what is left of the structure.

In the cemetery excavated by Dr. Sabah Jassem from the Department of Antiquities and Heritage of Sharjah, several camel burials related to monumental tombs were brought to light. Because of the great interest of these zoological remains, we decided to undertake their study. The already excavated skeletons were drawn, described, and samples were sent to the Museum d'Histoire Naturelle de Paris for further examination.

Previously, camel burials had been discovered at Ad Door, associated with tombs from the first centuries A.D. The camels were buried as part of the funerary rites, and thus accompanied their masters in death. This practice first appears in the 1st century A.D., and

continues until the 3rd century A.D. Other examples of camel burials in Arabia occur in Qatar, associated with a glass vase dating to the 3rd century A.D. in Oman, at Bat in a tomb from the first centuries of the Christian era, and at Samad, possibly associated with a Bronze Age tomb. It is in southern Arabia that the most numerous camel burials have been found, possibly dating to the 2nd/1st century B.C.

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Early metallurgical activities in Mileiha

Preliminary observations

by Dr. Alain Ploquin

In Europe, ancient siderurgy used the "direct" process of iron-making, and not the "indirect" one now in use. The changeover from one method to another took place from the end of the 13th century until the 15th century, and even later in some areas. In Africa, only the "direct" process was ever used in traditional iron making. China, however, used the "indirect" process quite early. Near Zhengzhou, blast furnaces have been excavated and dated from the 2nd century B.C.

The general chemical principle is the same in both methods. Reduction of iron oxides by CO and carbon at high temperatures (1150-1600°C). The CO and carbon are produced by burning charcoal. Ore and charcoal react in a furnace under a high flux of air (provided by tuyeres), which may be natural or forced.

The "direct" process, or bloomery, produces low carbon iron, commonly known as wrought iron, but not cast iron (except by mishap). In the shaft furnace, the wrought iron appears as "sponge" (puzzled iron and slag), and/or as "bloom." No pouring or tapping of the iron occurs. Each run produces hectograms or kilograms of iron. The slags are heavy and iron rich, tapped or not. Firing temperatures reach 1150-1350°C.

With the "indirect" process, the change in scale is significant. The furnaces used, blast furnaces, are much larger, more than 5-7 metres high, allowing charges and iron production to be heavier (several hundred weight or tons per run). Temperatures are also higher, attaining more than 1500°C, so more energy is necessary. The iron flows as cast iron (high in carbon), which can be moulded but cannot be forged without decarbonisation. Slags have low iron content.

During the next stage of iron working, the sponge and/or bloom produced by the direct method must be rid of slags by chafing and hammering, a process known as iron sintering. In this way, different qualities of wrought iron or steel may be obtained. By the indirect method, however, wrought iron and steel are obtained

دلت ورشة بلاك سميث التي وجدت في الحصن القديم في مليحة
على أن سكانها الأصليين كانوا يقومون بصهر الحديد الذي تم
اكتشافه بالقرب من جبل فياح.

by reworking cast iron. The carbon which is included (graphite) or alloyed (cementite) must be oxidised. This oxidation, "finery," occurs during remelting in an open furnace, or, during the 19th century, in a reflector kiln or "pudding." Wrought iron and steel are then used in blacksmiths' workshops for creating tools etc.

During archaeological excavations, furnaces and workshops are rarely found, but some metallurgical waste is often present. For a long time slags etc. were more or less ignored. However, more recently the study of these slags and associated products has been taken more seriously, and we are generally able to interpret them as indications of siderurgical activities.

The Oman Peninsula has a long metallurgical tradition. In the third millennium BC the copper of the Omani Mountains was heavily exploited, and the black boats of Magan transported it from the coasts of Abu Dhabi and Oman to the ports of Mesopotamia. This copper remained the only metal used in the manufacture of utilitarian objects in the region until the 3rd century BC., when iron metallurgy first appeared on the Mileiha site. It was of great archaeological and metallurgical interest to study the emergence and early stages of iron working on this site. During the survey of the area, certain sites were found containing a large quantity of iron or copper slags. In March 1994, some were studied in greater depth by two metallurgists, yielding interesting results.

Two blacksmiths' workshops were found: one which seemed to be associated with an area where iron was being produced as well as worked. No houses were found in close proximity to this site. The second was found inside the Mileiha fort, which dates to the 1st-2nd

centuries AD. Evidence of both bronze and copper working were found in the same workshop, probably related to the minting activities we know were going on there.

In another area which had much iron slag on the surface, bulldozing for cultivation has destroyed the remains of the iron making site that may have once existed there. However, on a lower level deep enough not to have been perturbed, evidence of copper working was found.

The use of copper, alone or in alloys such as bronze, is an older tradition, but one that is more difficult to study and understand through the waste products of metallurgy. Copper and bronze may be remelted as often as necessary, leaving little or no trace as a result of this activity.

During archaeological investigations, samples were taken for closer examination in a laboratory, which should permit us to answer with more certainty the questions that we have.

The closest match for the iron mineral used was found on the slopes of Jebel Faiyah, a mountain in the Mileiha region. Its particular chemical characteristics, a richness of chrome and nickel resulting from the pedological alteration of the ophiolites of the Sumail series of rocks beginning in the tertiary period, should "mark" the slags and hammer scales found. Analyses will tell us whether this was the iron used by the blacksmiths of Mileiha.

The forges used in Mileiha have been well studied, thanks to fragments found in the area. However the slags found are more ambiguous. They could be the remains of smelting of the iron mineral, or of the refining of the "sponge" and "bloom" into iron ingots. The chemical composition of the slags in relation to that of the potential mineral will be the main area of research, defining the various stages of iron working at Mileiha.

Numerous iron objects have been found at Mileiha, though some of them seemed rather large in comparison to the size of slag found in the forges. It is only through chemical analyses of the materials used in the objects that we will be able to ascertain the relation between the produce of the local iron industry, and the objects found.

The discovery of copper metallurgy in the settlement prompted us to study this industry as well. For a more complete picture, not only the Mileiha period (3rd C.

B.C.-2nd C. A.D.) copper working areas were studied, but samples were also taken from Iron Age sites (1200-300 BC). We have yet to interpret the findings where bronze and copper are concerned, as we do not yet have a reference model to go by. While we know that the Omani mountains are potentially rich in copper mineral, the lead and tin needed to make the bronze would have to be imported.

The morphology of the copper slags found at Mileiha and at Al Madam indicate that they were made in a crucible; are they the result of work on small quantities of mineral extracted locally, or simply of work on a semi-finished imported product?

If we are dealing with the reduction of small quantities of minerals, can we make the assumption that they are related to the numerous small cavities which are found in the ophiolitic mountains? This hypothesis of ancient mineral "scratching" should be examined. That, however would constitute a long and in-depth study, especially because many of these cavities have been re-used as shelters, or underground niches.

If it is a matter of secondary working, what is the imported product, and where does it come from? In the Emirates, we know of important ancient reduction sites located on the Eastern slopes of the Hajar mountains. Their exact dating is still uncertain. From the samples and analyses, tentative comparisons should be made with our Swiss and German colleagues who are working on the same problem.

An anecdote illustrates the interest and possibilities of ethno-archaeology: during the study of pottery found during the excavations at Mileiha, a large, spouted basin attracted the attention of the metallurgists on the team, because of its possible relation to metal working. It was one of the Pakistani workmen who, pointing to the basin, began to mime the gestures of a man working at a forge; he came from a family of metal workers, and was familiar with this type of object, still in use in the North of Pakistan. On the Mileiha site, several fragments of this type of vessel were found, in different areas and levels belonging to all phases of occupation.

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The Sabkhat Matti - a Forgotten Wadi System ?

by Tim Goodall

Introduction

The geomorphology (description and interpretation of landforms) of the desert of the United Arab Emirates has received little attention apart from the pioneering work of Dr. K.W. Glennie, (see *Tribulus* Vol 1.1, April 1991 for summary) and, more recently, the *National Atlas of the UAE*, produced by the Emirates University (1993).

Apart from the great sand dunes, one of the more common and striking geomorphological features of the deserts of the Emirates is the treacherous salt-flats,

أشارت الدراسات الجيولوجية إلى أن منطقة السبخات الموجودة في غرب أبوظبي والتي تعد من الأراضي الملحية الكبيرة التي كانت مصب النهر الذي غطى مساحة كبيرة من جنوب الجزيرة العربية.

known locally by the Arabic term *sabkhas*, and the most dramatic of these sabkhas in Arabia is the Sabkhat Matti, whose northern portion lies within the western part of the Emirate of Abu Dhabi. I have been studying the Sabkhat Matti region since October 1990, and during the subsequent period have spent a total of eight and a half months in the field examining the desert features of the area, (including the Baynunah region of western Abu

Dhabi).

One of the most important things I have learned from this study is that in order to understand the desert features seen in the Emirates today, it is necessary to understand and appreciate the effect that past climates had on shaping this desert landscape.

The scientific community currently believes that over long periods in the past, the world's climate was subject to dramatic changes. This has been especially prevalent during the last two million years, when the Earth has experienced a number of cold, glacial periods, alternating with milder interglacial or pluvial events.

The effect of a persistent glacial period is unexpected in desert areas. Although temperatures have been cooler, the global thermal gradients are steepened, causing the wind speeds to increase dramatically.

Because the swollen polar ice caps locked up large amounts of the world's oceanic water, there was a reduction in global evaporation, causing desert areas to receive less rain, and this resulted in them being much drier than they are at present.

On the other hand, during the interglacials, the climate would have been much more pleasant, with warmer temperatures, and, more importantly, the desert areas would have experienced regular seasonal (monsoonal) rainfall.

We are currently experiencing a mild interglacial period, but the present climate in Arabia is not as wet as it has been in the past because the current interglacial period reached its peak 6,000 years ago, and the climate has been getting progressively drier ever since.

The effect of a changing climate would not only have influenced the development of the desert landforms, but also the plants and wildlife, (including early man in Arabia), would either have had to adapt or migrate in order to survive the changes in their environment. Archaeologists

believe that early man has inhabited the Arabian Peninsula since Lower Palaeolithic times (McClure, 1971) and recently Sally McBrearty (1993) has discovered prehistoric stone artefacts in Abu Dhabi to which she ascribes a date that may possibly be as much as 200,000 years old. Since this time, there have been a number of significant climatic changes from very wet to very dry which would have been a major factor in influencing prehistoric man's habitat and, therefore, way of life.

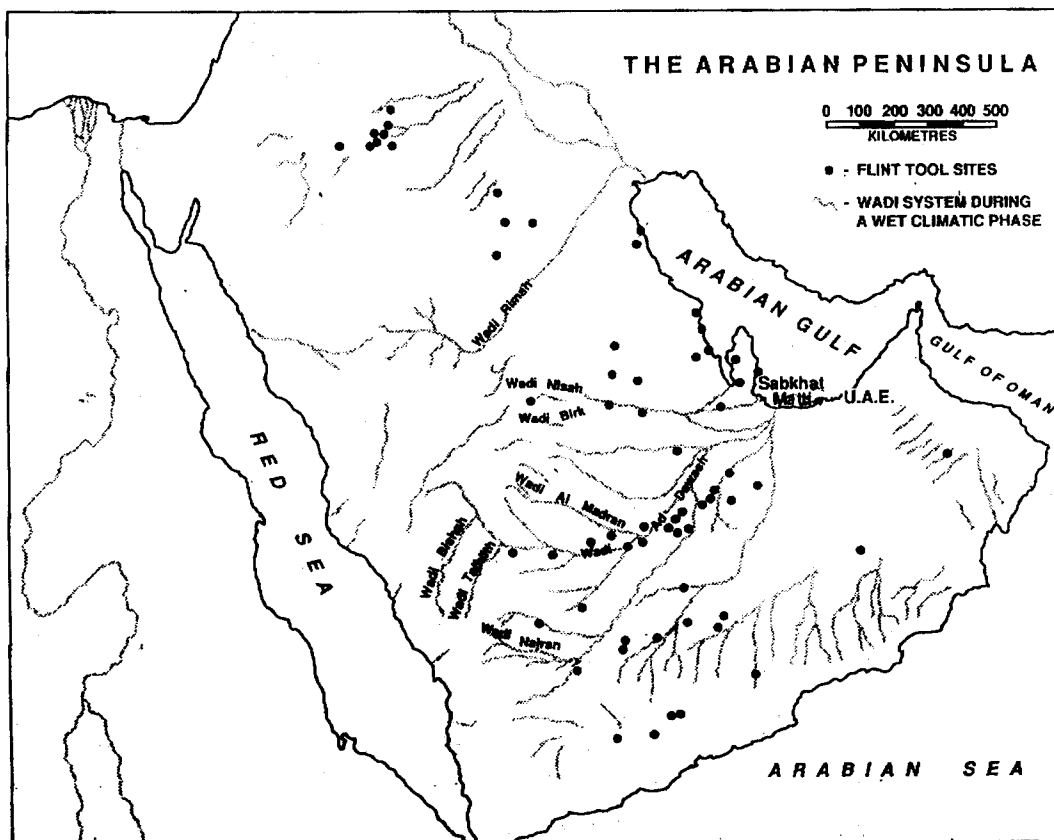
By dating the desert landforms of Abu Dhabi, valuable information on the timing of these changes has been obtained, and these dates can then be compared with existing work on climatic changes in the Arabian deserts, (McClure, 1976, Anton, 1990 & Sanlaville, 1992).

