

Bulletin of the Emirates Natural History Group



OCTOBER 1993 Vol. 3.2

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 in1991, 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.

Correspondence and enquires should be sent to:

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

Editorial Board:

H.E. Sheikh Nahyan bin Mubarak al Nahyan, Patron, A.R. Western, Chief Editor, Dr. Patrick Osborne, Dr. Michael Gillett, 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, **AI** Ain. The original is on display in **AI** 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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Cover illustrations:

English : A male Kestrel Falco tinnunculus in a fodder field outside Abu Dhabi The species is a breeding resident in the Emirates. (D.R. Robinson)

Arabic : Painted potsherds of the 'Ubaid period, circa Fifth Millenium BC, from a site on Dalma island, the oldest settlement yet identified in the UAE. (Dr. G.R.D. King)

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 26, without whom publication in this format would be impossible.

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

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Editorial

As with many other countries in the Middle East, the United Arab Emirates has now clearly joined the environmental bandwagon. The recent establishment of the Federal Environmental Agency, (whose Law appears in this issue of TRIBULUS), the planned Environmental Week in November and a UN-sponsored Environmental Management Training Workshop in December all imply a growing Governmental commitment to green issues that goes far beyond the beautifying of cities with trees, shrubs and lawns.

The emphasis thus far has been quite rightly on urban areas, where most people live and work. The Agency's avowed priority is to tackle pollution in industrial areas and also marine pollution in the Northern Emirates. Regulations for Environmental Impact Assessments are being drawn up for industry as a whole, (and are already in operation in Abu Dhabi's oil industry), while consideration is also being given to the questions posed by the disposal of solid waste and the use of pesticides in agriculture.

The Environmental Week, coinciding with this year's National Day, is designed to encourage public awareness by encouraging active participation from the media, an excellent move, but we beg to note that the stress still remains on the health of the cities.

The UAE is a very small country, about the size of Scotland. While the promotion of green awareness in the urban areas is laudable, it seems to me that, sooner rather than later, there must be some assessment of nationwide environmental planning.

The past thirty **years** have seen enormous development across the UAE's land area, and all the offshore islands have been affected to a greater or lesser degree. One might argue that the desert will always be there, albeit reduced in area as towns, industry and, farms encroach upon it.

It may be argued too that some of the mountain areas are too remote and too rugged to be in any danger from such pressures. Yet those of us who have been resident

here for ten years or more have already seen farreaching changes across the face of the landscape.

Where the Liwa was once a strip of plantations difficult to reach, the whole area from Habshan southwards is now one vast farm with an infrastructure of towns and villages. Elsewhere, the desert has been pushed and pummelled into conforming regularity. Once dunes, now level fields.

Where farming projects have not yet been established, the open desert is still open to the abuse of the widescale dumping of waste and the extraction of 'gatch.' More recently, the development of an unregulated tourist industry is further pressurising an already fragile ecosystem in the desert area, with the same being true of some mountain areas. Just look at what has happened to Jebel Hafit, near Al Ain.

It is true that nature has tremendous resilience. Many plant and animal **species** adapt to change in fheir habitats, some even thrive. But thus far, there has been no ecological or environmental study of the impact of human pressure upon the UAE countryside as a whole.

As an early compiler of records of wild flowers here, I have noticed definite changes over the years. There has been widescale accidental introduction of alien plant

species through fertilisers and various other organic imports. There must be the fear that, unless the situation is properly investigated, the UAE might follow the path of other developed countries, like Britain, and lose a significant proportion of its biological diversity.

The time has perhaps come for the setting aside of a number of areas to serve as mini National Parks, which collectively would highlight the diversity of habitats throughout the UAE. Some could be open to the public for recreational purposes, while others could be managed as reserves, primarily for scientific and educational purposes. Such reserved areas would need to be fenced off and left to develop naturally, with no grazing, hunting or settlement rights permitted, and then monitored continuously over a period of years to describe and monitor ecological and habitat changes.

Only through the creation of such parks may future generations be certain of seeing what diversity there really is in this country's landscape.

The alternative is the inexorable slow deterioration in the quality of our surroundings, the diversity of our wild-life, and our overall environmental awareness.

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In TRIBULUS, of course, we shall continue to report on a variety of environmental issues, as well as on the country's natural history and heritage, both as a matter of record and as a way of stimulating further interest in the UAE's heritage, fascinating in all its forms.

Maintaining our policy of a broad spread of topics, this issue includes a report on the first breeding of flamingos in Arabia for over seventy years, sadly unsuccessful due to nest robbing.

Carolyn Lehmann produces the second part of her major paper on fossil sea urchins to be found in the UAE, while attention is given to the UAE's endangered mammals in the form of a review of the killings of both lynxes and leopards last winter. Besides archaeology and other pieces on topics as diverse as ants and the diet of carpet vipers, the issue also contains, in both English and Arabic, the text of the law establishing the UAE's Federal Environmental Agency.

Many of the articles and papers report on original research not previously published elsewhere, in reaffirmation of the Group's and magazine's objectives of encouraging and publishing scientific research.

Finally, as part of long-term plans to enhance the scientific validity of TRIBULUS and its contents, we are delighted to welcome to the Editorial Board two distinguished scientists, Dr. Patrick Osborne, Head of Science for the National Avian Research Centre in Abu Dhabi, and Dr. Michael Gillett, lecturer in biochemistry at the Faculty of Medical and Health Sciences of the Emirates University, both of whom will contribute substantially to the quality of the magazine.

With three years of publication now complete, **TRIBU**-LUS remains the only magazine in English publishing scientific research into the whole range of natural history and heritage of the United Arab Emirates. Thanks to continued support from our Corporate sponsors, we shall continue our endeavours to act as an open forum for all those interested in the UAE's environment and heritage.

ROB WESTERN

The first breeding of Greater Flamingo *Phoenicopterus ruber* in the UAE

by Simon Aspinall and Erik Hirschfeld

Introduction

On June 7th 1993, SA and EH visited the AI Ghar Lake, situated close to Mafraq on the truck road to AI Ain east of Abu Dhabi, (ABBA Square: UB25), for some late afternoon birding. Apart from numerous Black-winged Stilts Himantopus himantopus and Kentish Plovers *Charadrius alexandrinus* with chicks, a group of a few hundred Greater Flamingos *Phoenicopterus ruber* were present in the same lakes.

Getting out of the car to mount our telescopes to see what other birds were around, SA immediately saw what appeared to be a group of incubating flamingos on a **sandbar**, just a few hundred metres away from the road-bank on which we were standing. Attracting **EH's** attention, an attempt was made to get higher than the roof of the car in order to look into the nest-mounds. Two eggs were visible, one of them being turned over by an adult using its bill, and the first breeding of Greater Flamingo in the UAE, (and the first in Arabia since **1922**), was proven.

The event aroused considerable interest in the media and among government officials, while birdwatchers visited the colony frequently, observing and documenting breeding progress during the month it was active. The colony was found deserted on July **9th**, after the hatching of at least four eggs, probably due to human disturbance.

Description of the breeding site

The AI Ghar Lakes are a complex of pools in 'sabhka.' (salt flats), which are dependent upon rainwater in winter, and which formerly received nutrient-rich waste inflow via an outlet from the nearby AI Wathba sewage treatment plant. The water **levels** therefore vary, although levels in the summer of 1993 were exceptionally high, (Peter Hellyer, pers. comm.). In some years the lakes almost completely disappear by the early autumn, such as in 1992, prior to the usual winter rainfall. The maximum depth is around two metres, although most of the area is certainly of a depth of less than one metre. The complex is criss-crossed by embankments which are used by lorries, and which provide good views of the lakes for birdwatchers.

According to newspaper reports, it was suggested that brine shrimps and their larvae were the main food of the adult flamingos, although apparently only larvae were actually found in the lakes. Dr. Reza Khan of Dubai Zoo (*pers.* comm.) suggested that the food was in fact bloodworms, the larvae of the familiar midge. These occur abundantly in the lakes, with more than 2000 larvae fitting on Reza's business card. A two to three by a half metre 'clump' of these small organisms was seen in the water close to the colony. An algal bloom in the lake may also have provided additional nourishment. The Centre for Desert and Marine Environment Research at the Emirates University collected water and faunal samples for analysis and their results are awaited. الموضـــــوع:

* في صيف عام ١٩٩٣ بدأت مجموعة من طيور الفلامنجو التكاثر في منطقة بحيرات الشعار في أبوظبي وذلك لأول مرة في المنطقة العربية لأكثر من سبعين عاماً. هذا المقال يلقي الضوء على محمية الفلامنجو في تلك المنطقة والتي تعرضت للتخريب بكل أسف.

Breeding progress

On June 7th, at least two eggs had already been laid, 15 nest-mounds seemed to be fully constructed, and six birds were apparently incubating. Counts by various . observers during the month after the initial discovery of the colony showed that 15 to 22 nest-mounds held incubating birds, and up to **571** adult flamingos (on June 10th) were present on or near the breeding lake.

Two hatched chicks were seen on July **5th**, with four on the following day, and as the incubation time for Greater Flamingos is 28-31 days, (Cramp & Simmons **1977**), the eggs observed on June 7th must have been very recently laid. The colony was found deserted on July **9th**, with the last observation of it in use being on July 8th.

The number of adult flamingos had shrunk to around 150 by this time, and these birds were found in the northernmost lake, well away from the breeding lake, apart from those birds actually involved in incubating or caring for newborn chicks.

Numbers continued to decrease in **AI** Ghar over the summer, with 220 on July **22nd**, and only singles still present in early August.

A total of 79 fully or partially constructed nest-mounds was counted on July IIth, making it likely that many more pairs would have bred during the summer had conditions been favourable.

The reason for the abandonment of the colony are not clear. Human footprints, one displaced egg and a dead chick were found by Peter Hellyer and Dick **Hornby** on July IIth, and indicate that human disturbance could have been the **cause.It** is also possible that a predator, e.g. an Arabian Red Fox, (*Vulpes vulpes arabica*), could have taken advantage of the situation, although no fox tracks were seen near the colony on July 11th.

The water level in the breeding lake fell rapidly as the summer progressed, and the nesting site, which was initially an isolated sandy islet, eventually becoming connected with the surrounding 'sabkha' prior to the desertion of the colony.

It was also noticeable, (P. Hellyer, pers. comm.), that over the month between the discovery of the colony and its desertion, 'as the water level shrank, the numbers of non-breeding adult flamingos feeding near the colony fell dramatically as the birds moved over to feed on the northernmost lake, with only small numbers of birds remaining. By early July, even birds from the nesting site were feeding on the other lake, returning to the colony only around nightfall, suggesting a decline in available food supplies near the colony. Even had there been no disturbance it is feared that the young would have starved prior. to fledging (a not uncommon occurence at many breeding sites).

Nigel Jarrett, (*pers.* comm.), who has considerable experience of captive breeding Flamingos, visited the Al Ghar Lakes, and commented that many of the nest mounds appeared to be nests from a previous year. Also several first-year birds were clearly associating with incubating adults, and were presumably last year's offspring of those same birds.

It is possible that breeding was overlooked in 1992, although records from that year give no indication of the presence of Flamingos on the breeding lake during that period, which, in any case, had largely dried up much earlier than in 1993. Otherwise, the 'closest-known breeding area is in Iran. (There are several ringing recoveries from Dubai of flamingos ringed at Lake Uromiah, **Iran** and one of a Russian bird recovered in Abu Dhabi, while there are Omani records of recoveries from Lake Rezaiyeh, also in Iran).

Flamingos are regularly present at the AI Ghar Lakes in flocks numbering up to several hundred. They were first observed at the AI Ghar Lakes by Peter Hellyer in March 1990, and reached a maximum of 125 in the winter of **1990/1991**, (March 22nd 1991). Numbers rose to 180 in ,July 1991 and to 350 in September, with lower numbers over the winter. 300 were recorded here in the summer of 1992, although with the near-disappearance of the lakes in the autumn of 1992, the birds all moved away. They began to return after rains in January 1993, with up to 50 being seen in late February, rising to nearly 600 in summer 1993.

No previous breeding attempts have been recorded in the United Arab Emirates, and it is unlikely that the species has previously bred or attempted to,breed at Al Ghar Lakes without being detected, as the site is frequently visited by birders, even if nest-mounds were commenced or completed prior to this year.

Other summer occurrences in the UAE

Khor Dubai has traditionally been considered as the most likely site in the UAE where flamingos might breed, as large numbers have been present there in the breeding season in recent years. **An** artificial island was built in late summer 1985 to encourage nesting, but was

never used. Numbers in Khor Dubai have regularly totalled up to 800 individuals in recent summers, (see Emirates Bird Reports, passim), but there was a decrease in 1992 and 1993, when the maximum numbers recorded were only 278 and 89 respectively. Wintering numbers at Khor Dubai have also decreased. Perhaps some of those birds later moved further south west to the AI Ghar Lakes.