Dating of Desert Landforms

Prior to the mid 1970's, the only technique available to date desert landforms was the carbon 14 isotope method, but it can be unreliable, and can only date sediments that are younger than 50,000 years old. To obtain a date, this method requires a sample of carbon, and in modern deserts, carbon is most commonly present in the form of calcium carbonate.

Calcium carbonate is usually only found in desert landforms that are indicative of 'wet' interglacial events, which makes it difficult to constrain the dry, glacial events. Examples of the types of features that have been dated by C^{14} include: lake deposits, fossilised lake fauna (freshwater snails, clams, etc.) and soil horizons (pedogenic calcretes).

Recently, a new method known as luminescence dating (see Wintle, 1993 for principles), has been used to date the time of the burial of sand, deposited either by the wind (dunes) or by flowing water (wadis). Martin Aitken pioneered the luminescence dating method in the



Stone Age sites and water courses in Southern and Eastern Arabia

1960's (Aitken *et al.* 1964), when he managed to date heated archaeological artefacts such as pottery or burnt flint. Later research into luminescence dating resulted in no improvements upon the original method until 1985, when a new method called optical dating (Huntley *et al.* 1985) was discovered which reduced the luminescence method's scientific error and, more significantly, its dating range was increased to cover sediments up to 700,000 years old. Subsequently scientists have successfully used optical dating to obtain dates for desert landforms.

Last year, 56 samples of sediments from the Abu Dhabi desert were dated using a combination of C^{14} and optical luminescence (or optically stimulated luminescence - OSL) dating methods. Along with my colleague at Aberdeen University, Jonathan Pugh, we collected thirteen of the samples, which were dated by OSL, and 43 samples were collected by the United States Geological Survey, USGS, in Al Ain, which were dated by C^{14} .

Desert Geomorphology in the Sabkhat Matti region

The Sabkhat Matti occupies a wide north-south trending depression to the West of Jebel Dhanna, and consists of a string of sabkhas, (hence the name 'Sabkhat,' the plural of sabkha), interrupted by gravel plains and flat sandy areas. This sabkha complex is vast, and is thought to be the largest in the world, covering an area of roughly 7,500 square kilometres. Its location appears to be controlled by the presence of north-south trending fractures in the underlying rocks, which have resulted in local subsidence of the area to form a depression that extends from near Jebel Dhanna to Sila'a.

There are two types of sabkha in the area: a coastal sabkha, which forms a narrow strip parallel to the coast, commonly covered with a thick white/grey salt crust and is prone to seasonal flooding; and inland sabkhas, which, in contrast, usually have a thin salt crust with a high proportion of clay, silt of sand, giving their surfaces a red/brown appearance. These may extend dozens of kilometres inland.

A large gravel plain flanks the Western margin of Sabkhat Matti, and is the remains of an ancient desert river or wadi which once flowed from the desert of the Rub al Khali in Saudi Arabia into the Arabian Gulf. This wadi is probably the source of a Bedouin tribal legend recounted by UAE President Sheikh Zayed bin Sultan al Nahyan that a great river once flowed through the Western Region of Abu Dhabi.

It appears that during wetter interglacial periods, huge wadis were active, probably for a few thousand years at a time, and brought large volumes of sand and gravel all the way from the Tuwaiq escarpment, over 900 kms. away, across the Saudi desert and into Abu Dhabi through the Sabkhat Matti depression (figure 1). During my research, I found good evidence that this was not a one-off occurrence, but that great wadis had flowed through the Sabkhat Matti a number of times over the course of the last 200,000 years.

Another interesting piece of evidence to support this hypothesis is the discovery of part of the jaw of a crocodile, probably a species closely related to the Nile Crocodile. Due to the present dry climate and the lack of permanent rivers, crocodiles no longer exist anywhere in the Arabian Peninsula.

Interestingly, the remains of other animals that would not have been able to survive under present climatic conditions have also been found in Saudi Arabia, such as Hippopotamus and Water Buffalo. Another piece of evidence is the good correlation between palaeolithic flint-tool sites in Saudi Arabia and the now abandoned

water courses of the Wadi Dawasir across what is at present the Rub al Khali and the Al Jafurah sandy deserts, (figure 1). It seems probable that at various times in the last 200,000 years, this wadi valley has been wet and fertile enough to support a wide range of 'savannah-type' species, as well as prehistoric human populations.

The Eastern flank of the Sabkhat Matti is topographically higher than the main body of the sabkha, and for this reason is relatively dry. The area, including the Baynunah region, is characterised by a transition from gravel plains, (with the occasional patch of sabkha), and jebels to progressively more sandy plains, ending in low dunes which extend dozens of kilometres South and merge into the Rub al Khali sandy desert. Between 15,000 and 25,000 years ago, (the glacial maximum), when the Arabian Gulf was dry, sand was transported from North-West Arabia by the Shamal wind and blown across the Qatar peninsula and into Abu Dhabi. Subsequent flooding of the Gulf of Salwa, North-East of Qatar, 15,000 to 5,000 years ago, cut off the passage of new sand to the area. Since then, the wind has been removing the pre-existing dune sands down to the level of the water table, and has blown them southwards, leaving behind a flat plain of gravel of sand known as a 'lag' deposit.

At present, there is a small input of carbonate sand (including shell fragments and ooids) from the beaches along the Abu Dhabi Coast, but this supply is insignificant compared to the volumes of sand that once travelled down the Gulf. This small volume of coastal sand is merely being incorporated into the present-day dunes.

Summary of the Role of Climate Changes in Abu Dhabi

The effect that climatic changes have had on the various desert landforms of the United Arab Emirates over the past 80,000 years is shown in figure 2. This table has been constructed using dates obtained from Emirates' desert sediments over the last eighteen months. The main wet and dry events record long-term climatic change, probably as a result of glaciations. It has recently come to light, however, that there were also shorter, more subtle climatic changes that were superimposed upon the broader, glacially induced events, which, surprisingly, have been recorded by the desert sands of Abu Dhabi. This is very unexpected, and shows how sensitive the desert environment is to climate change.

Hopefully, it will be appreciated how important is the accurate dating of desert sands and rocks of the Emirates on the recording of the timing of past climatic change. These changes between wet and dry conditions would have had far reaching implications not only for the development of the desert geomorphology of the Emirates, but also on the adaptation or extinction of the plants and wildlife that once lived (or still live) in Arabia, including the activities of early man.

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I am also grateful to the Chairman of the Abu Dhabi Department of Civil Aviation, Sheikh Hamdan bin Mubarak

AGE years	PALAEOCLIMATE	PALAEOCLIMATIC INDICATORS/GEOMORPHOLOGICAL FEATURES
0 —	ARID	Present day dune pattern, modification of giant Liwa dunes. Flooding of the Arabian Gulf was complete by about 6000 years ago.
6 000	WET	Calicic soils were formed, limited wadi activity (mainly erosive).
10 000 —	9 000	
20 000 —	HYPER - ARID	Increased dune activity resulted in the formation of the giant Liwa dunes. The Arabian Gulf was initially dry facilitating the movement of sand from Northern Arabia.
20 000 —	20 000	
30 000 —	VERY WET	Re-activation of a vast wadi system across eastern Arabia (Fig. 1). Lakes were present in the Rub al Khali (McClure, 1976); widespread formation of calicic soils (pedogenic calcretes in the U.A.E.
34 000		
40 000 —	ARID	Dune building event (Anton, 1990 & Sanlaville, 1992).
41 000	WET	Formation of pedogenic calcretes (calicic soils) in the U.A.E.
46 000		
50 000 —	HYPER-ARID	Increased aeolian activity resulted in the formation of the giant dunes of the Rub al Khali. The dunes formed at this time are comprised of sand that is now present as relics below the calicic soils (dated by OSL). Since global sea level fell at the onset of the glaciation (about 100 000 years ago) the Arabian Gulf would have been dry facilitating the movement of sand from Northern Arabia.
60 000 —		
70 000 —	70 000	
80 000 —	WET	Wadis were active, supplying a lot of the sediment that was subsequently reworked by later dune-building events.
	?	

al Nahyan, for arranging to make available to me the climatological data collected for Abu Dhabi International Airport over the course of the past few decades.

Bibliography:

- Aitken, M.J. *et al.* 1964. Thermoluminescence dating of ancient ceramics, *Nature*, **202**, 1032-1033.
- Anton, D. 1984. Aspects of geomorphological evolution; palaeosols and dunes in Saudi Arabia. In Jado, A.R. and Zottl, J.G. (eds) *Quaternary Period in Saudi Arabia*. Vol. 2, 275-296, Springer-Verlag.
- Anton, D. 1990. Environmental changes and aeolian dynamics during the Quaternary in the Arabian Peninsula. In El-Baz, F. *et al.* (eds.) *Sand transport and Desertification in Arid Lands*.
- Glennie, K.W. 1991. Sand Dunes in the Emirates. *Tribulus* **1.1**, 14-17.
- Huntley, D.J. *et al.* 1985. Optical dating of sediments. *Nature*, **313**, 105-107.
- McBrearty, S. 1993. Lithic artefacts from Abu Dhabi's Western Region. *Tribulus*, **3.1**, 13-14.
- McClure, H.A. 1971. The Arabian Peninsula and Prehis-

toric populations. Field Research Projects, Coconut Grove, Miami, Florida pp.92.

McClure, H.A. 1976. Radiocarbon dating of Late Quaternary lakes in the Arabian desert. *Nature*, **263**, 755-756.

Sanlaville, P. 1992. Palaeoenvironment in the Arabian Peninsula during the Upper Pleistocene and the Holocene. *Int. Symp. Evol. Deserts*, Ahmedabad, Feb 11-19, 1992.

United Arab Emirates University 1993. *The National Atlas of the United Arab Emirates*. Publ. UAE University in assoc. with GEOprojects UK Ltd. pp. 164.

Wintle, A.G. 1993. Luminescence dating of aeolian sands: an overview. In Pye, L. (ed.) *The Dynamics and Environmental Context of Aeolian Sedimentary Systems*. *Geol. Soc. Spec. Publ.* **72**, 49-58.

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Sooty Falcons in the United Arab Emirates

by Simon Aspinall

Introduction

There is relatively little known about the breeding distribution and number of **Sooty Falcons** (*Falco concolor*) in Arabia or indeed throughout most of its restricted world range. It is, however, regarded as regionally threatened throughout much of its range. The species is something of a Middle Eastern and eastern North African speciality although it is migratory, most spending the northern winter in Madagascar with a few also in southern Africa (mainly Mozambique). The world population is probably over 10,000 individuals (Cramp et al. 1980), this figure having been based on numbers in the winter quarters. Prior to recent surveys a breeding estimate would have yielded a much lower number, although 2000-3000 breeding pairs have recently been estimated (Gaucher pers. comm. 1994). Surveys have yet to be completed in much of its summer range. The breeding cycle is timed to coincide with returning autumn migrant passerines and near passerines, insufficient prey existing during the summer months to raise any young then. The Sooty Falcon is, in this respect, the counterpart of the better known **Eleonora's Falcon** (*Falco eleonora*) which breeds in similar circumstances in and around the Mediterranean Sea and also winters almost exclusively in Madagascar. Both species are also largely insectivorous on passage, in their winter quarters and in the pre-breeding season. The ecological similarity between the two species is remarkable although much still remains to be learnt about the former. The present account, by summarising findings to date from the UAE, is an attempt to redress the balance to some extent.