Summering flamingos have also been noted in recent years in numbers of a hundred or more at Ramtha in Sharjah and on the island of Sir Bani Yas in the extreme west of the Emirate of Abu Dhabi.

Future prospects for Flamingo breeding in the UAE

Land reclamation work in the autumn of 1993 filled in the whole of the 'sabhka' lake that had provided the original breeding site, while the main lakes to the East were also being partially filled. The increasing number of flamingos using the lakes in summer had originally led to the hope that a further breeding attempt might be made in 1994, but regrettably the disturbance to the habitat and a failure to provide any management now renders this unlikely.

Acknowledgements

We would like to thank Peter Hellyer, Colin Richardson and Dr. Joseph Platt for providing background information about Flamingos in the UAE, and Dr. Reza Khan for his information on food samples from the lake. Graham Clarkson, Nigel Jarrett and Martin McGill from the National Avian Research Centre, as well as PH and CR, kindly communicated their observations from the Al Ghar Lakes.

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Fossil Sea-Urchin tests found in the U.A.E. and adjacent areas

Part II : The "Irregulars"

Some Descriptive Notes and Identification Aids

by Carolyn Lehmann

Exposed formations of fossil-bearing sediments containing marine deposits from the Late Cretaceous Period are found in the United Arab Emirates and neighbouring areas of Oman. This paper, the second and concluding part, (Part 1, see **TRIBULUS** Vol. 2:1 page 3) describes and illustrates some of the fossilized echinoid tests occurring here. Although several other species are present, these are rare and only those which have been collected by Emirates Natural History Group members have been included. Preliminary field identification was done by Dr. Andrew B. Smith, Department of Palaeontology, British Museum (Natural History); taxonomic studies continue. Glossary appended.

Period: Late Cretaceous

Maastrichtian approx. 77-65 million years ago

Phylum: Echinodermata

Class: Echlnoidea

Sites: Jebel Buhays, J. Huwayyah (Fossil Valley), Jebel Rawdah

SUBCLASS: Irregularia

"Irregular' echinoid tests display bilateral symmetry. The periproct, no longer in a central position, lies outside the apical disc In the posterior interambulacrum; sometimes located aborally, or on the posterior edge of test, or even orally near the peristome. Peristome remains on the ventral (lower) surface but may be **off-centre** anteriorly.

ORDER: Holectypoida. 'The most primitive group of irregular echinoids. Cretaceous holectypoids have non-petaloid ambulacra composed of uniform pores from apex to peristome. The peristome lies centrally on the oral surface.

FAMILY: Conulidae

Conulus (Globator) orientalis Cotteau & Gauthier



* الجزء الثاني من دراسة حول القنافذ البحرية المتحجرة «المستحاثات» والتي تعود الى نهايات العصر الطباشيري وتم اكتشافها في المنطقة الشرقية لدولة الامارات العربية المتحدة ومناطق عُمان المجاورة. تم تشر الجرزء الأول في عدد «تريبيلوس» ١-١ الصادر في شهر ابريل عام ١٩٩٢م.

Somewhat inflated test with flattened oral surface; some of oval outline and slightly flattened, others rounder and higher. Very small, uniform tubercles entirely cover the test surface. Clearly outlined by minute pores, the ambulacra 'V' out in uniform rays from a compact apical disc containing 4 gonopores. Pearshaped (teardrop) periproct lies on posterior edge or 'side' of test, slightly above mid-line. Ambulacra continue around to peristome centred on oral surface. Elliptical with pointed ends, the peristome lies slightly angled to an imaginary circumference bisecting the apex and periproct.

FAMILY: Holectypidae

Coenholectypus inflatus (Cotteau & Gauthier)



Circular outline, medium to high-domed, with centre of oral surface slightly sunken. From compact apical disc containing 5 gonopores, ambulacra radiate in a straight line direct to centred peristome. Pore-pairs remain constant in size from apex to peristome. Tubercles fine aborally, slightly more prominent orally. Evenly spaced interambulacral tubercles are aligned both vertically and horizontally. This orderly appearance is emphasised by rectangular test plates, visible in weathered specimens. On oral surface, small elliptical periproct lies close to circular, sunken peristome which has pronounced gill slits.

ORDER: Cassiduloida All five ambulacra are petaloid. Special enlarged pores **concentrated** around peristome.

FAMILY: Faujasiidae Procassidulus sp. nov.



Small, broad test with rather shovel-shaped outline due to keeling on oral surface which is otherwise flattened. Aborally, slopes from high, rounded anterior to a wider, flatter posterior edge. High and vertical on this aboral posterior interambulacrum is a short anal sulcus containing a narrow, slightly elongated periproct. Tubercles tiny, somewhat larger on oral surface. Apex with 4 gonopores, slightly anterior. Petaloid ambulacra have 2 distinct rows of furrowed pores. Petals narrow distally but remain open, ending before the ambitus. Minute pores continue between petals and phyllodes. Small, pentagonal, stellate peristome offset anteriorly; surrounded by strong, projecting bourellets and phyllodes of pores arranged with a curved or bowed outer row. Orally, centre of posterior interambulacrum has lengthwise ridge devoid of tubercles leading to peristome.

Petalobrissus sp. nov.

Highly resembles *Procassidulus* (see above) except for the following differences: 1) Less shovel-shaped outline due to lack of side keels on oral surface (has only the mid-line raised in a slight ridge along oral posterior interambulacrum). 2) Periproct is longer and slit-like. 3) Phyllodes consist of 2 very well-marked rows of pores which are straight but convergent rather than bowed or parallel. There are circular pits along centre of phyllodes.

Cassidulus arumensis (Kier)



Oval, smoothly-domed test with flat oral surface. Vertical anal sulcus is longer than *Procassidulus*, extending to **ambitus**. Periproct is an elongated triangle. Apex, ambulacra and petals similar to *Procassidulus*. Peristome, though similar, is larger than in *Procassidulus* and phyllodes are parallel-sided, not bowed. Oral posterior interambulacrum not ridged.



Markedly truncated posterior results in rather rectangular outline, with long anal sulcus slightly distorting the **ambitus** inward: oral surface concave. Apex, ambulacra and petals similar to *Cassidulus arumensis*. Narrow, elongated oval periproct lies in upper portion of sulcus. Slightly anterior on sunken mid-line, the peristome is nearly **semi-circular** but may appear pentagonal in **degraded** specimens. No **bourellets**; phyllodes are parallel-sided. Naked zone on posterior oral interambulacrum.

Stigmatopygus sp. nov.

Moderately inflated, **smoothly** domed, test of broad oval outline with flat oral surface. Triangular (key-hole shaped) periproct with

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slight projection at top lies on the **ambitus**. Petaloid ambulacra have 2 distinct rows

of furrowed pores; pore columns of posterior pair are different lengths. Tubercles tiny, somewhat larger orally. Elongated pentagonal peristome lies longitudinally and slightly anterior. Large, distinct bourrelets project at junction of interambulacra with peristome.



Phyllodes consist of large, sparse and widely-spaced pores forming a single arc. Well-developed naked zones.

Faujasia eccentripora (Lees)



Medium to low-domed, flattened orally, and having a distinctive shield-shaped outline with pronounced projection at posterior edge of test. Two interambulacra either side of posterior one, also somewhat projected. Surface covered with minute tubercles which become more prominent orally. Gonopores widely separated and located in each interambulacrum rather than in apical

disc. Dorsal ambulacra strongly petaloid, outlined with double row of pores; minute pores continue to phyllodes near peristome. Small circular periproct lies orally just under the posterior projection. From here a markedly raised ridge runs direct to the small, anteriorly offcentred, pentagonal peristome. Peristome surrounded by swollen zones and by phyllodes of pores arranged in a bowed outer row.

Pygurostoma morgani (Cotteau & Peron)



Large, low-domed and orally concave with sub-oval outline and slight posterior projection. Underneath this projection, orally, is long, narrow periproct lying parallel to body length. Many minute tubercles, somewhat larger orally. Like many cassiduloids, apex has 4 gonopores, the posterior pair being further apart. Paired ambulacra of uneven length (see *Arnaudaster*) are distinctly petaloid with conspicuous, furrowed pores. Sunken, pentagonal-appearing peristome has distinct and large **bourellets** projecting over it. Outer row of **phylloidal** pores distinctly bowed around many inner bands of pore-pairs, giving leaf-like appearance.

FAMILY: Pliolampadidae

Zuffardia morgani (Cotteau & Gauthier)



Grape-shaped, covered with minute tubercles. Ambulacra and tubercles similar to *Petalobrissus* (see above). Small, round periproct located high on posterior edge of test; no groove. Peristome also small and circular, surrounded by swollen zones and by parallel-sided phyllodes of sparse pores.

FAMILY: Echinolampadidae.

Arnaudaster sp. nov.





Somewhat inflated, egg-shaped with flattened oral surface, slightly sunken in area of peristome. Covered with fine tubercles, more prominent orally. Apex slightly anterior, contains 4 gonopores. **Petaloid** ambulacra; single anterior and the posterior petals longer than antero-lateral pair and lateral petals have porecolumns of unequal length. Small, subcircular periproct on posterior just below mid-line. A narrow naked zone runs from periproct to **peristome.** Rather large pentagonal peristome slightly anterior. Indistinct phyllodes.

FAMILY: ClypeolampadIdae

Vologesia sp. nov.

High-rounded, eggshaped, flat-based test. Many fine tubercles, larger orally. Aboral ambulacra, edged by uniform pores, are



narrow, open, sub-petaloid and continue to **ambitus**; minute pores orally to peristome. Oval periproct lies cross-wise

just under edge on oral surface. Pentagonal peristome far forward. Naked band between periproct and peristome.

ORDER: Holasteroida Heart-urchins with elongate apical disc. (ill.)

FAMILY: Holasteridae

Hemipneustes is the largest Cretaceous echinoid found in the U.A.E. Oval outline, truncated posterior, deeply sunken anterior ambulacrum, furrowed pore-columns of unequal width (see picture).



Hemipneustes persicus Cotteau & Gauthier



Small, low-domed, and flat-based of sub-oval outline. 4 gonopores at centred apex; apical disc long and narrow. 2 pairs of petaloid ambulacra contain furrowed pores, one column distinctly wider than the other. Single anterior ambulacrum lies in relatively broad groove which runs around front edge and continues to semi-circular peristome which is well anterior. Elliptical periproct on truncated posterior, visible from oral surface.

Hemipneustes pyrenaicus Hebert



Large, 'tall,' high-sided, rather rectangular test, flattened' orally; sub-oval outline. Apex lies well anterior. Apical disc, two pairs of ambulacra, periproct and peristome similar to *H. persicus* (see above). Long, deep anterior ambulacral groove is slightly narrower than H *persicus*.

Hemipneustes arabicus Ali



Similar to *H. pyrenaicus* except test is flatter and more oval. Apex slightly posterior. Frontal groove narrow and sharply defined.

Note: The above three species of Hemipneustes are primarily distinguishable from one another by **1**)over-all shape and/or size, 2) width of anterior ambulacral groove, and 3) position of apex.

ORDER: Spatangoida Heart-shaped test. All

U.A.E. taxa have anterior ambulacrum in a frontal groove, differing from the other ambulacra which are petaloid. Show functional specialisation of spines and tubercles. Peristome semi-circular and lying well anterior. Apical disc compact. (ill).



FAMILY: Hemiasteridae

Mecaster victoriae Lambert



Inflated, heart-shaped test with high sides and flattened

oral surface. Higher posterior region is truncated, forming flat 'side.' Minute tubercles. Apex has 4 gonopores. Four relatively long, equi-length, sunken, petaloid ambulacra; anterior ambulacrum continues in a groove running around edge of test. Elliptical periproct high on flat posterior 'side.' Peristome semi-circular and well forward.

Hemiaster (Bolbaster) sp.



Inflated, ovoid, high sided, flatly domed test; markedly high posterior region 'peaks' on oral surface. Apex slightly posterior. Attractive pattern created aborally by 4 sunken, petaloid ambulacra which are paired, posterior pair being much shorter than anterior pair. Single, anterior ambulacrum, the longest, lies in a narrow, shallow groove which does not reach the **ambitus**. Oval periproct positioned high on posterior edge. Peristome oval and well forward. As with all spatangoids, posterior 'peak' on oral surface encircled by concentric rings of special tubercles which carried 'pusher' spines.

Notes: I) A spatangoid, (Family: Schizasteridae)

Proraster (Sanfilippaster) geayi Cottreau, was

found but it appears to be rare in the U.A.E. and our only specimen is extremely weathered. Low-domed, flat-based, posteriorly-truncated test of suboval outline. Apex markedly posterior. Two pairs of petaloid ambulacra of very unequal length, posterior pair much shorter. Anterior ambulacrum lies in a remarkably deep,



wide groove which narrows considerably at ambitus. Elliptical periproct on truncated posterior just below ambitus. Semi-circular peristome well forward.