A comprehensive survey of Sooty Falcons has yet to be completed in the Arabian Gulf. Breeding is known from very few sites here e.g. Howar Islands off Bahrain and Musandam (Oman) and suspected, but not yet proven, elsewhere. On the north shore nesting is likely on the Mekran coast of Iran as it is certainly confirmed on that of Pakistan. In the UAE breeding is suspected only on certain islands off Abu Dhabi Emirate (Qarnein, Zirku, Arzanah, Sir Bani Yas and Dalma), although opportunities to visit these islands are generally few. Confirmation of breeding on the last two named sites was obtained in 1993; successful breeding or breeding attempts having been proven at both previously as well as on Zirku (in 1981 at least). None is thought to nest on mainland coastal sites or on inland jebels although the possibility still exists. In Israel, for example, desert jebels have recently been found often to hold breeding pairs and the population estimate for that country was revised upward once previously neglected areas were surveyed thoroughly (Frumkin, 1986). The breeding ecology of this species has also recently been studied on island off the Saudi Arabic Red Sea coast, namely the Farasan Islands and a group of islets north of Al Lith. On the latter it nests on the ground under mangrove trees and *Salicornia* bushes (Gaucher et al. 1994). The abundance of small migrant prey species on these islands is far higher than on the adjacent and barren mainland coast, probably due to a fatally attractive wood and scrub cover drawing down tired individuals. The proximity of the Asir mountains to the coast opposite these islands is thought to funnel the

يعتبر الصقر الأسخم من الطيور الفريسة النادرة والتي
ينحصر وجودها في الشرق الأوسط. وأظهرت الدراسات الحديثة
لشواطئ جزر أبوظبي أن دولة الإمارات هي المأوى لعدد قليل
ومهم من سكان هذا النوع المهدد من الصقور.

flow of migrants producing a ready availability of prey, whereas similar islands situated further south are unimportant for Sooty Falcons. This geographical configuration is probably all important. In the Arabian Gulf, coastal drifting of migrants is probably more of a determinant of Sooty Falcon breeding sites as a north-south crossing by passerines in autumn is unlikely to result in any particular bottle-necking.

United Arab Emirates

Sooty Falcons have been recorded previously on both Dalma, Sir Bani Yas, Zirku and Qarnein Islands. On Dalma, Adrian Chapman (JADC) and Dave Robinson saw six or seven individuals (but possibly as many as 10) on 19/20 October 1989 and suspected there to be a breeding population. Three were also seen here, again by JADC, between 30 April and 4 May 1990, which apart from being a relatively early arrival date further added to suspicions. On Sir Bani Yas two pairs were recorded in June 1968 and a 'colony' was reported here in October 1970. There are no further details accompanying these records nor any further documented sightings until 1991, when a single bird was recorded by Peter Hellyer on 9 May, with five, possibly prospecting, on 13 May (Emirates Natural History Group). Armed with this knowledge NARC made visits in September 1993 to both Dalma and Sir Bani Yas specifically to look for this species and to assess its conservation needs.

In 1994 a NARC survey of the western islands of Abu Dhabi visited nearly forty separate islands and found several additional pairs of breeding Sooty Falcon. The islands visited included Zirku and Qarnein, where birds had been recorded before but where their status was uncertain. The UAE Sooty Falcon population now stands at 14 or 15 pairs.

Dalma

A systematic search was made of almost the entire island between 8 and 11 September 1993. The island is about six km long and four km wide and is roughly circular apart from an entirely manmade 'leg' a few hundred metres wide which extends seaward for about 3 km from the southernmost tip. It lies 40 km north-west of Jebel Dhanna, the nearest landfall. Extensive earth-moving and dredging off the island's S.E. and N.W. coasts is presently under way to reclaim a large area of seabed off the east side. Inland the island presents a remarkable landscape of innumerable steep-sided mounds, hillocks and ridges with many small cliffs and water-worn channels. Vegetation of any

kind is sparse. In the inhabited southern part of the island are levelled cultivations and plantations and a harbour housing a large fishing fleet. The human population must number several thousand, mostly in the town, but temporary construction camps for workers are also now found sprawling along the eastern shore. Only from the mid-point of the western shore to the north-west tip of the island are there any cliffs although for most of their length these are now landward of the island's perimeter road and no longer reached by the sea.

A minimum of 11 (or 12) Sooty Falcons were seen and five nest-sites located. Three of these held young; one was inaccessible (nor could it be seen into) and the other had apparently failed. The oldest brood of (three) chicks was considered to be about three weeks off fledging i.e. end of September/early October. The incubation period is 27-29 days and fledging a further 35 days so the approximate start laying date on Dalma would be after the third week of July. [In Saudi Arabia egg-laying began after 10 July and fledging was between 19 September and 15 October (Gaucher *et al.* in press)]. Interestingly in this same brood one of the chicks was considerably smaller than the other two and may have hatched several days later than its fellow siblings rather than being a runt, since the feather development was also retarded. Adult females are about 10% larger than the males but this is perhaps unlikely to be obviously manifest in nestlings. The other two brood sizes were not recorded precisely but both certainly had two or more young.

Four of the five eyries located were along about 1.5 km of the west side cliffs. The mean distance between nests was thus 500m although since one of the end nests was 750m from the next the others were only 250m apart (both on average and in reality). The only other eyrie found was on an inland cliff 4m high, had apparently failed and was the most easily accessible of the nesting sites (a broken, perhaps predated, egg was found in the nest). Both Sooty and Eleonora's Falcons are colonial nesters, the latter species generally considered more closely colonial, i.e. tolerating closer nesting by neighbouring pairs, although in Saudi Arabia the mean nest spacing was 20.7 - 28.5 metres with minimum and maximum distances of 7 and 65m respectively (Gaucher *et al.* in press).

Prey remains were collected from the vicinity of three of the nests (two with young and the inland site) and the species involved identified. These were as follows: **White-cheeked Tern** (*Sterna repressa*) fledgling 3; **Hoopoe** (*Upupa epops*) 2; **Isabelline Wheatear** (*Oenanthe isabellina*) 2; **Pied Wheatear** (*O. pleschanka*) 1; **Isabelline Shrike** (*Lanius isabellinus*) 1; **Rufous Bushchat** (*Cercotrichas galactotes*) 1 and an unidentified passerine (? **Spotted Flycatcher** - *Muscicapa striata*) 1. With the exception of the terns which may have been locally bred, all the remainder are autumn migrant visitors to Dalma. More significant was the discovery of apparent prey caches, both of which held single freshly killed Isabelline Wheatears, each placed in a recess under an overhang (out of direct sunlight and safe from scavengers). This would be a sensible insurance policy if, for example, there were disruption to the otherwise normal daily arrival of migrants in autumn. A change in wind direction might easily result in periodic shortages (see Sir Bani Yas account) when ordinarily there is almost invariably a glut of prey on the Gulf islands. The only previous mention of prey caching for Sooty Falcon is from Oman (Walter

1979), although it is not to be entirely unexpected as Eleonora's Falcon is recorded depositing 'surplus' food in a 'larder' near to its nest-site (Cramp *et al.* 1980).

In the south of the island there is an abundance of such resident species as **White-cheeked Bulbuls** (*Pycnonotus leucogenys*), **House Sparrows** (*Passer domesticus*), **Indian Silverbills** (*Euodice malabarica*) and **Crested Larks** (*Galerida cristata*) none of which feature as prey, as well as **Bee-eaters** (*Merops apiaster* & *M. superciliosus*) **Golden Orioles** (*Oriolus oriolus*) **Hoopoes** (also occurring in the north), many migrant **warblers** (principally *Hippolais* & *Sylvia* spp.), **Yellow Wagtails** (*Motacilla flava*), **Short-toed Larks** (*Calandrella brachydactyla*) and **Tawny and Tree Pipits** (*Anthus campestris* & *A. trivialis*) among others. The composition of prey species found on Dalma suggests that most hunting takes place in the northern half of the island (despite the presence of two other favoured prey species in the south - see next para.) and where the barren terrain would facilitate successful pursuit. The west cliffs may provide not only the preferred aspect and a suitable lookout but by facing into the dominant wind direction would provide both uplift, thus saving the birds energy, and, more calculatingly, bring migrant prey drifting downwind direct to their impending fate. Without cliffs entirely encircling the island, however, it is hard to test this hypothesis. Nonetheless chase of migrant birds often begins over the sea on their approach to land and when they are at their most vulnerable, perhaps already tired and weakened and unable to take cover anyway. This hunting strategy is also used to good effect by coastal nesting **Peregrines** (*Falco peregrinus*) in southern England (in spring) and Eleonora's Falcon in the Mediterranean. Furthermore, to reach the safety of the south end of Dalma, migrants have to run a formidable gauntlet as two or more birds generally engage in what may be considered, alternatively, a co-operative or competitive hunting technique, several falcons pursuing just one individual bird, which must greatly reduce the chances of escape. Three or more birds were seen on several occasions circling together early in the morning and again in the late afternoon which is when most hunting is reported to take place.

Although the small sample of prey collected on Dalma prevents quantitative comparison with that from the Saudi Arabian Red Sea colonies there are nonetheless some interesting observations that can still be made. At the latter just five species: **Marsh Warbler** (*Acrocephalus palustris*), **Whitethroat** (*Sylvia communis*), **Rufous Bushchat**, **Red-backed Shrike** (*Lanius collurio*) and **Isabelline Wheatear** accounted for 49.5% of all prey items collected and identified. Marsh Warbler alone was 26.5% of the overall total and three times more common than any other prey species. In the UAE where this same species can be abundant in spring, it is never common in autumn (Richardson & Chapman 1988). The only passerine and near passerine species available and likely to form the bulk of prey for Sooty Falcon would appear to be (in no particular order) bee-eater species, hoopoe, various wheatears, particularly Isabelline and Pied, Rufous Bushchat, Isabelline Shrike and perhaps **Swallow** (*Hirundo rustica*), Yellow Wagtail and Short-toed Lark.

It is interesting to note that White-cheeked Tern did not feature in the list of prey from Saudi Arabia although it certainly breeds and migrates southward down the Red Sea. Almost certainly fledglings are caught preferentially (and more easily) than adults so proximity to a ternery

would be essential. In the Gulf of Oman however, where terns and falcons may also breed together on the same island, it is more difficult to account for their complete absence from the latter's diet. The likely explanation may involve an investigation into optimal foraging, i.e. the energetics of capture against the calorific return. This could suggest that the Abu Dhabi islands are actually sub-optimal sites. In the UAE White-cheeked Terns mostly fledge in from late July onward which is before the eggs of Sooty Falcon have hatched, so the prey remains found on Dalma, despite appearing fresh, may have been preyed upon and eaten only by the adults.

The most frequent prey items from Oman were **Red-necked Phalarope** (*Phalaropus lobatus*) 18.3%, Rufous Bush-chat 11.9%, Spotted Flycatcher 8.8%, Common Whitethroat 7.3% & **Wilson's Storm Petrel** (*Oceanites oceanicus*) Red-backed Shrike and Desert Wheatear each 4 - 5%, Hoopoe 2.9% and Isabelline Shrike 2.2%. All other species, of which there were over forty, accounted for less than 2% each. In Ethiopia the recorded prey of Sooty Falcons on the Dahlak archipelago (also in the Red Sea) was Blue-cheeked and European Bee-eaters, Golden Oriole and Hoopoe, the first named being numerically the most important (Clapham, 1984).

The prey species list and their relative abundance provided by studies in the Red Sea tells as much about the migration route and timing of the different species as it does about the prey preference of Sooty Falcons. Pied Wheatears, which migrate to East and South Africa along with Marsh Warbler, Whitethroat and Rufous Bushchat, for example, appear mostly to take a eastern route through Arabia rather than a Red Sea route and/or possibly pass through the latter that much later. The feeding ecology of Sooty Falcons on Dalma will be studied further in 1994.

Future viability of Sooty Falcon population on Dalma

Some safeguards may need emplacing on Dalma to ensure the continued prosperity of Sooty Falcons here. The reason for any concern is over the extensive earth-moving and construction activities currently in progress on the island. In particular the cliffs on the west side of the island may, in due course, be subject to these same activities and be rendered unsuitable for breeding. Similarly, their isolation from a continuously eroding sea may also result in slippage and collapse and the gradual occlusion of any vertical face on which to nest.

Sir Bani Yas

The island was visited from 29 September to 1 October 1993. It is larger than Dalma, being approximately ten km by eight km and lies 7 km from the mainland. The habitat is broadly similar to that on Dalma with again a central core of hills extruded by salt dome diapirism. Most of the island perimeter is now re-landscaped by extensive earth-moving activities. These are ongoing even in the hills where there are several buildings and numerous bulldozed and levelled olive groves, orchards and woodland plantations. Irrigation is extensive. The landscape is still recognisably that of water-worn wadis and gullies and collapse features resulting from salt solution.

Certainly three, and possibly as many as five, different Sooty Falcons were seen and one eyrie located, this being in a quarry in the highest point and centre of the island. Three birds were in attendance (with no

agonistic behaviour observed) and it is just conceivable that there was a second nest site in the same quarry face only 15m from the confirmed site. All three birds mobbed or screamed at the observer. Loose down feathers were seen in the first site indicating the presence of one or more juveniles. Since the young had not yet fledged the laying date accords with that on Dalma. Although regarded as monogamous, in such an isolated station bigamy might be a possibility. There is an abundance of suitable nest sites on the island, more so than on Dalma, so this is not considered a limiting factor. However, there were territorial **Kestrels** (*Falco tinnunculus*) at two sites and there may be some interspecific competition. These Kestrels may be resident breeders or passage/wintering; even if the latter a hunting territory would be maintained and might well interfere with that of the late breeding Sooty Falcons. Even so there must still be ample nesting-territories available. The Sooty Falcon allows close approach (less than 50m) before taking flight both when near its nest and when just sitting on a lookout rock or other hunting perch one or more kilometres away. This is something of a feature of colonial (and seasonally insectivorous) falcon species. Most hunting on Sir Bani Yas was over the island's hilly centre and thus quite different from that observed on Dalma.