2) A new genus and species of spatangoid was also found. It and all the other new species are being monographed by Dr. Smith.

Glossary:

Aberal –	surface opposite the mouth; upper
	or dorsal surface; in regular
	urchins, anus is located here.
Ambulacrum –	pore-bearing segment
Ambitus –	equator, periphery, mid-line; great
	circle circumference.
Anterior -	front or forward portion
Apical disc 🛛 🗕 🗕	structure at apex of aboral
	surface.
Bourellets -	raised projections surrounding
	peristome; regions of dense small
	spines specialised for manipulat-
	ing particles into the mouth.
Cretaceous Period-	latest period of Mesozoic Era,
	following the Jurassic; 135 to 65
	million years ago.

Distal	-	remote from the point of attachment or origin.
Dorsal	-	upper or top surface; same as aboral.
Echlnoderm	-	member of phylum containing the starfish, brittlestars, feather stars, sea-cucumbers and sea-urchins.
Echinold	-	sea-urchin
Fasciole	-	narrow band (often appears to naked eye without magnification) of fine, dense tubercles forming linear features on test surface.
Furrow	-	narrow channel connecting pore-pairs
Gill slits	-	openings around edge of peristome for external gills.
Gonopore	-	small opening in genital plate of apical disc through which eggs are released; connected internally to gonads.
Interambulacrum	-	area of test between the ambulacra.
Maastrichtian	-	last Age of Cretaceous Period, approx. 77-65 million years ago; named for district in Netherlands where rocks of this age are well developed
Naked zone	-	Smooth area where no tubercles are present.
Oral (adoral)	-	surface of test on which mouth is located; lower or ventral surface.
Periproct	-	opening for anus; in regular urchins, located within apical disc.
Perlstome	-	opening for mouth
Petal		area of enlarged pore-pairs on aboral surface bearing specialised

		respiratory tube-feet.
Petaloid	-	form or appearance of a petal
Phyllode	-	leaf-shaped concentration of pores bearing specialised tube-feet for manipulating particles into mouth, in ambulacra
Pores	-	openings where rows of hollow tube feet operated by a water-vascular system protruded through the skeleton; usually paired.
Posterior	-	back or rear portion; in irregular urchins, direction in which anus migrated away from apex.
Stellate	-	resembling a star, in shape .
Sulcus	-	groove, slot
Taxon (pi.taxa)	-	any unit used in classifying organ- isms, e.g. species, family, etc.
Test	-	chalky shell-like skeleton of a sea-urchin.
Tubercle	-	rounded projection or outgrowth on body surface; knob-like mounting for spine; attachment point of spine.
Ventral	-	lower or bottom surface; same as oral.

Acknowledgement: Wihout the invaluable assistance, information, and field work provided by Dr. **Andrew** B. Smith, Department of Palaeontology, Briiish Museum (Natural History), this paper would not have been possible. Photographs by Dieter Lehmann.

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A summary of recent Lynx and Leopard sightings in the Northern UAE and Musandam

by Peter Hellyer

Even a cursory glance at UAE newspapers during the first few months of 1993 shows that there was a remarkable upsurge in the number of lynxes and leopards being reported, most, unfortunately, being dead. Both species are recognised to be endangered across the whole of their range, while the sub-species in the Arabian Peninsula are particularly rare. The number of records suggests that populations of both continue to hang on, but also that they remain under threat from hunters.

Increased media attention to the killing of wild animals may have helped to ensure that more incidents were reported than before. It also appears, however, particularly from the reports of Caracal Lynxes, that there may have been an increase in the population.

Local experts like Group member Marijcke Jongbloed suggest that reasonable winter rainfall over the past few years, with a consequent improvement of the vegetation * يعد السنور الصحراوي والنمر العربي من الحيوانات البرية النادرة في دولة الامارات العربية المتحدة. وفي شتاء عام ١٩٩٢ - ١٩٩٣ أفادت التقارير ان عدد من هذه الحيوانات تعرضت للقتل. هذا المقال يلقي الضوء على هذه المسالة ووضع تلك الحيوانات في المنطقة.

and consequently large numbers of prey animals like small rodents and hares, may have accounted for this increase.

At the same time, both lynxes and leopards apparently not only have the ability to increase quickly in number in times of plenty, (with more kittens being born and more surviving to maturity), but also can reduce litter sizes, leading to a population decline during times of hardship. Evidence of more animals now does not suggest that population numbers have entered a long-term recovery in numbers.

Those responsible for shooting the lynxes and leopards almost invariably claim that they have been losing sheep and goats to the predators. There is, however, little independent evidence to support this claim. There is, moreover, as reported in TRIBULUS over the past couple of years, some circumstantial evidence of increases in number in the mountains of at least one alternative prey species, the Arabian Gazelle, *(Gazella gazella cora = arabica)*.

The ecology of the UAE's lynxes and leopards is little known, and only through further study will it be possible to clarify this point.

Protection of these large cats is clearly an urgent task. It is difficult, however, to quarrel with the opinion of the Chairman of the Federal Environmental Agency, Health Ministry Ahmed Saeed al Badi, that there is also a need for the interests of hill tribesmen to be taken into account.

In an interview after the shooting of leopards in mid-May, Al Badi was quoted as saying that "it is a tragedy to see these animals being killed. It's clear that there is a great need for the people in the areas concerned to be educated about these animals, about their status as endangered species, and about the need for them to be protected."

"At the same time," Al Badi went on, "we must recognise that these people can suffer losses from these animals taking their stock We have to make sure that we can offer the necessary protection to the people of the mountains, for their children and for their livestock. Otherwise, how can we expect them not to seek to protect themselves? We hope that there will be increased awareness of the need for preservation of these rare animals, but there are other factors to take into consideration as well." (1)

Preliminary discussions are under way on a strategy that will probably include **compensation**, an educational campaign to stress the importance of the animals and existing laws protecting them, and efforts to capture some animals from the wild for a captive breeding programme.

The records over the winter of 199211993 are summarised below. (All records are from ABBA SQUARE WA 28, mainly in the area of the headwaters of the Wadi Bih, on the **UAE/Musandam** border, except where shown).

Caracal Lynx (Caracal caracal schmitzi)

- ★ A record from the Wadi Bih headwaters on November 30th 1992, of a carcase seen hanging on a tree. (This is a different record from that reported in TRIBULUS Vol 3.1., April 1993, of which a
 photograph was on the front cover. That lynx too had been shot in the Wadi Bih area, suggesting two casualties on or around the same day).
- ★ March 20th: one Lynx or Leopard, (probably lynx), seen alive in the headquarters of the Wadi Bih.
- March 25th: Two seen shot in the headquarters of the Wadi Bih, inside the UAE.
- * Late March: One mother shot in the Wadi Bih area,

probably inside the UAE. with three kittens being taken, and sold for Dh. 160.00 (around US \$ 43.50). One kitten was located in April and is being successfully reared, the only lynx currently known to be in captivity n the Emirates, but the other two died from diarrhoea caused by inappropriate feeding.

- ★ Early April: One shot by a tribesman in the Wadi Madha enclave of Oman, near Khor Fakkan, (ABBA SQUARE: WA27). Said to have been taking goats. The loss of goats continued after the shooting of the animal.
- ★ Mid-April: One road casualty near Wadi Abadla, on the highway from Masafi to Dibba, (ABBA SQUARE: WA 27).
- ★ April 23rd: One seen shot in Wadi Khabb Shamsi, 15km north of Dibba.

Arabian Leopard (Panthera pardus nimr)

- ★ November 1992: One shot in the headwaters of the Wadi Bih. Its skull was recovered for study.
- ★ May 13th: One shot dead, another wounded but escaped, twenty kilometres east of the Wadi Bih dam in the headwaters of the Wadi Bih. The sighting of two together suggests that they may have been part of a family party.

The records of Caracal Lynxes over the last few months, (ten dead, and one, possibly two, alive) have been more than the total of previous records in the possession of the Group. One or two have previously been seen shot dead in the mountains behind Ras al Khaimah, (for example in 1987 and 1988), while the footprint of one was found in clay in 1987 near Hatta, (WA26), and is now in the Group collection.

Others have almost certainly been shot in the mountains, but have not been reported.

Arabian Leopards are equally scarce, if not more so. Two dead, one wounded and one possible over the winter of 199211993 compare with a total of nine previous records in the last thirty years, some unsubstantiated, as follows:

Two killed in Ras al Khaimah in the late nineteen sixties, an unsubstantiated report of one being seen near Bithna in Fujairah, (WA27) in the late nineteen seventies, one being wounded on Jebel Hafit, near Al Ain, (VB25) in 1976, which later died in Al Ain Z ∞ , a male shot in Ras al Khaimah in July 1986, a female and two young adults in the same Emirate in December of the same year, and then a gap until the capture of one near Masafi (WA27) in February 1991, (see TRIBULUS Vol 1.2, October 1991).

Overall, according to Dr. Alan Shoemaker, Deputy Chairman of the Cat Specialist Group of the International Union for the **Conservation** of Nature, IUCN, (of which the ENHG is a member), "I doubt if the entire Arabian population (of leopards) is more than a hundred," (2), with only five in captivity, the one captured near Masafi in Dubai and **four at** the Bait **al** Barakah breeding centre in Oman.

Leopards can wander over wide areas in search of food, and, says Shoemaker, "I would suspect that any leopards found in the UAE are migrants from Oman."

Lynxes, perhaps both more common and more territorial, are also endangered, and, like the leopards,

need a viable captive breeding programme. In the UAE, only the young kitten rescued after the death of its mother earlier this year, (see above), is in captivity.

More field study, as well as more education and the initiation of a captive breeding programme, may well be the only way in which both animals can be preserved as part of the UAE's wildlife.

(A special trust to promote conservation and protection of the UAE's cat species was established in the summer of 1993:

The Arabian Leopard Trust c/o. Dr. Marijcke Jongbloed,

PO Box 12119, Dubai, UAE Individual memberships for UAE residents is Dh. 30 per year)

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A preliminary list of ant records from Abu Dhabi Emirate, U.A.E.

by Barbara J. Tigar and Cedric A. Collingwood

Introduction

Most people living in the UAE are probably aware of ants even if their only experience is finding them in their kitchen cupboards. Although some ants may reach pest status by infesting foodstuffs or crops and can cause a nuisance by biting humans, others rarely come into contact with man and live entirely in the desert environment of the UAE. In fact, many ant species are capable of surviving extreme climatic conditions such as the surface temperature of sand dunes (up to 50°C) On a collecting trip in November 1992 a number of different ants were found, including one species called Cataglyphis minima that had only been recorded previously once in Saudi Arabia (Collingwood, 1985). A preliminary list of ants for the UAE follows which incorporates these recent records as well as some examples collected by Heatwole (1991) and observations by Wingate (1992). It is hoped to increase these records through an invertebrate monitoring scheme being set up under the auspices of the National Avian Research Centre in Abu Dhabi. This will be part of the houbara bustard feeding ecology programme which is investigating the importance of invertebrates in the diet of this omnivorous bird. Surveys of Saudi Arabia and Oman have found 156 and 28 species respectively (Collingwood, 1985 & 1988) and recent material has boosted the total number of ant species in Arabia to around 275 (Collingwood, unpublished). Therefore it is quite possible that the 14 species listed here are only a small proportion of those that occur in the UAE.

Annotated list of ant records for UAE

Order : Hymenoptera Family : Formicidae

Family : Formicidae

Subfamily : Myrmecinae

Messor ebeninus Forel: BJT, Ras Ghanada Island 8.X1.92,

Messor rufotestaceus Foerster: BJT, 24' 46.8'N

هذه الدراسة توضح عرضاً لأنواع مختلفة من النمل تم رصدها في إمارة أبو ظبي.

54'55.3'E 9.X1.92

Crematogaster **antaris** Forel: BJT, 24' **46.8'N 54'55.3'E** 9.X1.92.

Monomorium abeillei **André:** BJT, Ras Ghanada Island 8.X1.92

Monomorium mayri Forel: BJT, 24' **46.8'N** 54' **55.3'E** 9.X1.92

*Monomorium tumairi*Collingwood (in litt): HH, Jebel **Hafit** autumn 89. **BJT, Ras** Ghanada Island 8.X1.92.

Monomorium wahibiensis Collingwood (in litt): HH, Jebel **Hafit** autumn 89. BJT, Ras Ghanada Island 8.X1.92.

Subfamily : Formicinae

Camponotus xerxes Forel: BJT, Ras Ghanada Island 9.X1.92, *BW, Ain Al Faidah Hotel & Park, April & May 1992.

Cataglyphis livida **André:** HH, Jebel **Hafit** autumn 89 BJT, Ras Ghanada island 8.X1.92.

Cataglyphis niger André: *BW, Al Ain Zoo, Ain Al Faidah' Hotel & Park and Al Wigan, April & May 1992.

Cataglyphis flavobrunneus Collingwood (in litt): HH, Jebel Hafit autumn 98, BJT, Ras Ghanada Island 8.X1.92.

Cataglyphis minima Collingwood (in litt): **BJT,** 24' **46.8'N 54'55.3'E** 9.X1.92, BJT Ras Ghanada Island 8.X1.92.

Cataglyphis sabulosa Kugler: HH, Jebel Hafit autumn 89, BJT 24' 46.8'N 54' 55.3'E 9.X1.92.

Acantholepis nigrescens Karawajew: BJT, Ras Ghanada Island 8.X1.92, BJT, 24' **46.8'N** 54' **55.3'E** 9.X1.92.

Recorders : HH-Haroid Heatwole, BJT = Barbara J. Tiger, BW = Bob Wingate. Determinations of all material collected by HH and **BJT** carried out by Cedric A. Collingwood. List according to Collingwood (1985).

Indicates that the identity has not been confirmed, although *C.xerxes* is distinctive because of its size. The genus *Cataglyphis* is also one of the more difficult taxonomic groups because of differences in geographically separated forms of the same species.

Discussion

In spite of their cosmopolitan occurrence few ant records exist for the Middle East and even fewer for the UAE. Those listed here range in habits from common household pests such as members of the genus *Monomorium* to night foraging ants such as C. xerxes and also those that are highly adapted to the desert environment, such as the genus Cataglyphis which is able to forage during the heat of the day. This is probably a reflection of the areas from where the ants were collected, which included a residential field research station, as well as several desert areas around Samha, **Al** Ain and Ras Ghanada Island, all in Abu Dhabi emirate. Future work to be carried out in further study areas may well increase the number of species recorded in UAE.

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French Archaeological Mission in Sharjah — Results of the 1993 Season

by Dr. R. Dalongeville and Dr. M. Mouton

Since 1984, the French Archaeological Mission in Shariah has been working to reconstruct the evolution of the environment in the Quaternary era throughout the Emirate. The results of preceding seasons were briefly presented in an article in an earlier issue of TRIBULUS, , (Vol. 2.2, October 1992, Page 5). During the 1993 season, in January and February, the approach adopted was different. Efforts were focussed on the Mileiha area, south of Dhaid, where the Mission first began working in 4986. The area is of particular interest in helping to understand the nature of human occupation of this part of the Oman Peninsula from the end of Iron Age to the first centuries of the Christian era. There are a number of topics of interest, such as why the site was selected for settlement and why it was later abandoned, the sources of food and water supply, the nature of agriculture and animal husbandry and so on.

In particular, work focussed on the excavation of the fort first discovered in the central part of the site in 1990 and on a geomorphological study of the environment. In future years, the programms is expected to include further work on the fort, excavation of thg site's iron and copper metallurgy craft areas and a continued study of the site's environment and past agricultural practices.

Mileiha is situated at the convergence of the seasonal streams flowing from the **eastern** and western slopes of Jebel Faiyah and from **the Hajar** Mountains to the east. The water runs from Mileiha to the north towards Dhaid, while the valley between Jebel Faiyah and Jebel Mileiha allows sands blown by the westerly winds to pass through. Thus the Mileiha area is subjected to two different dynamic forces, the streams and the wind.

* هذه الدراسة توضيح نتائج التنقيبات الأثرية التي قام بها فريق الأثار الفرنسي في امارة الشارقة خلال عام ١٩٩٣ مع التركيز على قلعة مليحة بالقرب من الزيد والتي يعود تاريخها الى ألفي سنة.

During period of relatively high humidity, the water manages to stop the encroachment of the sands, but during more arid periods, the sand advances to the east to the base of the mountain glacis, and the seasonal flows of water have considerable difficulty in removing This creates favourable conditions for the it accumulation behind the sand barrier of elements such as finer sand and silt, which could have supported a prosperous agricultural community in the past. In the cultivated area of Mileiha, to the north west and west of the main archaeological site, the thickness of the silt deposits exceeds three metres. Two areas containing terrestrial gastropods have also been identified, on which Carbon 14 dating is awaited, while a number of samples have been collected for vegetal macrorests and polynology.

The second area of particular interest has been that of local metallurgy. The first evidence of iron metallurgy in the Oman Peninsula has been found at Mileiha, dating to the third century BC. Excavations have yielded a number of bronze and iron objects, while in some areas of the old town, a large amount of bronze and iron slag has been found, suggesting a local source of the minerals, which has yet, however, to be located.

Searches have been made for mineral deposits in the Mileiha area, but it seems likely that the copper ores came from the **Hajar** Mountains, where mines of a later period have, for example, been discovered in the Wadi Qawr area, or from further away in Oman.

The source of the iron is less clear. The altered features of the ophiolites and fractures in the limestones of, in particular, Jebel Faiyah and Jebel Buhays, contain concentrations of ores which could have been exploited by man, although there is as yet no evidence of working of the Jebel Faiyah deposits in antiquity. Analysis of iron tools found in *situ* is being carried out.

The concentrations of iron in the Mileiha area are generally enclosed by flint, and this has led us to evaluate our original evaluation of the local lithic industry. We did **not**, for example, understand why there was such a large quantity of flakes on the lithic sites used to produce flint tools here, as compared to other lithic sites in the region. One possible explanation could be that the flakes are the result of man's search for iron ores. Further study should help to provide some answers.

THE FORT

The fort at Mileiha is built entirely of mud-brick, and is roughly square in shape. It is formed by a main outer wall. 1.90 metres thick. while the total length of the western side is 55 metres. Only the western side of the building is currently accessible, the remainder being covered by the road between Dhaid and Madam.

At each extremity of the western wall, which has been fully excavated, is a rectangular tower, measuring six metres by nine metres. A third tower projects from the middle of the wall. This third tower was at one point accessible through a door, which was later blocked, perhaps after construction had been completed.

Abutting the main wall, and bordering a central courtyard empty of structures, is a row of rooms. All have doors that open on to the main **courtyard**, but they do not appear to be linked to each other. In the corner of the southernmost room is what appears to be a **mud**brick staircase. The rooms also run along the northern and southern outer walls which continue under the modem road, and we may assume that rooms on the other side of the road are organised in a similar manner.

Because of preliminary soundings carried out in the 1992 season, we know that the fort has four levels:

Level 1: The construction level. The fort is built on a sand dune to the north and on natural soil to the south. After construction was completed, the interior of the fort was back-filled to provide a completely horizontal floor.

Level **2** The earliest occupation level, so far found only in soundings. The floors of this level are separated from those on the level above by an earth layer 10-20 cm. thick.

Level 3: On top of the previously mentioned layer of earth are the floors of the second level of occupation of the fort. These floors were completely excavated during the 1993 season, and are characterised by an abundance of potsherds and ashy layers. It was possible to identify the uses of different rooms from the material found within them.

In the northeastern room, which was not completely excavated, a vast amount of bones belonging to fish and large herbivores was found, but only a few potsherds. In the long neighbouring room to the west, there was an abundance of sherds of large storage jars and imported amphorae, while in the next room to the south there was again only a very little pottery, along with a large Qrindstone. To the south, there was a small room with many hearths or fireplaces composed of irregular stones, and large potsherds. The remaining rooms on this side were badly eroded.

The only room on the south of the courtyard to be excavated contained a fireplace constructed of mudbrick and small pieces of pottery, including painted wares. The towers did not contain any material of much significance except for the tower in the south west, in which were found broken storage jars and a fragment of a coin mould.

The finds, particularly of pottery, suggest the occupation of the building during the First Century of the Christian era. The presence of painted ceramics with abundant fine red mineral temper, imported glazed wares and certain forms of Western blown glass could indicate that occupation continued into the Second Century AD. This type of material has not been found anywhere else in the Mileiha area, but is present at the site of Ad Door in Umm **a**l Qaiwain, which was occupied from the First to the Fourth Centuries AD.

Level 4: Temporary. occupation layers have been identified on the lower destruction levels and irregular floors with associated material and small fireplaces 20-30 cm above the third level.

In the 1994 season, it is planned to excavate the lower occupation levels, and the **eastern** half of the fort, provided that the modern road is diverted.

The Mileiha fort, apparently built at the beginning of the Christian era, pre-dates the round-towered fort excavated by the Iraqi archaeological team at Ad Door in 1973, and points to the existence of a structured and stable society in Mileiha contemporary with the beginning of occupation of the Ad Door site.

The discovery in the fort of numerous pieces of copper and iron slag as well as large rotated grindstones indicates the permanent presence of metallurgical and agri-, cultural activities among the **population**. The discovery of fragments of two or three coin moulds, of well-known early Arabian types, shows that the fort was related to a politico-economic power in Mileiha which was sufficiently strong and stable to be minting its own money.

An Aramaic inscription found on a site in another part of the Mileiha area in an earlier season has recently been translated, and refers to the construction of a funerary monument in 'Mukki.' This could be the ancient name of Mileiha, which is the largest settlement so far known in the Oman Peninsula covering the whole period from the Third Century BC to the First Century of the Christian era.

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New discoveries on Dalma and Sir Bani Yas

by Peter Hellyer

The second season of the Abu Dhabi Islands Archaeological Survey Project took place in March and April 1993. Under the sponsorship of UAE Chief of Staff Major-General Sheikh Mohammed bin Zayed al Nahyan and directed by Dr. Geoffrey King of the School of Oriental and African Studies at London University, the season involved a continuation of survey work on islands offshore and along the coast, and excavations on the islands of Dalma and Sir Bani Yas.

The Dalma site was that of a settlement dating to the 'Ubaid period of the Fourth and Fifth Millenium BC, and shows that the island was occupied as much as 7,000 years ago. The oldest settlement yet discovered in the country, its location on an island offshore suggests that the inhabitants were capable of undertaking sea voyages at least around the Southern Gulf.

The site was first identified during preliminary survey work in 1992, and lies in and around the compound of the Abu Dhabi Women's Association. It covers an area of at least 150 metres by 300 metres. A lengthy test trench showed that archaeological deposits were more than one metre deep. From initial work it was clear that certain areas of the site were used more intensively than others, and further work is planned.

The finds included over one hundred and fifty potsherds, many of the typical painted 'Ubaid type known from southern Mesopotamia and elsewhere in Eastern Arabia. Other finds included two fine green stone amulets, believed to be the first of their kind ever found in the UAE, stone and pottery weights for fishing nets, a variety of beads and fragments of carved shell, large quantities of fish bones and shells, and several thousand flint chippings as well as a number of flint tools. There is no natural flint on the island, so the raw material must have been imported by sea.

At a lower level of the site, hard-packed surfaces were found, marked with post-holes, indicating that the site was a probable settlement, at least on a seasonal basis. the earliest settlement yet known in the Emirates.

The depth of the archaeological deposits, which begin a mere five centimetres below the current surface, indicate that the site was occupied over a lengthy period of time, with an interval of sand suggesting an interruption of occupation.

Major sites from the 'Ubaid period'previously discovered have been concentrated further north in Eastern Arabia, in Qatar, Saudi Arabia and Bahrain although a few scattered potsherds were known from Ajman, Umm al Qaiwain and Ras al Khaimah. Together with another major 1993 excavation of an 'Ubaid cemetery in Umm al Qaiwain, however, the Dalma site proves the existence for the first time of a substantial relationship between the 'Ubaid culture and the southern Gulf.

On Sir Bani Yas, three sites were examined.

One was a shallow wadi in the Ras Danan area on the north of the island, with evidence of occupation in the Islamic period, although without permanent structures. Potsherds and other material, such as fish and dugong bones and a fireplace, were examined and plotted, with tentative evidence of dating, based on a comparison of the pottery, to the mid-Islamic period. Some of the pottery was' of types known from elsewhere in the Emirates, but there were also sherds of Chinese celadon, tentatively dated to the sixteenth century.

Additional surveying of surrounding bluffs and hillsides revealed evidence of occupation during the local **Neo**-lithic period, although dating was not possible.

The main excavation took place on a mound in a pen containing llamas, part of the introduced wildlife on the island. The site was first identified from potsherds collected by Group member Carolyn Lehmann in May 1991.

The mound with evidence of plaster and of the lines of walls visible on the surface, proved to cover a building surrounded by a courtyard. In antiquity, the walls had all collapsed neatly outwards, still showing the courses of stone of which they were built. Walls and floors were finely plastered, while the roof of the building had evidently been of wood or similar material, which had been destroyed by fire. Seven similar mounds lie nearby, one of which will be examined in the 1994 season.

Not far away, a much larger mound, covering an area of several thousand square metres, was sampled, following the discovery on the surface in 1992 of finelyworked plaster, (see **TRIBULUS Vol 2.2**, October 1992). Remains of walls and floors of what was evidently an extensive settlement were located, probably the main settlement in the area.