No prey remains were found here to add to the data collected on Dalma. It was apparent, however, that compared with that island which was literally covered in hundreds of migrants earlier in September, a census of the entire migrant passerine population on Sir Bani Yas found only seven birds of four wheatear species: 3 Pied, 2 **Red-tailed** (*Oenanthe xanthopyrma*) and single **Hooded** and **Hume's** (*O. monacha* & *alboniger*) with occasional overflying Silverbills or singleton Swallows. The idea of a food cache as suggested earlier would be worthwhile in such a situation, even if the prey only remains edible for one or two days after capture.

One final observation is that the quarry nest site of the Sooty Falcons also housed over 80 **feral pigeons** (*Columba livia*), many also nesting. The former certainly mock-dived on the adult pigeons (which dodged easily), but would be rather large prey although newly fledged young might be taken. Several species will nest close to their potential predators e.g. **Woodpigeon** (*Columba palumbus*) close to **Black Kites** (*Milvus migrans*) in Spanish cork-oak and stone pine woodlands or to **Hobby** (*Falco subbuteo*) in northern European woodlands and **Jackdaws** (*Corvus monedula*) adjacent to Peregrines on a cliff, perhaps the protection afforded making it worth the 'risk.' It is also certainly the case with terns and Sooty Falcons in Oman as stated earlier.

Future viability of Sooty Falcon population on Sir Bani Yas

There must be some concern that habitat destruction and disturbance may result in desertion by Sooty Falcons, which, with only one definite pair anyway, can only be considered at least vulnerable.

Other Islands in Abu Dhabi Emirate Ghaghah and Kafai

Two groups of Sooty Falcons, totalling 12-14 individuals and including two or more juveniles, were seen between Sila (see below) and Ghaghah on 23 October 1993. Some of these birds were chasing White-cheeked Terns over the sea; once three falcons pursued, in relay fashion, the same individual tern, although the final outcome was not seen. These falcons may have been a migratory party on a temporary halt attracted by the

large concentration of terns, or may have bred locally. White-cheeked Terns, which follow a coastal route to S.E. Africa where they remain for the winter, may even be followed and preyed upon by some falcons for part of the way. Northern Hobbies are known to follow hirundines, their main prey species, on migration so the above strategy must be a possibility. However in June 1994 the NARC islands survey landed on Ghaghah and other islands off the Sila peninsulas and located an addition 7 or 8 pairs of territorial Sooty Falcons. No eggs had apparently been laid at that time. The islands are deliberately not named specifically at this time for security reasons. (Theft of young from nests near Bahrain and Qatar are reported.) A visit to Kafai soon after leaving Ghaghah found one additional occupied site. The 1994 findings more than doubled the previously known UAE population of Sooty Falcon, from 6 pairs to 14 or 15.

A large number of cast pellets and prey remains were collected on Ghaghah. There was only a modest amount of avian prey, namely an adult **Saunders' Little Tern** (*Sterna saundersi*), a nestling **Bridled Tern** (*S. anaethetus*), **Hoopoe**, **Pipit spp.**, **Lark spp.** and a **Calidrid spp.**, with only single individuals of each being retrieved. However the pellets yielded much invertebrate prey as well as a single **Lacertid lizard** (*Mesalina/Acanthodactyla sp.*). The invertebrate material included large numbers of Coleoptera, principally **Scarabids** and **Tenebrionids** (popularly known as Dung and Darkling beetles respectively). Some other unidentified winged invertebrates were also present. It seems that bird migration through the islands in spring may be that erratic or of too a small volume to provide a continuous food supply for the falcons and that they are sustained by invertebrate prey.

A **Nightjar** (*Caprimulgus europaeus*) had probably fallen prey to **Sooty Falcon** at one other UAE site this spring. At this same site some foraging was thought likely to take place on the mainland some 12.5 km away as the immediate food supply can only have been extremely spartan.

Future viability of Sooty Falcon population on Ghaghah

The population on Ghaghah is probably secure at present and although at least one cat is present on the main island none is found on the smaller islands which hold the territorial falcons. Human pressure and collecting are potential threats. The possibility of a shortage of suitable nest-sites was addressed by constructing several new 'ideal homes' in the form of lidded chambers facing to the north-west. More should perhaps be built in future both here and elsewhere.

Qarnein, Zirku, Arzanah and Yasat

Mention has already been made of Qarnein, Zirku and Arzanah, all of which possess hills formed in the same way as on Dalma and Sir Bani Yas. As such they are considered potentially suitable for Sooty Falcons to breed on. The first named has been occupied by an ornithologist who recorded Sooty Falcons as late autumn visitors, but questioned whether breeding may actually have taken place in 1984, when two birds summered and three were present in late October and early November. Breeding may have taken place unnoticed. There is neither continuous, nor even annual coverage here (which depends on the interests of the Decca personnel who are stationed here for three weeks only every two months or so). Sporadic breeding rather than colonisation is a possibility on Qarnein. No

Sooty Falcons were present in the summers of 1993 or 1994. One or two pairs apparently bred on Zirku in 1981. A nest containing two eggs was recorded on the exceptionally early date of 29 April (Fraser 1981). One pair was recorded 'pursuing terns' here on 15 May (1981) and the nest was still tenanted on 29 May. No later details are known. Regular breeding here must still be a possibility although none were located during a brief NARC survey visit in June 1994. There are also occasional records of migrant birds on Das in September and October but certainly none breeds here. A visit to Arzanah in 1994 failed to find any birds and there are no known historical accounts of breeding bird species from here other than of seabirds. Similarly searched in 1994 was Yasat, the last remaining major island group in western Abu Dhabi, but no birds were seen.

Elsewhere in UAE and the Southern Gulf

Knowing now that Sooty Falcons in Saudi Arabia will also nest on the ground under mangrove or *Salicornia* bushes rather than just on cliffs and crags, meant that similar island sites in Abu Dhabi might host breeding pairs and would therefore be worth searching. Bu Tinah shoals came to mind but no falcons were found in 1994 and all other things being equal the islands are probably sited 'wrongly' in the Gulf.

Some inland and coastal jebels of Abu Dhabi were visited in summer 1993 but no birds were seen and unless considerable distances were travelled to hunt would appear apparently unsuitable for this species to nest (due to a shortage of passing migrant prey). The Sila 'peninsulas' (in western Abu Dhabi opposite the islands of Ghaghah - see above), the islands off eastern Qatar, Saudi Arabia and the Musandam and nearby offshore islands (Oman) are probably the only other localities worthy of consideration for surveys. Sooty Falcons are already known to breed in the last-named of these sites but the exact numbers are unknown.

There is much still to find out about the ecology, status and distribution of the Sooty Falcon in Arabia. The Sooty Falcon population remains threatened in the Middle East, which itself forms the larger part of its restricted world range. As such, island surveys are essential to adequately provide for its successful conservation.

Acknowledgements

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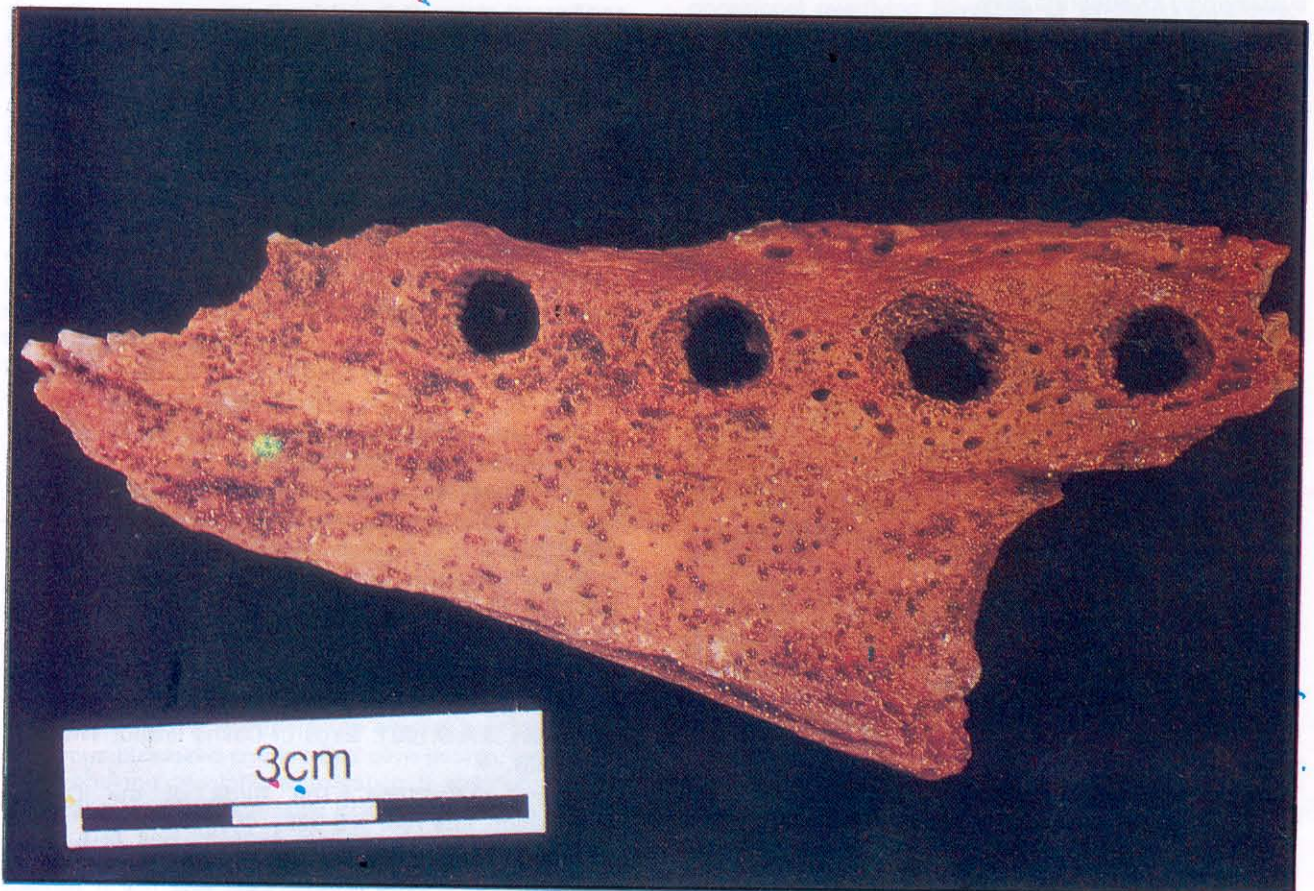
References

- Chapman, J.A.D. 1991. Birds of Dalma Island. *Tribulus* 1.1:21-23.
- Clapham, C.S. 1964. The Birds of the Dahlac Archipelago. *Ibis* 106: 376-386.
- Cramp, S. & Simmons, K.E.L. (eds) 1980. **Handbook of Birds of Europe, the Middle East and North Africa**. Vol. 2. 334-338. Oxford University Press. Oxford.
- Fraser, I. 1981. Bird recordings on Zirku Island, 1981. **ENHG Bulletin** No. 14: 27-28. Abu Dhabi.



Sooty Falcon chicks in the nest on Dalma Island, (See Page 14).

Picture by Simon Aspinall / NARC



A Sub-fossil fragment of the jaw of a crocodile, *Crocodilus sp.* found in the Sabkhat Matti. Crocodiles are now extinct in Arabia. (See Page 10).

Picture by Tim Goodall.



Petroglyphs in the Wadi Ashwani, Fujairah, (see Page 24). Above, a group of hunters, and, below, a single animal, possibly an Arabian Leopard, *Panthera Pardus*. Pictures by Dr. Patrick Osborne / NARC



- Frumkin, R. 1986. The status of the breeding raptors in Israeli deserts. *Sandgrouse* 8: 42-57.
- Gaucher, P., Daunicht, W.D. & Eichaker, X. *in press*. The Sooty Falcon in Saudi Arabia. In: *Proceedings of IV World Conference on Birds of Prey*.
- Richardson B. 1991. Recorder's Report. *Tribulus* 1.2:31-32.
- Richardson, C. & Chapman, J.A.D.C. 1988. Migration patterns through Dubai 1984-1988. *Sandgrouse* 10:

71-80.

Walter, H. 1979. The **Sooty Falcon** (*Falco concolor*) in Oman: Results of a breeding survey. *J. Oman Studies* 5: 9-59.