Preliminary dating of the pottery found both in the courtyard house and on the village site suggests a dating from late Sassanian times until the Omayyad period. No other sites from the same period were previously known from anywhere else in the Emirates nearer than Jumeirah in Dubai, over 400 kilometres east of Sir Bani Yas, although the 1993 Survey produced surface evidence of possible contemporaneous occupation on the island of North Yasat, south west of Sir Bani Yas.

Taken together, the Sir Bani Yas and Yasat sites suggest the presence of a sophisticated series of island settlements in the west of the southern Gulf.

The importance of the discoveries is underlined by the fact that nothing was previously suspected or reported, of any important settlements in the area apart from the well-known **pearling** centre on Dalma.

In its first two years of work, the Abu Dhabi Islands *Ar*chaeological Survey has made substantial discoveries that are beginning to change the understanding of the history of this region. According to Survey Director **Ge**offrey King, "Before we started our work, no-one had any idea that there was such a wealth of archaeology on the islands and along the coast of the Western Region. It was virtually a blank on the map of the history of the Gulf. As we begin to fill in those blanks, we can see that the people of the region have been playing an important role in the region for many thousands of years.'

Besides the support of the Survey's Patron, the 1993 work was sponsored by Emirates Airlines and by Group Corporate member the Abu Dhabi National Oil Company, ADNOC, with additional logistical support being provided by Corporate member the Abu Dhabi Company for Onshore Oil Operations, ADCO, and ICL.

Further excavations, and survey work along the coast are being planned for the 1994 season.

Archaeology Recorder of the Group, the author also acts as Co-ordinator for the Abu *Dhabi Islands* Archaeology Survey.

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NOTES AND QUERIES

Iron Age Fort in Fujairah

More information on the ancient past of the East Coast of the UAE has been revealed with the disclosure of the results of an excavation of the remains of an Iron Age fortress at Husn Madhab, on the outskirts of Fujairah.

The discoveries at Husn Madhab were announced by Pierre Corboud, leader of a four-member team from the Swiss-Liechtenstein Foundation for Archaeological Research Abroad, which has been working in Fujairah for several years under the terms of **agreements** signed between the Fujairah Government and the Grand Duke of Liechtenstein, Prince **Hans-Adam**.

According to Corboud, "the fortified site of Hush Madhab is definitely one of the most important sites in Fujairah, because of its size, about 80 metres by 50 metres, and because of its good state of preservation."

The site is that of a major Iron Age fort, dated to around the first half of the First Millenium BC, (1000 BC to 500 BC).

The decision to excavate the site was taken because of the discovery on the surface of numerous pottery sherds from the Iron Age period, inside an enclosure wall and on the hill top.

During the excavations, Corboud and his colleagues uncovered the entrance to the fort, which comprised, he said, Your steps, followed by a corridor. The steps were made of large flat blocks and **packed** down grey silt, located between two square-shaped walls that interrupt the enclosure wall. Other steps **must** be there, but they are currently still covered by rock and silt outside the entrance."

According to Corboud, two benches were placed in the entrance corridor, which extends for a length of 6.5 metres.

Inside the enclosure wall of the fort, excavations yielded the remains of a mortar-lined wall on top of a tank cut into the natural rock, which, according to the Swiss archaeologist, is probably a water cistern. It would have been used to hold water for the **fort's** inhabitants.

"The presence of a water tank in this hill fort," Corboud said, "can be seen as an indication of a continuous occupation of the fortification."

Another excavation along the west of the enclosure wall, half a metre from what appeared to be remains of a structure used for living, was designed to study the archaeological deposits in the area, and also the function of what appeared to be a small opening in the fortress wall. On this site, according to Corboud, a layer of sherds of Iron Age pottery was found as well as a grindstone.

"This means that we found the exact level of one of the various phases of occupation that occurred on the **site**," he said. "A study of the pottery sherds will, we hope, tell us to which period of the Iron Age they belong."

"The soundings we made on the Husn Madhab site yielded many interesting aspects of life of the site," he added, "while we also learned a lot about the architecture of the fortress. We know that it was used during the First Millenium BC, and there is certainly much more important information left to be uncovered."

The Swiss team also examined remains of an Iron Age settlement site at Bithna, not far from the important tomb they excavated a few years ago.

"Little archaeological material was found," says Corboud, "but the plans of the two structures we examined are interesting and are quite rare."

One was a large rectangular house, of about 12.5 metres by 6.5 metres, with two additional rooms, one an entrance lobby, added on to the east side of the building. The second was a rectangular house of 5 metres by 6.5 metres, with rounded corners, and with four large doorsteps.

Corboud and his team also conducted further surveying of some areas, including the Jebel Aqqab area just south of Fujairah International Airport, and adjacent to Kalba, part of the Emirate of Sharjah, as well as in the Mirbah and Qurayyah areas.

The Swiss team, based at the University of Geneva, plans a further series of excavations in the 1993-1994, which will include two or three more settlement sites, as well as further work on the Husn Madhab fortress.

PETER HELLYER

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Brandt's Hedgehog in Al Ain

The ENHG Mammal Recorder's reports for January -June 1992 include the first record for the Group of Brandt's Hedgehog (*Paraechinus* hypomelas *niger*) from Wadi Naqab. At roughly the same time as the publication of this record, I wrote an article for the November issue of the AI Ain ENHG Newsletter describing the occurrence of a hedgehog of this species in a garden in AI Ain. At the time I failed to realise the significance of this record, thinking that the species was well known in the UAE, since it is described and illustrated in Christian Gross's book, Mammals of the Arabian Gulf. The details of my records (and of a less satisfactory one) are given below.

The hedgehog was found during the morning of 2nd

September 1992 in a flower bed of a garden in the **Al** Jimi district of **Al** Ain. It was about **20cm** in length, but could not be accurately measured, as when handled or even approached it rolled itself up into a tight misshapen ball. For the same reason, the sex of the animal could not be determined. The animal agreed well with the description and illustration of P. hypomelas given by Gross, in particular the short legs, large ears and black coloration of head, limbs and spines. Surprisingly, the skin beneath the spines was clean and entirely shining creamy-white. The animal was apparently free of vermin, unlike all other hedgehogs that I have handled. It was released back into the garden where it was found, but has not been seen since. There have been other



The Greater Flamingo Phoenicopterus ruber colony at Al Ghar Lakes, Abu Dhabi, in June 1993, the first recorded breeding in Arabia since 1922. (S.J. Aspinall)



The nest-mounds of the Al Ghar Greater Flamingo colony after robbing of the site in July 1993. The single egg visible was originally found nearby. (P. Hellyer)



The fort at Mileiha, dated to the first centuries of the Christian era, looking from the road that runs through the middle of the site. (P. Hellyer)



A Desert Monitor, Varanus griseus, swimming in the Al Ghar Lakes near Abu Dhabi, (see Page 20). (Dr. Reza Khan)

sightings in recent years of live hedgehogs (species unknown) at the Tawam Hospital site. Another record refers to a road casualty along the Ain Al Fayda road in December 1991; this was also a black animal and was almost certainly a Brandt's Hedgehog. A third Brandt's Hedgehog, a young one, was seen dead in the middle of the road in front of the Al Ain Prisunic supermarket, in March 1993.

These records prompt me to draw attention to a discussion of this species given by Michael McKinnon in

his book *Arabia: Sand Sea, Sky.* He states that this species arrived long ago from Iran, but now has a westerly distribution, occurring in the high mountains of Yemen and Oman. He also mentions that it has been found in the UAE on Jebel Hafit, which would fit well with the present records.

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A Swimming **Desert** Monitor, (Varanus griseus)

On June **II**th 1993, together with three colleagues, I visited the area of the AI Ghar Lake, (ABBA SQUARE UB 25), to study the newly established breeding colony of Greater Flamingo, *(Phoenicopterus ruber)*. In addition to a dozen flamingos sitting on two tiny (5m by Im) islands, nearly 360 of the birds were within a range of 100 metres. There were many Black-winged Stilts, (Himantopus himantopus), and Kentish Plovers, *(Charadrius alexandrinus)*, in the area, some sitting on eggs, and others accompanying small chicks.

While observing some chicks near the western end of the largest of the lakes in the area, we noticed both the Stilts and the Plovers making alarm calls, with some Stilts apparently attacking something close to the water's edge around 100 metres away.

Upon closer examination, their target proved to be a Desert Monitor, *(Varanus griseus),* which was chasing two Plover chicks along the shoreline.

When we approached, the lizard lay motionless on the shore. We encircled it from three sides, so as to cut off its escape up the bank, and began to take close up photographs. Finally, with frequent flicking of its long bifid tongue, it entered the water, diving under the surface, and exhaling a substantial amount of air which rose as bubbles.

After a short time, it surfaced, lay motionless for a few seconds, and then started wriggling its body in a cumbersome way, showing evident difficulty in balancing the trunk. After a minute or so, it seemed to find its balance, and began to swim.

It moved much slower than the related Varanus ssp., (Bengal, Yellow and Ringed Monitors), I have previously watched swimming in Bangladesh.

While we were watching the monitor on the bank and close to us in the water, the Stilts and Plovers continued to make alarm calls. **As** soon as the lizard was five

Archaeology Law

Upon the instructions of the UAE Cabinet, the Ministry of Information and Culture began work early in 1993 on the drafting of a federal law to protect archaeological sites and artifacts as well as other parts of the country's heritage.

The draft law, still be endorsed when this issue went to press, is said to involve the creation of a Higher Council for Archaeology, and to lay down rules for the control of trade in artifacts and on their export.

It also suggests regulations for the control of archaeological excavations, including those carried out

metres or so into the water, two pairs of Stilts began once again to dive at the monitor, which paid no attention, and continued swimming for the other bank several hundred metres away. This took around thirty minutes, with the Stilts continuing to attack it until it was around half way across.

The Desert Monitor has been said to 'dislike water,' and not to take to it readily, one reason being given that it 'inhabits arid sandy country.' (1).

The specimen seen was clearly not a good swimmer. It had a well-rounded tail, unlike other species, which have a 'compressed tail with low double-toothed crest above,' (2), which would be more efficient in the water.

I am not aware of any other records of the Desert Monitor being seen swimming, either in the UAE or elsewhere.

Nor am I aware of any other records locally of the species acting as a predator on the chicks of waders.

Other potential predators on Stilt and Plover chicks seen by others in the area of the Al Ghar Lakes during the breeding season in previous years have included Grey Heron, (Ardea *cinerea*), Marsh **Harrier**, (Circus *aeruginosus*), Brown-necked Raven, (*Corvus ruficollis*), and Arabian Red Fox, (*Vulpes vulpes arabica*). (3).

References:

1 & 2: THE FAUNA OF BRITISH INDIA, INCLUDING CEYLON AND BURMA, reptilia and **amphibia**, VOL.2. (ANURA), SMITH, M.A., Taylor and **Francis**, London, 1935 and

THE BOOK OF INDIAN REPTILES, DANIEL, J.C., Bombay Natural History Society, Bombay, 1985.

3. P. Hellyer, pers. comm.

Dr. Mohammed Ali Reza Khan,

Dubai Zoo, P.O. Box 67, Dubai.

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by teams from abroad. At present, each of the **UAE's** seven member Emirates has the authority to adopt its own individual policv.

Part of the draft also suggests heavy penalties for anyone who illegally smuggles archaeological artifacts abroad, and gives the Higher Council power to purchase any finds.

The Cabinet decision to prepare for a federal law follows a decision earlier in the year by the Emirate of Sharjah to introduce its own regulations.

RECORDERS' REPORTS FOR JANUARY-JUNE 1993

Archaeology and Palaeontology

The first half of 1993 saw one of the most active seasons of archaeology in the Emirates for several years, as both local teams and foreign expeditions undertook work throughout the country.

On the palaeontological front, the team of specialists sponsored by our Corporate members the Abu Dhabi Company for Onshore Oil Operations, ADCO, and the **Abu** Dhabi National Oil Company, ADNOC, completed another winter season of work in the Western Region of Abu Dhabi on the Miocene rocks of the Bainuna Formation, summarised in the last issue.

Some of the results were explained in a **specially**commissioned film, 'Abu Dhabi - The Missing Link,' which compared the supposed environment of the Western Region in late Miocene times with the East **Afri**can savannah of today.

On the archaeological front, activity covered virtually the whole of the country.

As reported elsewhere in this issue of **TRIBULUS**, a team from the Swiss-Liechtenstein Foundation for Archaeological Research began excavation of an Iron Age fort at Ain Al Madhab in Fujairah, (see Page 17), while a French team began excavation of a fort dating from around the beginning of the Christian era near Mileiha in Sharjah, (see Page 15).

In Ras **a**l Khaimah, major work on the site of the old **Islamic** port-city of Julfar came to an end with the completion of last winter's season, with French, German and Japanese teams carrying out work in the early part of the year, following the British dig at the end of 1992.