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Impact of the oil spill on intertidal areas along the east coast of the United Arab Emirates in April 1994

by Benno Böer and Andrew Griggs

Introduction

On 30th of March the Panamanian registered crude carrier 'Seki' spilled 15900 tonnes of light crude oil into the Gulf of Oman. The incident happened 9.6 nautical miles off Fujairah after a collision with the United Arab Emirates registered tanker 'Baynunah.' The collision caused the biggest oil spill in the Arabian Sea since 1988. After the collision, the residual cargo in the ruptured tank was transferred to other storage areas of the ship. booms and mechanical skimmers were set up around the vessel in order to confine the spill to a small area. 1500 tonnes of oil were collected in four floating storages, which were deployed at the site. Vacuum trucks were mobilized in shallow coastal waters to suck the slick in order to reduce damage to the beaches. Chemical dispersants were limited to open sea areas and were not used near the coasts.

The coastal area of the Arabian Sea consists of sandy beaches and rocky headlands in the north and a low lying coastal strip with lagoonal areas further south. Most of the northern coasts of the Gulf of Oman have not yet been examined scientifically (Sheppard *et al.*, 1992). Nevertheless, many marine and intertidal species have been recorded in the coastal waters of the Arabian Sea, such as a dozen species of dolphin, toothed whale, dugong, baleen whale, and coral with their associated vertebrate and invertebrate communities, seabirds, fish, turtles, sea snakes and crustaceans.

One of the largest mangrove areas within the UAE occurs in the intertidal zone around Khor Kalba. The subspecies *kalbaensis* of the **White-collared Kingfisher** (*Halcyon chloris*), endemic to the UAE, is found only in this area, dominated by *Avicennia marina* trees, some of which are about seven metres high and with stems more than half a metre in diameter. Extensive coastal flats, providing habitat for a number of salt marsh plant species, such as *Arthrocnemum macrostachyum*, *Halocnemum strobilaceum*, *Limonium axillare*, *Tamarix sp.*, *Suaeda vermiculata*, and *Aeluropus lagopoides*, occur north of Fujairah between Qurayyah and Qidfa. A number of local and expatriate people living on the UAE Arabian Sea coast are directly dependent on the coastal ecosystem working in fishing and tourism.

According to newspaper reports, dead fish, turtles and other forms of marine life were washed ashore with an oily mousse, and a turtle nesting beach was affected. A thirty kilometre slick spread northwards by marine currents and winds washed the oil up on the beaches

تقارير هذه الصفحة تنحصر على الساحل الشرقي للامارات العربية المتحدة بشأن بقعة الزيت التي ظهرت في ميناء الفجيرة في مارس ١٩٩٤م.

between Luluyyah and Ras Dhadnah. Small amounts of oil moved off-shore and did not affect the UAE coast.

Materials and methods

In order to evaluate the impact of spilled oil on the coast between Dibba and Fujairah, a rapid assessment was carried out by car along the coast. A global positioning system (Magellan) was used to locate precisely the geographical position of affected and unaffected beaches. The first coastal survey was carried out on April 3rd, five days after the collision of the vessels. A second survey was carried out twelve days after the incident, on April 15th. An additional survey was carried out on April 29th, in order to investigate the areas south of Khor Fakkan. The entire UAE coast on the Arabian Sea of about 80 kilometres was thus surveyed. The depth of oil penetration into the sediment was examined and evidence of oil spill effects on both sediment and marine and terrestrial organisms was recorded. On May 23rd the water surface was investigated by boat between Khor Fakkan and Dibba. Two dives were carried out on the same day, in order to look for visual impact on submarine organisms.

Results

Between Ras Dhadnah and Luluyyah the smell from the slick was present for at least three days after the incident happened. However, the situation varied along the coast. Sandy, gravely and rocky substrates all occur in situations exposed to wave energy. It was found that only ten days after the spill, new substrate was deposited on top of the oiled sandy beaches, whereas the gravely beaches remained oiled on the surface. All along the oil affected sandy beaches, the dark black oil slick had disappeared after ten days and a light brown water-oil emulsion was found discontinuously. Some of the previously oiled rocky shores also appeared clean after ten days. A small number of dead fish and crustaceans was found along both gravely and sandy beaches. It appeared that the crustaceans had died as a result of contact with oil, but there was no evidence to link the dead fish with oil. *Ocyropsis saratan* crabs, which

live just above high water mark, seemed not to be affected. 250 **Lesser Crested Terns**, a number of **Western Reef Herons**, **Slender-billed Gulls** and some other terns without any visual signs of pollution were reported from Dibba, a location north of the oil exposed beaches, and south of Khor Fakkan, an area that again was not affected by the slick. New sediment was deposited on top of the oiled sandy sediment, and a self cleaning effect due to wave energy was observed within ten days and again three weeks after the spill happened. Oil penetrated into the sandy sediment for about a depth of 2-10 cm.

Oil accumulated on rocky beaches and a bitumen layer, black in colour, remained on the surface. This applied to both wave exposed and non-wave exposed gravelly beaches. No crustaceans were observed on this

deposit, whereas crustaceans were active both on top of it, and in, the oiled sandy substrates.

Dead marine organisms were recorded in low numbers on beaches. Dead seabirds were not reported. The 12 km long salt marsh area along the coast at Qurayyah was not affected by the oil, due to the fact that the slick was transported further north. The 6km long mangrove woodland in Khor Kalba was not affected by the oil spill. It was found, however, that some salt marsh and mangrove areas have been reduced by land infilling.

During the survey of May 23rd it became clear that a large area of the sea was still affected by floating tarballs and small areas by oil water emulsion. No visual impact was recorded regarding submerged organisms, as compared with dives made in the same areas before the oil spill.

Table 1: The coast was examined at the following locations:

Location:	Beach type:	Situation 3 April 1994	Situation 15 April 1994	Situation 29 April 1994
24°58'45"N/56°22'32"E UAE Oman border	Sandy beach and mangrove			No impact Active fish and crustaceans
25°00'48"N/56°21'45"E	Sandy beach and mangrove			No impact Active fish and crustaceans
25°01'08"N/56°21'50"E	Sandy beach			No impact Hundreds of seabirds
25°01'58"N/56°21'59"E	Sandy beach			Oil water emulsion over a 100m strip. Dead fish. Oil film on sediment.
25°02'38"N/56°21'49"E	Sandy beach			Oil water emulsion over a 100m strip. Dead fish. Oil film on sediment. Fresh tar balls.
25°02'05"N/56°21'58"E	Sandy beach			No impact
25°08'35"N/56°21'18"E	Salt marsh	No impact	No impact	No impact
25°09'00"N/56°21'23"E	Salt marsh			No impact
25°09'33"N/56°21'23"E	Salt marsh	No impact	No impact	No impact
25°12'03"N/56°21'19"E	Salt marsh	No impact	No impact	No impact
25°15'09"N/56°21'37"E	Salt marsh	No impact	No impact	No impact
25°17'31"N/56°22'21"E	Salt marsh	No impact	No impact	No impact
25°19'12"N/56°21'39"E	Sandy and gravelly			Gravelly areas smeared. Crustaceans active on sandy sediment. Oil water emulsion.
25°21'42"N/56°20'51"E	Sandy beach	Oil accumulation 1-2 cm below surface		No visible impact
25°23'25"N/56°21'44"E	Gravel beach	No impact		

Location:	Beach type:	Situation 3 April 1994	Situation 15 April 1994	Situation 29 April 1994
25°27'10"N/56°21'37"E	Sandy beach	Oil impact. Sand and water coloured black. Dead crustaceans on the beach.		No visible impact
25°27'41"N/56°21'42"E	Sandy beach	Oil impact Sand and water coloured black. Dead crustaceans on the beach.	Oil was not to be found on the rocks nor on the adjacent sand. Oil emulsion in the water.	No visible impact
25°28'42"N/56°21'46"E	Sandy beach	Oil impact Sand and water coloured black. Dead crustaceans on the beach.		No visible impact
25°29'03"N/56°21'41"E	Sandy and gravelly beaches	Oil accumulation		Oil accumulation. Oil emulsion.
25°29'03"N/56°21'41"E	Sandy and gravelly beaches	Oil accumulation		Oil accumulation on gravel
25°33'15"N/56°21'15"E	Gravelly beach	Oil impact. Gravel smeared with oil.		Oil accumulation on
25°33'43"N/56°21'09"E	Sandy beach		Oil film on the sediment, without oil penetration into the sediment. Oil emulsion in the water.	No visible impact
25°35'06"N/56°21'22"E	Gravelly beach	Oil impact. Gravel smeared with oil.		Oil accumulation on gravel
25°35'50"N/56°20'49"E	Gravelly beach	Oil impact. Gravel smeared with oil.		Oil accumulation on gravel
25°36'02"N/56°20'28"E	Gravelly shore		Oil accumulation in the top 5 cm sediment. No new sediment accumulation.	Oil accumulation on
25°36'13"N/56°19'29"E	Sandy beach	Oil impact. 2 cm thick layer of oil smeared sediment.	2 cm thick layer of oil smeared sediment underneath a new sediment surface layer of about 10cm.	
25°36'35"N/56°18'11"E	Gravelly beach	Oil impact. Gravel smeared with oil.	No visible impact	No visible impact
25°37'36"N/56°16'12"E Oman UAE border	Sandy beach	No impact	Semi liquid tar balls on the beach	Tar balls on the beach

Discussion and conclusions

Almost 16,000 tonnes of crude oil were spilled into the water off Fujairah. The vessel 'Seki' is a double-hull design, which was developed in order to minimise spills from tankers. The use of chemical dispersants off shore, vacuum trucks on the beaches, booms around the damaged vessel and the fact that the ship was a double-hull design possibly all helped to prevent a greater amount of oil from reaching the shore. However, 16,000 tonnes was enough oil to effect the beaches between Luluyah and Ras Dhadnah, a distance of ca. 20km. The majority of the oil was washed ashore north of Khor Fakkan, and a smaller amount was carried off-shore. The immediate impact on the coastal environment was obvious. Oil smeared the beaches and black oil water emulsions were to be found in the surf. A number of dead marine organisms were washed on to beaches, and oil penetrated into the sediment of sandy, gravelly and rocky shores. Seabirds seemed not to be affected and avoiding the polluted sites. Terns and gulls were observed fishing in areas that were not been affected by the slick (Richardson, pers. comm.). Terns do not plunge into water unless they can see prey (Aspinall, pers. comm.).

North of Khor Fakkan the beaches are generally exposed to permanent wave activity. Further south is 12 km of salt marsh and a 6 km stand of mangrove. The oil did not have any effect on these sensitive ecosystems, as the slick did not reach these areas. Intertidal vegetation, such as salt marshes and mangroves generally occur in low energy beaches. Mangroves are known to survive minor oiling (Spooner, 1970). If large amounts of oil accumulate on mangroves or salt marsh plants, the result might be long term impacts and the destruction of unique ecosystems, as happened off Jubail after the 1991 Gulf War oil spill in Saudi Arabia (Böer, 1993).

Evidence of the oil spill was to be found on sandy, gravelly and rocky beaches. However, due to permanent wave activity and sedimentation processes, most of the sandy beaches were visually clean three weeks after the spill had happened. Crabs were evident on the beaches. Rocky beaches had been cleaned by wave activity and gravelly beaches remained smeared with a bitumen slick.

Not much data could be collected regarding the immediate impact on marine organisms. Only a low number of dead crustaceans, fish and cuttlefish was found on the beaches. However, it is not known whether these died due to the oil spill or due to other factors. Detailed studies, including species inventory comparisons and chemical analysis are required in order to assess the impact of the oil spill on marine organisms. A month after the incident it became clear that a major long-term disaster had been prevented, as the oil did not reach beaches with low wave energy, which are the type most susceptible to lasting damage from oil spills. The oil slick was washed ashore on beaches with moderate to high wave activity. Evaporation processes and wave activity resulted in visually clean beaches within four weeks. Nevertheless, the impact of the oil spill occurring on rocky beaches might be a long term problem and some competent long-term biological monitoring should be initiated.

The oil spill had a detrimental effect on the economy of the area, especially to local fishermen and to the tourism industry, for example hotels and diving schools. Boats and fishing gear were smeared with oil and a bitumen coat remained on this equipment. Boats could not enter the sea, until the oil slick disappeared. It is not known

whether the fishing grounds were affected. The tourism industry received damage, due to oil accumulation on sand beaches along the east coast and due to reporting in the local press. According to local people the numbers of tourists visiting the area decreased significantly in the weeks following the spill. The Middle East has more than half of the world's proven oil reserves and the waters surrounding the Arabian peninsula are among the world's busiest tanker routes. For these reasons, it is not surprising, that oil spills in the marine environments of the Arabian Gulf, the Red Sea, and the Gulf of Oman happen. (Sheppard *et al*, 1992). The Fujairah anchorage is a place of intense tanker activity.