In Umm al Qaiwain, attention focussed on two expeditions. A team led by Professor Dan Potts, a former speaker to the Group, continued work early in the year at Tell Abraq, site of a Third Millenium fortress that was in continuous use by succeeding civilisations until the early centuries of the Christian era. One major result of this year's work was the partial excavation of a typical mid-Third Millenium 'Umm an Nar' tomb, adjacent to the walls of the fortress, in which a substantial number of burials were found. Also found were a number of artefacts suggesting a possible trading link with the early 'Bactrian' civilisations of northern Afghanistan. Further work will be undertaken next season.

On the coast north of Umm al Qaiwain, Carl Phillips of London University's Institute of Archaeology excavated a fourth or fifth millenium shell mound, discovering several dozen burials from the 'Ubaid period, the first time that such a well-preserved and substantial cemetery from the period has ever been found in the Lower Gulf, and adding very substantially to our understanding of this formerly obscure period.

Excavations were also carried out on another extensive 'Ubaid site on the island of Dalma by a team from the Abu Dhabi Islands Archaeological Survey Project, directed by Dr. Geoffrey King, (see Page 16).

Carl Phillips also carried out excavations under the auspices of the Sharjah Department of Archaeology on a

Fourth Millenium shell-mound near **Khatmat** Milaha, in the East Coast Sharjah enclave of **Kalba**.

In Dubai, a team under Dr. Hussein Kandil of the Dubai Museum continued work on the excavation of late **Iron** Age cemeteries in the Qusais area, and began planning future work on the Omayyad settlement in Jumeirah, while in the **A**I Ain area, work over the 1992-1993 season included preliminary studies on a suspected early First Millenium 'falaj' near Shwaib and rescue excavations on Islamic sites in and around **A**I Ain itself.

Besides the excavations on **Dalma** and Sir Bani Yas carried out by the Abu Dhabi Islands Archaeological Survey, extensive surveying work was done on the islands of North and South Yasat, Ghaghah and Kafai, as well as on parts of the Sila'a Peninsula, during which over a hundred sites were located, ranging in age from recent Islamic to Neolithic. Although much further work remains to be done, the two seasons so far of the Survey have proved the continuing importance of this area over a period of several thousand years, something that was previously completely unsuspected.

Archaeological activity by Group members was relatively limited, although brief surface surveys were carried out on the island of Thumayriyah and in the Sheleala area of the Abu Dhabi coastline. A number of possible pre-Islamic burials were located on Thumayriyah with evidence of Islamic occupation, probably by fishermen, both there and at Sheleala. The sites will be examined later by members of the Abu Dhabi Islands Archaeological Survey.

Group members Kate Bonner and Carolyn Lehmann also joined the excavations on Sir Bani Yas, with the former also assisting in the French excavations at Mileiha.

Archaeology in the United Arab Emirates is receiving an increasing amount of international attention, with several papers on recent work being delivered at the annual Seminar for Arabian Studies in London, which was attended by the Ruler of the Emirate of Sharjah, Dr. Sheikh Sultan bin Mohammed **a**l Qassimi.

Activities by Group members continue to show that there is a role for amateurs to become involved, either in locating sites for the experts to study, or in assisting in actual excavations.

As usual, a number of our Corporate members helped to sponsor local archaeology in a variety of ways, of whom ADNOC and **ADCO** deserve special mention.

Finally, work began during the year on the drafting of a new Federal Antiquities and Heritage Law, designed among other things to enhance the preservation of archaeological sites. Initial indications are that the new Law will continue to place the prime responsibility for this upon the individual member Emirates of the UAE.

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Birds

What could be better than another good birding season in the Emirates, which the first half of 1993 surely was. There was no shortage of experienced observers in the country as the National Avian Research Centre continued to recruit crack ornithologists for a stream of projects in Abu Dhabi and visiting birdwatchers from Europe scoured the country in search of interesting new species for their lifelists. Not to mention the dedication of all UAE birders! All this activity further added to our knowledge of the country's **390**-odd species and helps to bolster our Bird Records. It has not been possible to list all the interesting sightings (this will be covered in Emirates Bird Report 18) but the following reports stand out as worthy for the period.

Rarely recorded due to its anti-social pelagic existence, only one Audubon's Shearwater was seen on 17th June, flying some distance off the beach at Dibba, during the early stages of the south-west monsoon. An extraordinary flock of 21 Little Bitterns were found on passage at Bateen Wood on 28th April, while in the mountains near Masafi Bob Richardson was rather surprised to see a flock of 60 migrating Greater Flamingos fly over at high level in loose V-formation on 30th April. Ruddy Shelduck is always a quality species, with one at Al Wathba prison sewage pools on the 23rd January and 3 at Ramtha on 6 March, only the 10-11th records for the country. A good selection of interesting raptors were found too. A rather northerly Lappet-faced Vulture was seen at Daftah (near Masafi) on 10th March, while Honey Buzzards continued to avoid the Northern Emirates, with up to 2 wintering around Bateen wood and Mushref Palace in Abu Dhabi until early May. A Lesser Spotted Eagle was found at Dubai's fish farm on 28th March (2nd UAE record). Of the smaller faster birds of prey (Bops?), Lesser Kestrels starred at Hamraniyah in early April, where 98 birds were counted each day from 3-4th, while in much smaller numbers single Hobbys were seen at Al Wathba on 28th April and at 'Fossil Valley' (Sih Huwayyah) on the 30th. A Merlin was on Abu al Abyadh from 27th February. 5th March and an immature Lanner Falcon was found dead at the side of a road near Rifaa in Umm al Qaiwain on 20th June. This species is rarely recorded in the UAE and its status is still unknown.

Chukar still seems common in the Musandam area, with 74 counted on 2nd June near Wadi Bih, while on 28th June a Quall was an interesting summer find on Das Island. Literally flocks of Cream-coloured Coursers were encountered in early summer this year: a total count at Khor al Beldah came to 100 birds, present from 26-28th May., Other groups of up to 60 coursers escaping the desert heat were also found near pools at Ruwayah and at Khor Dubai from late May to July. 4 Sociable Plovers spent some weeks at Hamraniyah from 2-20th January, while a White-tailed Plover was at Ramtha on 15th January. 3 very smart Caspian Plovers were on Hulaila Island (Ras al Khaimah) on 5th April: Great Knot still seemed rare, until 227 were seen on the far off mudflats at Merawah Island on 22 March, while a mere 29 were at Khor al Beidah on 5 March and 31 at Abu al Abyadh on 11th March. This species is obviously more regular than previously though. Up to 7 Pintail Snipe overwintered at the Emirates golf course until 19th April and one occurred on passage at the fish farm

from 20-26 April. -Good counts of more ubiquitous waders at Al Ghar bake included 1353 Curlew Sandpipers and 103 Ruff on 16th April and an exceptional 39 Red-necked Phalaropes on 5th May.

Normally scarce, Common Tern lived up to its name in 1993 when 318 were counted roosting at Dibba on 30th May and several hundred others were counted amongst White-cheeked Terns at Kalba and Umm al Qaiwain. In addition 26 Little Tern were counted at Khor Kalba on 18th June, at a time when dozens were being found (in breeding plumage) on other UAE beaches. Perhaps we should be more discerning with these look-alike terns.

Namaqua Doves were seen on Das Island, with single males from 1-2 April and on 29th April. Probable breeding sites of **Bruce's Scops** Owl in Ras al Khaimah were discovered at Wadi Bih in April and at Kharran in June. 7 Egyptian Nightjars over **A**I Wathba camel track fields on 28 April must have been spectacular, while a **Wryneck** on the ladies' beach at Abu Dhabi on 2nd January was the only winter record.

Larks were found in good numbers, with small elusive groups of Small Skylarks found at Khor Dubai on 17th January, Abu Dhabi race track in late February, **A**I Wathba in early March and Abu al Abyadh in late March. At least one pair of Lesser Short-toed Lark was found feeding young on Siniyah Island on 20th May and 7 Bimaculated Lark were at **A**I Wathba on 12th February. Several Bar-tailed Desert Larks were seen between Ghanada and Sweihan in April, which indicating a much wider distribution than previously known. Meanwhile 5 Black-crowned Finch Larks on Das Island in May also indicates the roaming abilities of this genus.

Never common, a Crag Martin was on Das Island 25-28th March, while also on the Island a pair of White-cheeked Bulbuls provided interest when they nested and produced the island's first young in June (quickly taken by a nearby shrike, we should add). Another bulbul, this time on North Yasat Island, seemed to be miles from home. A mystery bird, with the characteristics of Common Bulbul, was reported there on 15th April. Grey Hypocolius, a key species for many birders was seen in a number of western locations, including up to 4 at Abu al Abyadh from late February, 2 at Al Wathba 14th March and 2 on Das Island on 26 March. A Robin was also reported on Abu al Abyadh on 24th March. Single Eversmann's Redstarts were on Abu a Abyadh on 13th April and on Das Island on 27th April, while a Thrush Nightingale was a first for Das on 28th April. There was a flurry of Finsch's Wheatears in March, with 4 reported between 14-18th March at Abu al Abyadh, Abu Dhabi, the Emirates golf course and Fossil Valley. Could these birds have been on passage from some wintering areas elsewhere in Arabia? A similar mystery surrounds the status of Hooded Wheatear which was once again found on Das Island, a total of 4 birds in February and March, while others were found at possible breeding sites at Hatta pools in January and in Wadi Bih in March.

Interesting warblers included single Savi's Warblers at Hamraniyah in March and Bateen Wood in April, Grasshopper Warblers at Al Habab and Abu al Abyadh in late March and one at Al Wathba in April, and a potential 1st record Green Warbler in Bateen Wood on 17th April. Red-breasted Flycatchers were reported from Das Island in February and March, a species rare at the best of times on the mainland and almost never in spring. Nearly a horror story,. **2** House Crows (a spreading pest) arrived on Das Island on 30th April, but according to Len Reaney' they only stayed 'for 2 minutes'! Life must be hard on Das Island....

All sparrows are not boring as proven by this selection of goodies — 1,000 Pale Rock Sparrows were at Al Oha (near Al Ain) on 16th March, during a week when the mountains and plains were crawling with them. A few days later, a Dead Sea Sparrow was heard singing in the mangroves at Merawah, only its 2nd occurrence in the country. Meanwhile at Hamraniyah, in Ras al Khaimah a breeding colony of Spanish Sparrows was at peak activity in early March, with over 200 birds

present.

Last, but not least, a male Cinereous Bunting was found at Al Ain zoo on 29th March and another 2 were at Aboule, north of Buraimi on 30th March. The latter birds, found in the Omani enclave of Mahdah have been accepted by the Oman Bird Records Committee as a 2nd record for the country.

My thanks go to the following observers for their contributions: Simon Aspinall (NARC), John Bannon, Peter Hellyer, Erik Hirschfeld, Jenny Hollingworth, Steve James, Patrick Osborne (NARC), Dave Paynter, Rob Quested, Len Reaney, Bob Richardson and Mike Wood.

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Mammals

As predicted in the last issue of TRIBULUS (Vol. 3.1, April **1993)**, the first six months of 1993 have seen a wave of reports of the country's mammals, focussing, in particular, on the rarer species of the cat family. During the winter of 1992 and 1993, there have been more reports of Caracal Lynx (Caracal caracal *schmitzi*), than ever before, while the first records of Arabian Leopard (Panthera pardus *nimr*) since 1986 from the Wadi Bih areas of Ras **a**l Khaimah, (ABBA SQUARE **WA28**), have been obtained. In most cases, the reports, obtained through the local media, were of animals being killed.

An overview of the Lynx and Leopard reports can be found on Page 11.

There was, however, substantially better news on the Gordon's Wildcat, *(Felis sylvestris* gordoni), another of our endangered species. Group member Marijcke Jongbloed, initiator of the international captive breeding programme for these felines, (see TRIBULUS vol. 1.2, October 1991, P. 21) launched a campaign to capture more animals from the wild early in the year. (TRIBULUS Vol 3.1., April 1993, P. 23).

The results showed that the sub-species is more widely distributed than originally realised, with road casualties being seen in February 18th near Al Aweer (VB27), a possible near Fujairah on February 19th, (WA27), another, long dead, near Al Aweer on February 22nd, and near Masafi on April 2nd (WA27).

One was seen alive in the Wadi Ashwani, a tributary of the Wadi Siji, (WA27), on March 18th by a group including Marijcke Jongbloed, the first time she had seen the species alive in the wild, while finally a young male was captured alive near Al Aweer in mid-April, being promptly incorporated into the breeding programme. It is planned to release it after a couple of years, perhaps with a radio collar to track its movements and behaviour.

Scattered reports were received from throughout the country on a number of other species.