Since the massive deliberate Gulf War oil spill in the northern Arabian Gulf, which was supposed to have been the biggest oil spill in history (Krupp and Jones, 1993), a number of major oil spills have happened in several different regions of the world, for example the Nicobar Islands (India), Shetland Islands (U.K.), Eastern Australia and Bay of Biscay (France/Spain). It is common for oil slicks to be washed ashore. Thus, coastal ecosystems along tanker routes are very much at risk from oil slicks. This is true for low energy beaches, such as mangroves and salt marshes as well as for high energy beaches, such as rocky, gravelly or sandy shores.

From previous scientific research it is known how diverse can be the reaction of different coastal and marine ecosystems to oil spills. Climatic factors, wave exposure and the quantity and quality of spilled oil seem to be the most important factors. Oil spill contingency plans are urgently required for the protection of all the UAE's coastal and marine ecosystems, fishing industry and coastal tourism. These plans need to guarantee a quick response to marine and coastal pollution events (Western, 1994). These plans should be made publicly available, in English and Arabic. It is a question of time until the next oil spill will happen in these waters. However, the quantity of spilled oil could have been larger. The winds and currents did not drift the oil into sensitive areas. Very high spring temperatures and permanent wave activity contributed to the natural self cleaning effect. No high seabird concentration occurred within the oil affected area at the time. This time it was a minor disaster.

Acknowledgments

Colin Richardson supplied bird records for periods after the spill had happened. Simon Aspinall helped with additional information on wildlife of the UAE East Coast.

References

- Böer, B., 1993: Anomalous pneumatophores and adventitious roots of *Avicennia marina* (Forssk.) Vierh. mangroves two years after the 1991 Gulf war oil spill in Saudi Arabia. *Marine Pollution Bulletin*, 27, 207-211.
- Krupp, F. & D.A. Jones, 1993: The creation of a marine sanctuary after the 1991 Gulf war oil spill. *Marine Pollution Bulletin*, 27, 315-323.
- Sheppard, C., A. Price and C. Roberts, 1992: Marine ecology of the Arabian region. Patterns and processes in extreme tropical environments. Academic Press, London.
- Spooner, M., 1970: Oil spill in Tarut Bay, Saudi Arabia. *Marine Pollution Bulletin*, 1, 166-167.
- Western, R., 1994: Editorial in: *Tribulus*. Vol. 4.1., pp 4.

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NOTES AND QUERIES

Petroglyphs in Wadi Ashwani, Fujairah

On 2nd December 1993, Patrick Osborne, Barbara Tigar and I camped in a small wadi that adjoins the Wadi Ashwani, near Siji in the Emirates of Fujairah, in an effort to trap the **Gordon's Wildcat**, *Felis sylvestris*, that we had seen there the previous April.

Finding our trap empty the following morning, we decided to explore the wadi where we had camped, up a very rough track. The wadi itself was dry, but after rains, it seemed likely that there would be some good deep pools of water in several places.

Following up the track, we found it to peter out on a high plateau, from where we explored a little further on foot, through a small maze of rivulet channels with high reeds and palm trees.

On the way back, we tried to find a short-cut to the main channel of the Wadi Siji, a kilometre or so to the west. One track went in the right direction, but again petered out. On foot, Barbara and Patrick walked to the crest of a hill, and found what appeared to be a number of man-made cairns. Interestingly, when you approached the cairns, there was nothing to indicate the marvellous view that became visible the instant you stepped between the cairns. From the edge of a high cliff, the view encompassed a deep wadi flanked by mountains.

The cairns were not intact, and some stones had fallen. On several of them, there were rock drawings, (petroglyphs).

The largest drawing showed a group of hunters on horse (or donkey) back in pursuit of something that looked like a large spider. Another drawing showed a hunter on a camel pursuing the same spider-like creature, drawn even larger than in the first drawing.

It was the third drawing that excited me the most, a four-legged animal with a small head and a long tail that

curved over the back towards the head. I had seen the same pose on a video of a hunting **Leopard**, *Panthera pardus*.

A few weeks later, Peter Hudson went to check the area and he found another set of petroglyphs further downstream, including a much more sophisticated drawing of a hunter.

I have subsequently compared the petroglyphs with the bas-relief described as 'two lions catching a gazelle,' depicted on the Hilli Tomb in Al Ain, which dates back to the middle of the Third Millennium BC. The 'lions' are also, in my opinion, either leopards or cheetahs.

The habitat, at the foot of the Hajar Mountains, would favour the leopard. Lions are not known to have occurred in this part of Arabia, although they did in the Syrian desert and would, in any case, have been recognisable from the larger head, the mane and the plumed tail. The **Cheetah**, *Acinonyx jubatus*, has occurred in Arabia, and is believed to have become extinct only in the last twenty or thirty years, (tantalising rumours suggest it may possibly survive in the south west of Arabia), but likes to hunt in grassy plains, not plentiful in our part of the peninsula.

Patrick Osborne took a GPS reading of 28°15.428'N, and 56°8.699'E.

In the vicinity of the rocks carrying the petroglyphs, three fragments of pottery were collected, one of which was of typical late Islamic imported Persian glazed ware, and the other two pieces of a cruder local manufacture. The pottery certainly post-dates the cairns, although dating of the petroglyphs is more uncertain.

(See photographs on P. 19)

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Two interesting garden residents

Over the last few years, I have been recording the insects and arachnids in my Dubai garden. Two stand out as being particularly interesting.

They are both tiny, and probably easily overlooked, and may therefore not have been reported previously.

One is a treehopper, of the **Membracidae** family, which appears every year around February/March. Since they are so small, about 3 mm in length, they are best appreciated through a magnifying glass. The head has two horns, and a pair of antennae that curves all the way round to the tip of their abdomen. The eyes are relatively large. The insects are a brownish green, sometimes with a white spot on the flank. Transparent wings stretch to well beyond the tip of the abdomen.

The second annual visitor is a yellow Crab Spider (family **Thomisidae**). The female of the species is the same colour as my sunflowers and yellow daisies. It sits near the heart of the flower on the yellow petals, waiting for the arrival of bees.

Although the crab spider is barely one third of the size

of the wild garden bee, it grabs the bee with its powerful pincers and hauls it to safety under the flower, where it sucks out the body liquids.

The spider can jump substantial distances in relation to its size and I have watched one jump around 30 centimetres. It can also jump in an upward direction, from one flower to a higher one.

The male is miniscule, less than 1 millimetre in size, and dark brown. I have seen them mate, but did not stay long enough to note whether they separated after mating, or whether the male ended up as a meal for his mate. Subsequent babies were the size of aphids.

I have no idea where these spiders go when my flowers have died in the heat of summer, and would like to know more about them

J.N.B. 'Bish' Brown once told me that he had seen a pink crab spider on an oleander flower. Does the species adapt to the colour of its host plant?

Dr. Marijcke Jongbloed



Cobras, wolves and local tales - a personal view on recording

As knowledge about the occurrence of wildlife in the Emirates grows, it is inevitable that we should ask how to use the collective skills of naturalists to best advantage. It is clear that large number of records of a common species, (for example, the **House Sparrow** *Passer domesticus*) from a well-frequented place are of limited value. Similarly, although a good deal of personal satisfaction may be had by making a difficult identification unaided, its scientific value pales somewhat if someone living nearby is able to record large numbers of the same species almost at will.

Comparison of scientific records with local tales and beliefs provides a rich source of ideas for targeting survey effort within the Emirates. For instance, the scientific records of land reptiles for Abu Dhabi lists 36 species, the **Horned Viper** *Cerastes gasperetti* and the **Carpet Viper** *Echis carinatus* being the most dangerous of these.

Yet there is at least one detailed local account of someone being bitten by an **Arabian Cobra** *Naja haje*, an extremely poisonous species, near Al Ain.

According to Gasperetti (1988) this cobra occurs in Arabia from Taif southwards through Asir to Yemen, then east through the Hadramaut to Dhofar, a considerable distance from Al Ain. Does this species occur, as yet unknown to science, within the Emirates? If so, it could represent a so far undescribed sub-species. Alternatively, the incident in Al Ain could refer to an escaped cobra, perhaps brought in from Egypt or Sudan.

Compare also the very infrequent records of certain mammals with accounts from the Bedu and travel-

lers. The **Arabian Wolf** *Canis lupus* has very rarely been recorded by naturalists and yet, it is said, it can still be heard howling at night in the mountains of the northern Emirates. The **Arabian Tahr** *Hemitragus jayakari*, a globally threatened species, is also still reported by locals from the mountains in the north. Wilfred Thesiger, on his travels through Abu Dhabi's deserts in the 1940s, noticed tracks of **Fennec Fox** *Vulpes zerda* and **Honey Badger** or **Ratel** *Mellivora capensis*, yet there are no authenticated records for either species within the Emirates.

It seems to me that local observers with a lifetime of experience in the desert are unlikely to be mistaken in what they report. What is needed is a concerted effort to catalogue and substantiate their sightings for the scientific community. The rapid pace of habitat change in the UAE means that this task must be done now before the species are lost for ever.

Here there is a role for everyone: for local people, for amateur naturalists and professionals alike. If members, and others, have any information on the species mentioned, or any local stories or records that are worth following up, please contact the editor with details.

Reference: Gasperetti, J. (1988). Snakes of Arabia. *Fauna of Saudi Arabia*, 9: 169-450.

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Sheikh Mubarak Natural History Prize

Replacing the previous Jashanmal Annual Award for Natural History, ENHG Patron and Minister of Higher Education and Scientific Research Sheikh Nahayan bin Mubarak al Nahayan announced earlier this year the establishment of the Sheikh Mubarak bin Mohammed Natural History Prize. The founder of the Arabian Leopard Trust, Dr. Marijcke Jongbloed, was chosen as the first recipient of the prize, which carries with it a trophy and a cash sum.

In remarks made while presenting the Prize, Sheikh Nahayan commented "His Highness President Sheikh Zayed bin Sultan al Nahyan has always been keen on the protection of our wildlife. He has established special guards who patrol the desert to protect the animals and birds and to prevent hunting, and also to protect our trees."

Dr. Jongbloed was chosen as the winner of the first Sheikh Mubarak Prize for her efforts in establishing the Arabian Leopard Trust, which is devoted to helping to ensure the survival of the UAE's wild animals, in particular the members of the cat family.

Through its educational campaigns, the Trust tries to

encourage people to protect the animals, while it is also planning to establish a special breeding centre at Fili, near Dhaid, on a two square kilometre patch of mountains specially donated to the Trust by Supreme Council member and Ruler of Sharjah, His Highness Dr. Sheikh Sultan bin Mohammed al Qassimi.

"The work of the Trust is admirable," Sheikh Nahayan told Dr. Jongbloed. "Organisations like the Trust, with volunteer membership drawn from UAE nationals and expatriate communities living in the country have a great role to play in helping to conserve our wildlife for generations to come, and I am delighted to be able to present you with this award as a well-deserved mark of recognition for your hard work and dedication."

"Our support for the Emirates Natural History Group," Sheikh Nahayan continued, "in its efforts to study and conserve the wildlife of the UAE stems from the support and encouragement of President Sheikh Zayed. Following his path, we do what we can to help to make people know more about the natural history and wildlife of the country, and to try to preserve it for the future."



RECORDERS REPORTS

Archaeology and Palaeontology

With the Recorder's Report in the last issue, (*Tribulus* Vol. 4.1, April 1994, P. 25), having covered, in outline at least, the details of the whole of the 1993/1994 winter season of activity, there is, not surprisingly, little to report from the summer months, during which the weather prevents both foreign and local teams from undertaking much activity outside the laboratory or away from the drawing board or report-writing computer.

The only outdoors work of any significance has been rescue excavation on a Third Millennium site at Umm Suqeim in Dubai, where an Umm an Nar tomb and settlement originally identified by our member Carolyn Lehmann was partially damaged as a result of construction work. Swift action by the Dubai Museum managed to halt the work, and a rescue dig was undertaken by Dr. Hussein Kandeel. A complete dig is planned for this winter, and will be undertaken by Professor Dan Potts.

As usual, the UAE figured prominently at the annual Seminar for Arabian Studies in London, with papers being presented, among others, by Dr. Geoffrey King, (on the Sir Bani Yas excavations - see Page 5), and Carl Phillips on his work in Kalba.

The 1994/1995 winter season began in early October, with, the Al Ain Department of Antiquities and Tourism being first into the field. An early discovery, in October, was the first site ever found in Al Ain from the period around the beginning of the Christian era. Foreign teams will once again be active, with work planned by the Potts-led Australians in Dubai, Sharjah and Fujairah, the Germans and Japanese in Ras al Khaimah, the French in Sharjah, the Belgians in Umm al Qaiwain, and the British-led Abu Dhabi Islands team both onshore

and offshore in Abu Dhabi. The first focus of the latter will be the Late Stone Age site at Merawah.

Group members, as usual, have been relatively quiet insofar as field activity is concerned, although a second brief survey of the island of Bal Ghelam, east of Abu Dhabi, was carried out at the end of September.

With attendance at Group talks on archaeology suggesting that there is very considerable interest in the country's ancient heritage, it is a pity that some members cannot be persuaded to get out more into the field.

On the palaeontological front, the focus will be a conference planned next March under the aegis of ENHG Patron and Minister of Higher Education and Scientific Research, Sheikh Nahayan bin Mubarak al Nahayan. The first conference ever on the fossils of Arabia, it will review the academic results of the work undertaken in the past few years in the Bainuna region, and is being supported by our Corporate member ADCO.

Discoveries in the UAE's archaeology and palaeontology remain one of the more exciting areas of research taking place locally, and it is pleasing to see growing support for the work not only from Government but also from the corporate sector.

One result, may be the feeling that there is no way in which the amateur can take part. The scientists, however, remain delighted to collaborate with volunteers, some of whom have helped to identify significant new sites over the years, and Group members should not feel there is no place for them. On the contrary.

PETER HELLYER
Recorder



Birds

After one of the driest winters on record migration was rather slow to get into gear in the early part of the year.

However, **Blyth's Pipits** certainly pumped adrenalin back into the system when three were reported from Dibba and one from Abu Dhabi on March 27 and March 29. A **Red-breasted Flycatcher** was found in Abu Dhabi on March 29, and a **Semi-collared** was there on April 6.

The Emirates Golf Course turned up quality birds, as it often does, with up to three **Barred Warblers** from March 25-April 14, up to two male **White-throated Robins** from March 29-April 20, two **White-tailed Plovers** on April 5, single **Corncrakes** on April 14 and 20, a **Spotted Crake** on April 20, a (**Hume's**) **Yellow-browed Warbler** also on April 20 and three **Masked Shrikes** from April 10-14. Several **Hume's Lesser Whitethroats** were seen in the Dubai area from March 27 to April 14.

Probably the star attractions were at least 64 **Grey Hypocorolius** feeding on ripe berries in a small wood near the Al Wathba Camel track, first found on March 24 and staying for at least five days. Lucky for some, a male **Finsch's Wheatear** was present at the race track fields nearby on March 27.

During studies of **Lesser Kestrel** migration, 109 birds were found circling over a field at Hamraniyah on April 7, a record number for the UAE. On the same day, a

flock of over 100 **Pale Rock Sparrows** were feeding among the stones on the edge of Wadi Bih. Higher up in the wadi, a **Long-billed Pipit** and several **Trumpeter Finches** were heard in song on April 2. **Plain Leaf Warblers** stayed late in the mountains this year, with one still present on April 1.

During a month of massive passage by swifts, (**Common** and **Pallid**), an **Alpine Swift** (7th record), was seen near Kalba on March 31, while in Al Ain a **Little Swift** (also 7th record), was over the camel track on April 5.

Late spring is usually quiet in the Emirates, with only the tail end of migration visible when a few **Nightjars**, **Cuckoos**, **Red-backed Shrikes** and **Spotted Flycatchers** are still wending their way north. Thousands of **Marsh Warblers** passed through the Emirates during the first two weeks of May.

Contrary to the usual pattern, however, three new species for the country were reported between May 6-9. The first to be found was a **Blyth's Reed Warbler**, long expected, and reported by several observers over the years, but never conclusively identified in the hand. The bird was trapped by Erik Hirschfeld at Zabeel fish ponds in Dubai on May 6. The next day, a smart male **Pied Stonechat** turned up at the Emirates Golf Club in Jebel Ali, only a second record for the Gulf States. Perhaps the most interesting was a **White-eyed Gull**, found on

May 9 lounging with several hundred **Sooty Gulls** at Khor Kalba, well outside its normal Red Sea range.

An **Olive-backed Pipit** on May 8 at the Emirates Golf Course on May 8 was a further surprise, the latest ever in spring, and only the 12th UAE record.

In spite of all this excitement, birdwatchers were still happy to find several **Upcher's Warblers** from May 1-8, a late **Pale Rock Sparrow** on May 1 at the Emirates Golf Course, several **Rock Thrushes** from May 12-16 in the Jebel Ali area, a **Masked Shrike** at the Golf Course from May 12-16 and 5 **Red-rumped Swallows** at Ras al Khaimah on May 22.

A visit to Ras al Khaimah by two members of the Emirates Bird Records Committee on May 22 confirmed the breeding of several species that are rarely found nesting anywhere else in Arabia. Several pairs of **European Starlings** were at nest sites in the fields of Hamraniyah, and a pair of **European Rollers** was found at a nest hole in an old well a few kilometres away. **Spanish Sparrows** were active in the fields and a **Bruce's Scops Owl** was found in a tree in a garden just south of Ras al Khaimah. All in all, an important day for the Atlas of Breeding Birds of Arabia, currently in preparation.

Another major discovery for ABBA, and for the UAE, resulted from an extensive survey by the National Avian Research Centre of breeding seabirds on offshore islands in Abu Dhabi from mid-June to early July.

Overall, a total of 21,000 pairs of **White-cheeked Terns**, 40,000 pairs of **Bridled Terns**, 24,500 pairs of **Lesser Crested Terns** and 1,250 pairs of **Crested (Swift) Terns** were found, as well as several pairs of **Sooty Falcons**, establishing territory on previously unexplored islets. (see Pages 14-20).

The most impressive results came from the island of Qarnein, which held 20,000 pairs of **Lesser Crested Tern**, over 1,200 pairs of **Crested (Swift) Tern**, an estimated 15,000 pairs of **Bridled Tern** and 1,050 pairs of **White-cheeked Tern**, along with at least 200 pairs of **Sooty Gulls**. Larger colonies of White-cheeked Terns were found on several other islands, with another small Sooty Gull colony on Dayyinah, making the UAE home to the only two colonies of the species known in the Arabian Gulf.

The tern colonies of Qarnein are sufficiently large to make it one of the most important sites in the Gulf, and the island has been nominated as an Important Bird Area for the Middle East. It also holds the sole remaining known colony in the UAE for **Red-billed Tropicbirds**. Television viewers shared the discovery, with short items on BBC, CNN and Star Television.

Abu Dhabi's islands also proved to be good places for wayward migrants. On Kafai, an **Upcher's Warbler**, a **Yellow-throated Sparrow** and a possible **Spanish Sparrow** were found on June 15. On Qarnein, a male **Black-headed Bunting** was seen on June 17.

Regrettably, the **Greater Flamingos** that bred at the Al Wathba Lakes last year, (*Tribulus* Vol 3.2, P. 5-7), the first in Arabia for over seventy years, were unable to do so this year, as the lakes have been infilled, in a move whose environmental logic seems impenetrable. It is to be hoped that plans for new artificial wetlands in Abu Dhabi's desert now being drawn up will pay more attention to the needs of local birdlife.

From the point of view of migration, there is a quiet spell of anticipation during mid summer when bird movement seems to come to almost a complete standstill. It is surprising, however, how early 'autumn' passage actually starts. The first signs are usually wetland species on the coast or at man-made pools. On June 28, a flock of 290 **Lesser Sand Plovers** made an appearance at Khor al

Beidah, heralding a good autumn, particularly as they were with two **Crab Plovers**, always a rarity at this site in mid-summer. The bulk of the UAE's Crab Plover population in summer is usually at the colony on Abu al Abyadh, which held around 300 pairs this year, and its smaller offshoot at Umm Amim.

The sprawling fields at Hamraniyah have a diverse avifauna in summer, and are a relatively new breeding site for **European Bee-eater**. 10 were there on June 28, along with over 30 **Bank Mynahs**, now spreading up the coast, 40 **Indian Rollers**, 4 **Red-wattled Lapwing**, dozens of **Purple Sunbirds**, and a **European Swallow**, surely a lost spring migrant.

Simon Aspinall reported a slow, but steady, flow of **Wilson's Storm Petrels**, interspersed with several **Persian Shearwaters**, visible from the shoreline near the Sandy Beach Motel on the East Coast on June 30. They were still passing on July 1, supplemented by over 400 **Bridled Terns** and about 30 skuas, mainly **Pomarine**, passing during a three hour period in the late afternoon.

Meanwhile in the mountains near Masafi, a **Lappet-faced Vulture** was seen overhead on July 1, the first sighting from this area since Major Michael Gallagher led 'Operation Tuyur Watch' there in 1971. On July 15, a pair of **Barbary Falcons** were found on the summit of 3,000 foot Jebel Hawrah near Al Ain, a previously unknown site for the species, which now seems to be relatively widely, if thinly spread.

Several **Bruce's Scops Owls** were found after sunset in Mushrif Park, ten minutes drive from downtown Dubai, on July 8 and 10, perched in the open under street lighting. There have been several sightings of 'scops' owls here over the years, which surely indicates breeding.

Other early migrants included two **Green Sandpipers** at Ramtha Tip on July 14, a **Glossy Ibis** in Dubai on July 15-16, a **Blue-cheeked Bee-eater** and 8 **Whiskered Terns** at Zabeel fish ponds, also in Dubai, on July 16, and a **Cattle Egret** and three young **Sooty Gulls** there on July 20.

A **Caspian Plover** was present at the Emirates Golf Course in early August and 34 **Cream-coloured Coursers** were counted at Abu Dhabi International Airport on August 18, a high total. 24 **Great Knot** were counted on Merawah island on August 22-23. One **Knot** was present on August 23.

First winter **Citrine Wagtails** appeared at Khor Dubai and at Al Wathba on August 19, the first of autumn. A **Blyth's Reed Warbler** was ringed on Merawah on August 23, with three more ringed the next day, only the 2nd to 5th records. Merawah also produced a **Black-headed Bunting**, the first of several this autumn, and 2 **Rose-coloured Starlings** on August 23.

Excitement peaked in September, due in part to intensive work by ornithologists from Poland and France who joined in an Abu Dhabi Shorebird Project, organised in collaboration with the National Avian Research Centre, believed to be the largest such project ever carried out in the Gulf, and sponsored by several local companies, including ENHG Corporate members ADCO, ADMA-OPCO and the Al Fahim Group, and TOTAL Oil Company.

While studying wader migration in Merawah and on nearby mudflats, they found three new species for the country. The first was a **River Warbler**, netted and ringed on August 29, followed by a **Red-necked Stint** on September 9, at Dhabbiyah. The next day, a **Kittlitz's Plover** was found on the Merawah mudflats, a first UAE record and only the second for Arabia, (the first having been trapped by Erik Hirschfeld in Bahrain).

A wader count from September 9-11 produced a total

of 36,343 birds at twenty sites. Of particular interest was the evidence that the UAE is used as a refuelling site by a number of species, while there was a significant contrast in species counts from the January count. Visiting and resident birders competed from mid to late September at almost bird race frenzy, and another new species was found off the East Coast when two **Lesser Noddys** were seen off Ras Dibba on September 14. One, at least, stayed until mid-October, permitting all the members of the EBRC to 'twitch' this welcome stray. A **Black-shouldered Kite** at the Fujairah National Dairy Farm at Dibba on September 15-16, only a 3rd record, underlined the importance of this site, now producing a fine selection of birds throughout the year. Back on Merawah, the Abu Dhabi Shorebird Project ringers were seeing or trapping several **Blyth's Reed Warblers** daily from September 6, suggesting a previously unsuspected migration route for a bird only first recorded locally four months earlier. On September 18, a **Blyth's Pipit** landed and refused to keep out of the nets for the following few days. Each time it was released, it obligingly called, to the delight of all present. Neither species had been recorded locally prior to 1993. Overall, 144 birds of 35 different non-wading species were ringed, (the most common being **Whitethroat**, **Olivaceous Warbler**, **Clamorous Reed Warbler** and **Blyth's Reed Warbler**, the latter a remarkable result when the species was only first recorded in May). Also ringed were 322 waders of 22 species, with the most common being **Bar-tailed Godwit**, **Sanderling**, **Grey Plover** and **Curlew Sandpiper** and **Lesser Sand Plover**, the totals representing a useful addition to the steadily growing number of UAE-ringed birds.

Other good reports included an adult male **Pallid Harrier** at Hamraniyah on September 18, a **Lesser Kestrel**, first of several autumn records, at Dibba on September 16, a **Caspian Plover** on Das island on August 26, a build up to an amazing 603 **Great Knot** on Merawah, (a record number for Arabia), and a **Bruce's Scops Owl** at Hamraniyah, the latter two both on September 18. A **Namaqua Dove** (6th record) was at Dibba on September 14, 3 **Little Crakes** at the Emirates Golf Course, September 17-20, with a **Bittern** also there on September

ber 18. A sight for sore eyes was a flock of 40 **Red-necked Phalaropes** swimming on one of the ponds at the golf course on September 8, while at least 30 **Rose-coloured Starlings** were reported from several locations, including the golf course, Merawah and Dibba, from September 2-17. A female **Cinereous Bunting** was at the golf course on September 17, and a ridiculously early **Brambling** at Jebel Ali the same day. Six **Long-toed Stints** at the Al Ain Camel Track on September 29 and one in mid-month at the Ramtha Tip were also noteworthy.