Hedgehogs were reported several times, including one Ethiopian Hedgehog (*Paraechinus aethiopicus* dorsalis), being found in a date garden at Al Madam (VB27) by French archaeologists in early February and one dead in the Wadi Quda'a on March 12th, (WA28), and one Brandt's Hedgehog (Paraechinus *hypomelas niger*) seen in Al Ain (VB25) in mid-March, and another being brought alive into Al Ain Choueifat School in mid-May. A number of other records were not identified as to species, but it is now clear that the Brandt's is not the rare animal it was though to be until recently.

The same may very well be true of the Arabian Gazelle, (Gazella gazella cora = *arabica*). New records came from the Jebel Qatar plateau in Oman, near Al Ain, (VB25), where one was seen bounding away by two observers on January 21st and from the heart of the mountains behind Bithna, near the head of Wadi Safad, (WA27) on May 31st.

Three interesting records of Bats were received, all just over the border into Oman. On May **7th**, an Egyptian Fruit Bat, (*Rousettus aegyptiacus arabicus*) was seen in a large cave in Wadi Khafi, (WA26), where another perhaps the same individual, had been seen in May 1992, while on June **6th**, around ten Muscat Mouse-tailed bats (*Rhinopoma muscatellum*) were seen roosting in the fort at Aboule, (VB25), where they had been recorded several years ago.

Another colony of perhaps 100 small insectivorous bats, unidentified as to species, was reported as having been seen in small crevices in a ridge six kilometres north-east of Buraimi near Jebel Qatar (VB25), in September 1992. Identification as to species would be welcomed.

Other terrestrial species to be reported included Lesser Jerboa (*Jaculus jaculus*), twice in the Al Ain area, House Mice (Mus musculus *gentilulus*) several times in Buraimi, but oddly enough only in November 1992, and not subsequently up to the end of June, Arabian Red Foxes, (Vulpes *vulpes arabica*), a mother with cubs being seen on Bahrani island, (UA25), on March 31st, and up to three foxes being seen just outside Buraimi on May 28th and June 3rd. The May 28th animal, a young one, was initially suspected to be a possible **Rueppell's** Fox, (Vulpes *rueppellii*), owing to its

prominent ears, but this species is generally seen only far from human habitation, while the local Red Fox also has much more prominent ears than its European cousins.

Five or more Cape Hares (Capus lepensis omanensis) were seen evidently thriving on the island of North Yasat (SA25) on April 15th, despite the sparse vegetation. A Jerbil species, (Gerbillus sp.) probably G. dasyurus or G. nanus (Baluchistan Gerbil), was caught at Tell Abrag (VB25) on January 6th, but unfortunately failed to survive, while during the Gordon's Wildcat trapping campaign in February, March and April, a number of Jirds (Meriones sp.) were caught in the Al Aweer area, (VB25), though they were not identified as to species. (Sundevall's or Libvan).

From the coast and offshore a few records came in of marine mammals. In early April, a recently dead Dugong (Dugong dugon) was seen in the lagoon at Ghaghah island, (RB25), with death being ascribed as possibly due to natural causes. This is the Group's first record of Dugongs so far west, suggesting that a population may exist in the Khor Al Odaid area. A skeleton a few months old was found on Thumayriyah island, (TA25) at the western end of the Khor Al Bazm, a known dugong feeding ground, on April 16th with a rope still tied around its flipper.

Five Bottle-nosed Dolphins, (Tursiops truncatus), including one young, were reported near Umm Shaif oil field. (TA27), on March 14th, and four groups of between 1 or 2 and 6 in early April off North Yasat

Reptiles

The following summarises my own recordings from April to June in Abu Dhabi Emirate, (except where otherwise identified). Co-ordinates of the sightings have ben entered on the National Avian Research Centre database, which also holds other records gathered during survey work in winter 1991/1992.

The 'Dhub,' Uromastyx *aegyptius*, was commonly seen in desert trips during all three months, and is one of few species still active in the midday heat of summer. Most sightings came from within eighty kilometres of the coast, and I did not personally record it from the far south eastern corner of Abu Dhabi. One was seen, (by Garv Feulner), on March 22nd on the road to East Liwa. (ABBA SQUARE, UA 23). One adult specimen, said to be around one metre long, found its way mysteriously into a building in the Tourist Club area of Abu Dhabi in early June, where it scared residents until it was unfortunately killed. It was presumably brought in from the desert as a prank. It is, of course, better to leave these harmless vegetarian lizards where they belong in the desert.

Another press report a few weeks earlier was a 'Wirral,' or Desert Monitor, Varaneus griseus, emerging from a hole in a graveyard in Ras al Khaimah. It was excitedly mis-identified as a dinosaur!

In Abu Dhabi Emirate, Varaneus griseus was abundant, like the 'dhub,' its presence often betrayed by its tracks which march for miles across the desert sand. One was seen at the AI Ghar Lake (UB25) in early June,

(SA25), Kafai (RB26), Ghaghah, (RB25) and near Ras Ghumeis (RB25) in early April, the latter with two Hump-back Dolphins, (Sousa chinensis), the only record of the latter species for the period.

The Hump-backed Dolphins commonly seen in the area of Bahrani Island, to the immediate west of Abu Dhabi, UA25), were not reported during the period. Records would be welcome. However, a family of Bottle-nosed were reported near Dhabbiyah at the beginning of June, following a boat as far as Bahrani.

Finally, an animal resembling a Seal was seen off Dibba in early June. Seals have not been recorded in the Gulf, although Elephant Seals from the Antarctic have been found dead in Oman. It was not seen distinctly, and one suggestion is that it might have been a small Porpoise. Records of the cetaceans, (whales, dolphins, porpoises) of the Arabian Gulf and Gulf of Oman are confusing and little studied. More work is clearly required in this area. Any records, even those lacking detail, would be appreciated.

A pleasing increase in the number of people submitting records, (including records of lynxes and leopards), was noted. My thanks to: Simon Aspinall, Steve Bolton, Kate Bonner, David Douglas, Gary Feulner, Terry Finney, Mike Gillett, Erik Hirschfeld, Richard Hornby, Steve James, Mariicke Jongbloed, Brian Moore, Bob Read, Anwar Sher and Quinta Woodward.

> PETER HELLYER Recorder

hunting chicks of Kentish Plover, (Charadrius alexandrinus), and then swimming across the lake. (See Notes and Queries, Page 20)

Tracks of the nocturnal snakes Eryx jayakari (Sand Boa) and Cerastes cerastes (Sand Viper) were also common on the fine desert mornings of May and June.

Clearance work in one of the large aviaries at AI Ain Zoo disturbed large numbers of Echis carinatus (Saw-scaled Vipers), one of our most venomous snakes.

The warm summer evenings produced good numbers of geckoes. Stenodactylus arabicus was common in sand throughout, and five new locations were added to NARC records. Stenodactylus doriae was found twice inland from Ras Ghanadha island, (UB26), and south of the Dhabbiyyah peninsula, (UA25). Stenodactylus selvini occurred just once on gravel in the Bainunah area, (SB24).

A related but larger gecko, Teratoscincus scincus, was first captured in a pitfall trap set for insects on April 26, but was later recorded at seventeen locations near Ras Ghanadha. This species was not seen during the NARC 1991/1992 winter surveys, (Pitfall traps often catch lizards, and we deliberately avoid using killing agents in the traps, so that they may be released unharmed.)

NARC's field station at Ras Ghanadha is home to two resident species of gecko, Hemidactylus turcicus, (which is abundant and produced many young), and a

pair of H *flaviviridis*. Both species were seen almost daily from March to the end of June.

An interesting change in the behaviour of **Bunopus tuberculatus** was noted. Almost every piece of scrap wood in the desert will house one of these geckoes in winter, but not in the heat of summer. Instead, they retreat deep in old burrows, emerging as the sun sets to hunt for food. Sightings came from near Ras Ghanadha and south of Dhabbiyyah, but the species is one of Abu Dhabi's commonest lizards."

The UAE has three skink species, and I had hoped we could assume that all desertdwellers in the west were Scincus *mitranus*. Not so. A skink caught at Bainunah on June 8 turned out to be *Scincus scincus* conirostris, not easy to tell from S. *mitranus* without close study. There goes that easy life! (*S.s. conirostris* was a second species not recorded during NARC's 199111992 survey).

A fine male agamid, Agama *flavimaculata*, was seen displaying on April 6 at Bainunah and four further records were noted at locations across the Emirate. More common was the smaller agamid *Phrynocephalus arabicus*, which probably occurs almost everywhere on soft sand although actual records are few. It is an entertaining species, with elaborate tail-signalling displays and a remarkable body-shuffling act which allows it to disappear vertically into the sand when disturbed.

The lacertids of the genus **Acanthodactylus** are causing identification problems. Our commonest species, A **schmidtil**, presents least difficulty, and is widespread, the blue-tailed juveniles being abundant in June when the adults are virtually absent. A **gongrorhynchatus** is another matter, and two individuals caught almost together on June **14** south of Dhabbiyyah were markedly different in key characteristics. A. gongrorhynchatus was first described in 1967 from a specimen caught in the Emirate of Abu Dhabi by John Gasperetti, and it may be that the taxonomy of Acanthodactylus is still incomplete.

Scattered records of turtles have been received. At least six Green Turtles, (Cheionia **mydas**), were seen off Ghaghah (**RB25**) and North Yasat, (**SA25**) at the end of March and in early April, while several Hawksbill Turtles, (*Eretmochelys imbricata*), were reported in early June as having found their way into the **seawater** intake of the **ADGAS** plant on Das Island. At least nine were noted in the same intake in August and September **1989**, and .were rescued and released, five of them having been marked. One of the marked animals was among those reported this year, which were also rescued, marked and released.

From Khor Kalba, (WA27), came an early June record of a turtle seen returning to the sea after laying eggs, although it was not identified as to species. Finally, in April, an immigration officer in Ras **al** Khaimah (VB28) rescued a clutch of thirty eggs from a beach that is a popular site for 4-WD vehicles. The eggs were buried in his garden, and eighteen subsequently hatched, (one later died), and were taken to the Desert and Marine Environment Centre at the Emirates University, where they were identified as Hawksbills. They were later released into the sea close to the original nest site. This is the first recent confirmed, (albeit man-assisted) successful turtle breeding record in the UAE. An area close to the nest site has now been designated as the site for a future marine research station.

Inland, there were the usual reports of tadpoles, probably of the Arabian Toad, (*Bufo arabicus*), seen in the wadis early in the year.

My thanks to those who supplied additional records: Simon Aspinall, Gary Feulner, Dr. Saif Al Ghais, Erik Hirschfeld, Steve James, Dr. Reza Khan, Andrew Owen and Rob Western.

Dr. Patrick Osborne

Recorder c/o. NAR.C., P.O. Box 45553, Abu Dhabi.

* *

GAZELLE RECORDS

Sir,

In the October 1992 TRIBULUS, (Vol. 2.2), I noted with much interest recent research on the Houbara Bustard by the National Avian Research Centre in various parts of the Emirates has revealed important data on other resident wildlife. As a member of IUCN's Antelope Specialist Group, I was particularly interested to learn Arabian Idhmi, (Gazella gazella cora), have been demonstrated to be more abundant than previous records would suggest, and that both Saudi Rheem, (G. subgutterosa marica), and Afri (Dorcas), (G. dorcas saudiya), remain on the island of Abu Al Abyad off the Abu Dhabi coast if not at other locations.

You will know that all Arabian gazella taxa are considered rare and endangered, and research is urgently needed to determine their status in the region. Moreover, taxonomic relationships between the various taxa remain unclarified, and recent studies have added another taxon, G. saudiya. Mito-chondrial DNA analysis and karyotyping of individuals kept at the King Khalid Wild Life Research Centre, Ath-Thumamah, Saudi Arabia, and originating from Bahrain and the **UAE**, have revealed that G. saudiya is more closely related to Chinkara, G. bennetti.

The **IUCN** Antelope Specialist Group, whose members are involved in research programmes on Arabian gazelle species and oryx, would be able to contribute significantly to the development of **important** conservation initiatives in the UAE. However, as I observed earlier, we currently do not have sufficient baseline data on gazelle distribution in the UAE.

I would very much appreciate more information on records, both past and present, about distribution and status of the various gazelle taxa in the UAE.

Jelle Boef Postjesweg 111-36, 1057 DZ AMSTERDAM Holland.

Corporate Members of the ENHG

Production of TRIBULUS, and much of the other activity of the Emirates Natural History Group, like our sponsorship of the Emirates Bird Report, would not be possible without the generous support of the Group's Corporate members.

The Editorial Board and the Group Committee acknowledge, with thanks, the sponsorship of the following Companies and bodies, whose support has been invaluable.

Abu Dhabi Company for Onshore Oil Operations, ADCO, Abu Dhabi Hilton Hotel, Abu Dhabi Maritime and Mercantile International, ADMMI, Abu Dhabi National Hotels Company, Abu Dhabi National Oil Company, ADNOC, Abu Dhabi Marine Operating Company, ADMA-OPCO, Abu Dhabi Petroleum Ports Operating Company, ADPPOC, ANZ Grindlays Bank plc, Al Fahim Group, Al Nasr Technical Trading

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The Higher Colleges. of Technology, Mobil Abu Dhabi Inc., Motivate Publishing, National Bank of Abu Dhabi, Shell Gas Abu Dhabi, Spinney's Abu Dhabi and Union National Bank.