The winter influx of **Cattle Egrets** into Abu Dhabi began early this year, with the first records from early September, building up to five by the end of the month. This is another potential breeder for the UAE.

The above records, all subject to formal confirmation by the Emirates Bird Records Committee, have been taken from reports submitted to *BIRDWATCH* magazine and to the weekly *Twitchers' Guide* in *Emirates News*.

Two useful pieces of information were gained from the first two ever recoveries of UAE-ringed birds, both ringed by Erik Hirschfeld, and both **Reed Warblers**. One, (ring number A0354), was ringed in Bateen Wood on April 10 and was controlled (retrapped and released) there on August 25, indicating its faithfulness to the same site on both spring and autumn migration. The second, A0374, was ringed at the Zabeel fish ponds in Dubai on May 4 as a breeding adult with broodpatch, and was controlled in Bateen Wood on September 1, indicating post-breeding dispersal within the UAE.

Finally, the British Trust for Ornithology has advised the Group of details of a **Great Black-headed Gull** found dead on Jumeirah beach on January 9 1992, bearing the ring Moskwa DB-366 014. It was ringed as a juvenile in Russia's Astrakhan Delta, north of the Caspian Sea, on May 25 1991, and had travelled a distance of 2,222 km. Other ringed gulls of the same species have also been found in the UAE in previous years.

COLIN RICHARDSON,
Recorder,

Secretary, Emirates Bird Records Committee.



Mammals

Evidence of the survival of the **Arabian Wolf**, *Canis lupus arabs*, in the Hajar Mountains became available earlier this year with a photograph being taken of the carcase of an adult hanging on a tree near Ayeem, north of Masafi, on April 22nd, by Jim Footit of the Dubai Natural History Group. A later visit to collect the skeleton was fruitless, with only a decayed **Red Fox**, *Vulpes vulpes arabica*, (smaller and orange in colour), being found under the tree, perhaps a regular 'hanging tree.' Footit and colleagues are certain they were two different animals, while the picture is clearly not that of a fox. The first confirmable Wolf record is still awaited.

Over the past year, effort has been put into collecting information from villagers living in the mountains, which, although it is not scientifically verified, provides a good guide as to what may exist. It is now apparent that substantially more wildlife exists than previously recorded. The numbers of **Caracal Lynx**, *Caracal caracal*, and of **Arabian Leopard**, *Panthera pardus nimr*, are obviously greater than once believed, although there are still far too many being killed. Records kept by the Arabian Leopard Trust, indicate that since December 1st 1993, there have been five live sightings of Caracals, but elev-

en seen dead, while there has also been at least one Leopard killed this year, in the Al Waib area of Musandam, with another being seen live on a ledge near Al Waib on August 28th.

There is also hearsay evidence of the survival of other species.

From Wadi Safad, north of Fujairah, a villager, Ali Ahmed, has reported the presence of 'wa'el' in a remote part of the wadi. The word 'wa'el' is used to describe both the **Wild Goat**, *Capra aegagrus* and the **Nubian Ibex**, *Capra ibex nubiana*, neither of which have been recorded in recent years by scientists.

A male Wild Goat from a private collection in Al Ain was paired earlier this year with an ancient female which had been living alone at the Al Ain Zoo for the past fifteen years, while a four month old female and a one year old male, from two different private collections in Al Ain, were presented to the Zoo. Both are said to have come from the UAE's Hajar Mountains.

Ali Ahmed also reports sightings of Wolves by villagers in June, in an area he describes as being seven kilometres from his house, deep in the mountains.

This winter, a major priority for scientists will be at-

tempts to work with villagers to see, and if possible to photograph, such animals, which will, for the first time, permit a proper inter-relationship between scientists and villagers and hunters.

Group members who speak Arabic could help when wandering about in the mountains, by asking villagers if they know of any wild animals. The Arabian Leopard Trust, (P.O.Box 12119, Dubai), run by Dr. Marijke Jongbloed, can supply a book of photographs of the key animals and the Arabic names, as well as a standard questionnaire for serious surveyors.

Other reports continue to provide evidence that the **Brandt's Hedgehog**, *Paraechinus hypomelas niger* is more widely spread than previously suspected. From Al Ain, Mike Gillett reports a flurry of records in Jimi, the Prismic area and Al Kuwaitat, as well as in Fossil Valley, while Gary Feulner saw no less than five live specimens in the Wadi Yarana in Ras al Khaimah, (ABBA Square WA28), and one more dead in a field on April 15th. Marijke Jongbloed found three in Dubai in the first half of the year. Dubai NHG member Tony Johnston reported two at high altitude on the Dibba to Ras al Khaimah route, while Bob Read noted a road kill in the same area.

While hedgehogs can be seen quite easily, dead or alive, our resident rodents are smaller - and move

sufficiently fast to escape at least some of the traffic. Studying organic matter, found near tombs in Buraimi in January, Bob Read, found a couple of skulls identified later as being of the **Jird**, *Meriones crassus*, and of the **Spiny Mouse**, *Acomys cahirinus dimidiatus*, the latter one of only a very few recent records. A friend later showed him a live, but captive **Libyan Jird**, *Meriones libycus*, in Buraimi.

There is substantial research still required on our mammals - and road kills can often provide information more easily than elusive live sightings.

Also from Al Ain came reports of several large Bats seen flying at dusk on several occasions in January and February near the cement factory and mineral water plant. On the Dubai-Al Ain road, Marijke counted up to sixty bats at lamp-posts in each winter between 1986 and 1992. No identifications were possible. The same is true of bats seen opposite the Chicago Beach Hotel in Dubai in May 1994. As previously stated, more work needs to be done on this group of mammals.

Thanks, as usual, to those providing records, including Gary Feulner, Michael Gillett, Marijke Jongbloed, Bob Read and the staff of NARC.

PETER HELLYER
Recorder



GROUP PROGRAMME - January to June 1994

January 3rd	: Jaime Samour, A Day in the Life of a Vet.,
January 17th	: Annual General Meeting
February 7th	: Richard Day, The Southern Bald Eagle research programme.
February 21st	: Steve James, 'How to be a birdwatcher in the UAE.'
March 7th	: Prof. Daniel Potts and Jodie Benton, 'Excavations at Tell Abraq and Jebel Emaleh.'
March 21st	: Dr. & Mrs. John Cooper, 'Animal research in a Rwanda Gorilla reserve.'
April 18th	: Dr. Geoffrey King, 'An update on excavations on Sir Bani Yas.'
May 2nd	: Tom and Teri Bailey, 'The Chipangali Savannah Wildlife Research Project.'
May 16th	: Gary Feulner 'Water in the UAE: a natural history travelogue.'
June 6th	: Patrick Moore, 'Missions to the Planets.'
June 20th	: Dr. Richard Hornby, 'Conservation in Uzbekistan.'

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BOOK REVIEWS

Supplement to The Pre-Islamic Coinage of Eastern Arabia, by D.T. Potts

Continuing archaeological research into the Emirates is now being paralleled by the publication of a growing number of academic works. The latest is a *Supplement to the Pre-Islamic Coinage of Eastern Arabia*, by Professor Dan Potts, who, besides excavating Tell Abraq and Jebel Emalah, is also perhaps the top expert on the indigenous pre-Islamic coinage of the area.

The original work, published in 1991, has been rendered out of date by the appearance of a number of new coins, many of which are in private collections Potts was previously unable to examine. A number, though, are surface finds from Mileiha, near Dhaid, one of the two main sites for local pre-Islamic coinage, the other being Ad Door.

As reported in his first work and elsewhere, a fragment of a coin mould was found at the Mileiha fortress site excavated by Michel Mouton, (see Page 7 and *Tribulus* Vol 2.2, Page 5, (*Archaeological research in the Emirate of Sharjah*), suggesting that a mint existed there. Examining the new coins from Mileiha, some of which are of a new class, Potts proposes that the pre-Islamic ruler Abi'el, whose name appears on many of the coins in Aramaic, may well have had his centre, and mint, at Mileiha in the early Second Century BC.

It now seems that Abi'el's name continued to be used on debased coinage as late as the First Century AD. As such, he appears to be the first historical personage from the Emirates of whom we thus far have definitive, albeit scanty, knowledge.

Potts's two books, taken together, provide the only satisfactory existing introduction to eastern Arabian pre-Islamic numismatics, although one would wish also for a publication that provided information about the coins of Alexander the Great and his Greek successors that are known to have circulated in the region.

The publication of the *Supplement*, as well as the original work, was possible only because private individuals made their collections available for study, both from Saudi Arabia and from the Emirates. Rumour has it that there are other collections in the UAE that have yet to be seen by archaeologists, and it is to be hoped that they will now let their coins be examined.

Those interested in the country's early history will make sure they obtain the *Supplement* as well as the first volume. Together, they provide an invaluable insight into a still little-studied aspect of the UAE's heritage.

(*Supplement to the Pre-Islamic Coinage of Eastern Arabia*, by D.T. Potts. Carsten Niebuhr Institute Publications, University of Copenhagen, Njalsgade 92, DK-2300, Copenhagen S, Denmark.)

PETER HELLYER

Emirates, by Dr. M.A. Nayeem

With more discoveries about the archaeology of the UAE being made every year, there is a pressing need for a new book devoted to the topic. In particular, one appealing more to the specialist than to the general reader. Sadly, an attempt to fill that gap has fallen far short.

Volume Three in a series on the Prehistory and Protohistory of the Arabian Peninsula, by Dr. Muhammed Abdul Nayeem, of the Department of Archaeology and Museology at Riyadh's King Saud University, the book is called simply *Emirates*, and reviews archaeological discoveries from earliest times up to the end of the Iron Age, around 400-300 BC.

With seven emirates to cover, Nayeem has adopted the approach of first going period by period, and then, within each period, listing the sites from each, offering a guide to what can be found where. Most of the major sites are covered, from the first one ever dug in the country, Umm an Nar, to Jebel Emalah, near Mileiha, which was excavated this spring.

There are, of course, glaring gaps to anyone who follows Emirates archaeology closely, such as the 7,000 year old 'Ubaid cemetery in Umm al Qaiwain and excavations in the Wadi Qawr, at Qidfa or in Kalba, but this is, to be fair, because the archaeologists concerned have not yet published any reports. When one relies on published material, one is in the hands of those who publish.

Nayeem divides his book into sections dealing with the physical environment, the constituent elements of local archaeology, Stone Age cultures and the subsistence economy, and then the settlements and structural remains, funerary architecture, pottery and stone vessels, metallic items, miscellaneous antiquities and rock carvings. There is also a section dealing with the foreign relations of the region in ancient times.

So far, so good, but partly as a result of Nayeem's own lack of knowledge of the UAE, and partly because he lacks contacts with some of the archaeologists, he has not kept fully abreast of the re-evaluation that takes

place when one archaeologist makes discoveries that question the conclusions, on dating for example, on sites excavated earlier.

Nor is there any real attempt to assess the significance of individual discoveries. Our *Tribulus* Chief Editor, Rob Western, found flint tools at Qusaihwira, Habshan and Bu Hasa many years ago, now on display in the Al Ain Museum, but Rob would no doubt be amazed to see the three places figure among a list of important sites, which they weren't, and aren't. Merawah, Dalma and many of the sites around Al Ain are of much more significance.

There are, moreover, infuriating inaccuracies, like a map that shows the city of Abu Dhabi sitting on the Dhabbiyyah peninsula, thirty kilometres to the west. More seriously, a map purporting to show the main sites in the text is grossly inaccurate, with Khor Fakkan next to Dibba, the sites around Al Ain, like Hilli and Rumeilah, scattered nearly half way across the desert towards Abu Dhabi, and Mileiha half way between Dhaid and Khatt, rather than south of Dhaid.

Editing by a qualified eye would have made the book simpler to read, while it is disturbing to find textual references to plates that simply don't exist, quite apart from those that are out of order.

Those whose desire to obtain an introduction to the topic of the UAE's archaeological heritage outweighs their desire for linguistic correctness will find the book a useful introduction.

I suspect, however, that those actually involved in local archaeology will simply shake their heads sadly at the thought of so much effort being expended for such a sadly inadequate result. Perhaps one of them could show us how it should really be done.

(*Emirates: Prehistory and Protohistory of the Arabian Peninsula, Volume 3*, by Dr. Muhammed Abdul Nayeem, Hyderabad Publishers, 10-2-5/8/1, A.C. Guards, Hyderabad - 500 004, India).

PETER HELLYER

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