Group Meetings — January to June 1993

January	4		'The British in the Gulf,' by Dr. Mohammed Mursy Abdullah
January	18	:	Annual General Meeting, with film on palaeontology, 'Abu Dhabi:
			The Missing Link' and talk on 'Elephant Research in Tanzania,' by Charles Fole
February	8	:	'Flowers of the Emirates,' by Rob Western
February	11	1	Annual Dinner Dance
February	22	:	'Chinese New Year' — by Michael Martin
March	1	•	'Conservation in the Emirates' by Dr. Marijcke Jongbloed
March	15	•	'Mountain Walking in the UAE,' by Gary Feuiner
April	5	•	'Gould's Bird Paintings,' by Peter Clements
April 15	/16	:	Inter Emirates Weekend in Khor Fakkan
April	19	•	'Recent discoveries in local archaeology,' by Dr. Geoffrey King
May	3	:	'Marine Research in the UAE,' by Dr. Saif Mohammed al Ghais, UAE University.
May	17	:	'Memories of the Emirates,' by Edward Henderson.
June	7	•	'Visit to the Sacred Mountain of Tibet,' by Dr. Avi Pingle.
June	21	•	'The Sunderbans Forests of Bangladesh,' by Dr. Reza Khan

Federal Law No. (7) of 1993 for the Establishment of Federal Environmental Agency

Introduction

The new Federal Environmental Agency was created in March 1993, under the terms of Federal Law Number Seven for 1993.

The new Agency is the first UAE-wide institution with legal *powers* to protect and conserve the environment.

The unofficial translation that follows appears for information and as a matter of record.

Federal Law No. (7) 1993

We, Zayed bin Sultan **al** Nahyan, the President of the United Arab Emirates.

After Perusal of the provisional constitution, Federal Law No (1) of 1972 concerning the ministries' jurisdictions and ministers' powers, and its amendments,

Federal Law No (8) of 1973 in respect of Civil Services in Federal Government and the amendments thereof.

Federal Law No. (14) of 1973 concerning the Rules for Preparing the Budget and Accounts.

Federal Law No. (7) of 1976 on the Establishment of State Audit Institution and

Upon the proposal made by the Minister of Health, Cabinet approval and endorsement of the Federal Supreme Council, we issue the following law.

ARTICLE (1) Definitions

In implementation of this law, each of the following words and items, unless otherwise required by the rest, shall have the meaning assigned thereto hereunder.

State	: United Arab Emirates					
Minister	: Minister of Health					
Agency	: Federal Environmental Agency					
Board of Directors	: Board of Directors of the Agency					
Chairman	: Chairman of the Agency					
General Manager	: The General Manager of the Agency					
Concerned Bodies	: Bodies concerned with Environment Affairs and the Development thereof within and outside the state.					

CHAPTER I

Establishment and Objective of the Agency ARTICLE (2)

A public authority concerned with environment affairs to be established under the name of the Federal Environmental Agency and shall have an independent artificial personality enjoying financial and administrative authority to be annexed to the Cabinet.

ARTICLE (3)

The Agency shall have its head office situated in Abu Dhabi city and may establish branch offices within the state as may be resolved by the Board of Directors.

ARTICLE (4)

The objectives of the Agency shall be to protect and develop the environment within the state; establish the necessary plans and policies to protect the environment against the harmful effects arising from activities inflicting damage to human health, agricultural crops, land and sea life, other natural resources and climate; implement such plans, schemes and policies; take all suitable measures and actions to stop environmental deterioration, fight environmental pollution of all kinds and forms **present** and **keep** it to the minimum possible level for the welfare of' both present and future generations.

With the purpose of achieving its aims and objectives the Agency may co-operate and co-ordinate action with concerned bodies to:-

- 1. Prepare draft laws, legislation and regulations ensuring environment safety, protection and development.
- 2. Conduct research and studies and propose plans and policies for environmental issues on the state level.
- Study and negotiate plans and policies set by ministries, bodies, establishments, organisations or companies practising activities which might effect the quality of the surrounding environment. Propose solutions to any environmental problems or obstacles impeding such programmes and projects.
- 4. Investigate, study, make necessary proposals and suggest suitable solutions for any matters or problems in connection with the environment referred thereto by the cabinet or any other official or non-official authority or body within the state.
- 5. Conduct or supervise the conducting of comprehensive research and studies on pollution, monitoring its negative effects on health and environment and take all preventive measures and actions to limit environmental pollution of all kinds and forms to the minimum possible level.
- 6. Set the necessary basis and principles for linking environmental considerations with planning and development policies within the state by incorporating environmental measures as an integral part of the decided strategies for planning.
- 7. Executing and following up development projects undertaken by government entities or the private sector through the evaluation of such projects' impact on the environment, to monitor public and private activities adversely affecting environment quality, give approval to projects with negative effects on the environment. Before approval, such projects shall be subject to cabinet resolutions.
- 8. Collect and implement effective studies related to air, water, sea, and soil pollution and to the protection of their resources and preservation of natural and living resources.
- 9. Take interest in the development of natural forms of

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life as well as the development of nature reserves.

- 10.Study the nature of soil, water and energy and propose methods and ways to prevent their deterioration and insufficiency, by setting necessary controls to stop any misuse or drainage thereof and to concentrate on subterranean water, desert areas and to combat desertification.
- 11.Study the nature of coastal areas and the marine environment and propose ways for protecting and developing their resources.
- 12.Set and develop preventive measures and actions related to the limitation of marine pollution, development of human resources and training of specialised personnel to implement pollution control schemes and plans in coastal areas.
- 13. Establish a central environmental laboratory and provide the necessary technical personnel and specialised equipment for the operations thereof.
- 14.Specify and monitor controls and the permissible limits for the concentration of radioactive materials in water, air, soil and food.
- 15.Endeavour to develop interest in educational, media, sociological and cultural aspects to increase and develop environmental awareness to enable the whole of society to participate actively and efficiently in achieving the desired objectives and aims of preserving and developing the surrounding environment.
- **16.Set** and implement the necessary plans and programmes for training and qualifying technical personnel in the environment field.
- 17.Specify suitable methods for forecasting, anticipating and limiting natural disasters.
- 18.Conduct a comprehensive limiting of human settlement problems in cities, villages and desert areas. Follow up the effects of economic and social development on proposals for human settlement programmes providing for suitable solutions and the implementation of such programmes, particularly including the following:
 - a) Reaching an ideal ,distribution of human settlement in rural and desert areas.
 - b) Insuring the application of suitable technological methods in designing buildings and constructions from the environmental point of view.
 - c) Taking into consideration the most suitable conditions for life in the planning of cities and villages.
 - d) Combating noise and air pollution by collecting and gathering information on the optimum use of means of transportation.
- **19.Set** necessary regulations related to gathering information and data, exchanging them with and utilising them through and benefitting from research institutions, organisations and specialised associations in the field of the environment whether in the state or anywhere else.

CHAPTER II

Management ARTICLE (5)

The Agency shall be managed by a Board of Directors chaired by the Minister and comprising nine directors,

who should be distinguished figures concerned with environmental and developmental issues within the state. Directors shall choose from among them a vice chairman to relieve the chairman in his absence or to replace him, should his position **become** vacant. The Minister shall nominate the directors whose nominations and remuneration shall be determined by a cabinet resolution.

ARTICLE (6)

The Board of Directors shall **be** the authority concerned with setting the policy to be adopted by the Agency for achieving its objectives and handling its business and affairs, passing all decisions and issuing all instructions on all matters of concern to the Agency. Generally, the Board of Directors shall be vested with all necessary powers and authorities for carrying out the above actions, things and deeds particularly,

- To set up the Agency's plans and scheme and to supervise and follow up the implementation thereof, ensuring the achievement of the Agency's objectives and aims.
- 2. To prepare the Agency's annual budget and accounts.
- 3. To set the Agency's by-laws, financial, contracting and warehouse regulations.
- 4. To prepare the Agency's organisation chart specifying duties and tasks of the main and subordinate units therein.
- 5. To prepare job descriptions for the Agency's staff.
- 6. To prepare the Agency's personnel regulations including terms and conditions applicable to appointments, wages, allowances, increments, leaves, disciplinary actions, dismissal and terminations and all other related matters,

.

- 7. To approve contracts and agreements rendering the Agency entitled to certain rights or liabilities in accordance with the provisions of the Agency's regulations.
- 8. To approve the acceptance of grants and aid given to the Agency.
- 9. To examine and look into whatever the Minister offers under the Agency's jurisdiction.

10.Other authorities provided for herein.

ARTICLE (7)

The Board of Directors shall hold at least four periodical meetings a year at the chairman's notice. The Board of Directors may also be convened for an extraordinary meeting upon the chairman's request or upon a request received from at least four directors. Unless attended by not less than half the directors, including the chairman or the vice chairman, the Board of Directors meeting shall not be considered as duly held.

Board decisions shall be determined by an absolute majority of votes of the directors present at the meeting. In case of equal votes, the chairman shall have a second or a casting vote.

ARTICLE (8)

The decisions of the Board of Directors shall be recorded in \dot{m} inutes of meetings to be signed by the chairman. Decisions shall be passed under the chairman's signature.

ARTICLE (9)

The Board of Directors may, from among its members or otherwise, form a committee and assign it for the supervision and follow up of the implementation of the Agency's plans and policies or any other duties and tasks the Board of Directors may think fit to delegate thereto. The Board of Directors may also form

specialised committees whether permanent temporary as dedicated by public welfare.

Such committees, their powers, authorities and duties, members' remuneration and work regulations shall be specified in a decision to be issued by the chairman.

or

ARTICLE (10)

The term of the Board of Directors shall be three years as of the date on which the decision on its formation was passed.

ARTICLE (11)

The chairman represents the **Agency** before **courts** of law and in its relationships with third parties.

ARTICLE (12)

The Board of Directors may delegate any of its members or the general manager signing powers in matters of its concern and specialisation.

ARTICLE (13)

The Agency shall have a general manager who shall be appointed by Ministerial decision after being approved by the Board of Directors. The general manager shall be a scientifically-qualified well-experienced efficient person in the field of environment.

The general manager shall handle the technical, administrative and financial affairs of the Agency in accordance with the law and the regulations and rules of the Agency as well as its board decisions.

ARTICLE (14)

The general manager shall have a technical, administrative and financial team, the members of which are to be appointed and their duties are to be specified by the chairman's decision after obtaining the approval of the Board of Directors.

CHAPTER III Financial Affairs ARTICLE (15)

The Agency shall have an independent budget to be attached to the state budget.

ARTICLE (16)

The financial year of the Agency shall start from the first of January and end on the thirty first of December every year.

ARTICLE (17)

The general manager shall prepare the annual budget for the Agency and offer it to the Board of Directors for approval before the first of September each year. The general manager shall also prepare the Agency's final accounts.

ARTICLE (18)

Annual revenues comprise:-

1. Annual allocations provided by the state for the Agency within the general budget.

- 2. Savings achieved in the Agency's budget of the previous year.
- 3. Funds received from international and regional organisations concerned with the environment in support of or in participation in the execution of joint programmes.
- 4. Grants and subsidies which the Board of Directors accepts.
- 5. Other revenues realised by the Agency while practising its activities.

ARTICLE (19)

Agency funds are public monies.

ARTICLE (20)

The Board of Directors shall set the system related to the invitation of experts and fixing their renumeration and expenses.

General Provisions ARTICLE (21)

dency's by-laws organisational chart

The Agency's by-laws, organisational chart and job descriptions shall be issued under a cabinet resolution.

ARTICLE (22)

The Agency's personnel and staff members shall, in matters not expressly provided for herein, be subject to Federal Law No. (8) of 1973 in respect of Civil Service in Federal Government.

ARTICLE (23)

Decision taken by the Agency in the field of its specialisation shall be binding on the concerned bodies within the state.

ARTICLE (24)

In implementation of the provisions of article (417) hereof, the entity applying for a licence or approval of a project having a negative impact on the environment shall bear the experts' fees and all costs of studies and researches done for the evaluation of such project as determined by the Agency.

ARTICLE (25)

Any existing legislation contradicting this Law is revoked.

ARTICLE (26)

The law shall be published in the Official Gazette and shall become in full force and effect as of its date of publication.

(Signed)

Zayed Bin Sultan Al Nahyan

The President

of the

United Arab Emirates

Promulgated by us in the Presidency Palace in Abu *Dhabi* on 4/2/1993.

(Translation courtesy of Afridl and **Angell**, lawyers P.O. Box **3961** Abu **Dhabi**, **U.A.E**)



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