

# TRIBULUS



Bulletin of the Emirates Natural History Group

Vol. 8.2

WINTER 1998



## NOTES FOR CONTRIBUTORS

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

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

Correspondence and enquires should be sent to:

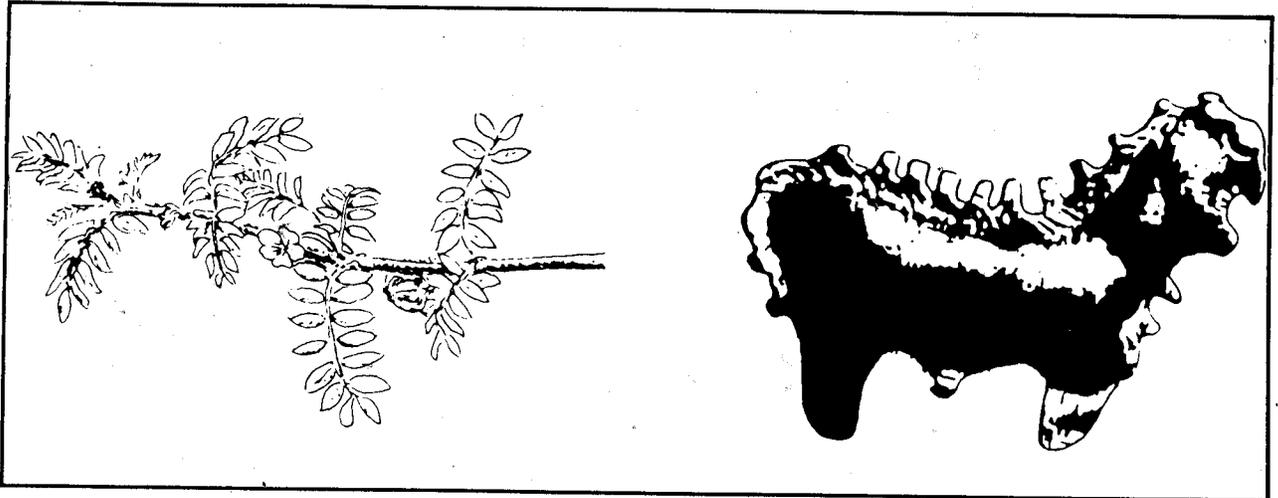
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The plant motif above is of the genus *Tribulus*, of which there are six species in the UAE. They all have pinnate leaves, yellow flowers with free petals and distinctive five-segmented fruits. They are found throughout the country, except in coastal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

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

Manuscripts should be typed, on one side only, and double-spaced, and may be submitted in either English or Arabic. A short abstract should precede the article, with the address(es) of the author(s) at the end. For Arabic contributions, a short summary in English, of not more than 200 words, should also be supplied.

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

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

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

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The Editorial Board of TRIBULUS and the Committee of the Emirates Natural History Group acknowledge, with thanks, the support of the Group's Corporate members, a full list of whom can be found on page 4, without whom publication in this format would be impossible.

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

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# Editorial

The UAE's approach to the environment in the next century is outlined in the National Environment Strategy and workplan, recently publicised in the press. There are three consecutive stages, beginning with a National Environmental Agenda which aims to identify priority issues and evaluate the resources needed for specific projects. The next stage will be to establish a coherent strategy for sustainable environmental development. The final stage will be to establish a national workplan based on that strategy. Industry, the municipalities, oil, water, agriculture, health and education sectors are all involved and before the end of 1988 a comprehensive report will be issued on the first stage.

This is another welcome sign that things are moving in the right-direction and that everybody is waking up to the fact that the UAE is a small country in danger of being overwhelmed by development and industrialisation. We in the ENHG feel we are 'doing our bit' to highlight environmental issues in the UAE, even though our main objective remains that of recording exactly what is here, whether on land, at sea or in the air.

This issue of **Tribulus** continues a tradition of covering a variety of topics that we hope appeals to our readers. Butterflies have been touched on occasionally but here we begin with a checklist of the UAE's Macroheterocera (macro-moths) by Albert Legrain and Edward Wiltshire. A second checklist follows, this time by Graham Giles, of the damselflies and dragonflies of the UAE. The plates are intended as a reference guide to enable (at last) more recording of this neglected group by ENHG members and others. Many people do not appreciate that dragonflies are not confined to oases. Many are migratory and turn up in numbers on offshore islands as well as on the mainland. Gary Feulner follows up with

our first ever look at freshwater fish. Most of us have seen the tiny 'minnows' in wadi streams, but who has stopped for a moment to consider just what species they might be ? Compared to the marine environment, the pools and streams of the mountains remain relatively underexplored.

Uli Wernery and Maria Lipp report on a case of snakebite, something that may be in the back of the mind of anyone on a camping trip. How many of us know which snakes are poisonous and which are not ?

Archaeology gets a look in with an article by Tony Harris, erstwhile Chairman of the ENHG, on a Late Stone Age site south of the Liwa. Tony's interest in the history and prehistory of the UAE goes back a long way - in 1977 he wrote four articles for the **Bulletin** (the precursor of **Tribulus**) No.2. In July 1978 he gave us a history of the old main Abu Dhabi mosque and in March 1979 he spoke to the Group on the Liwa itself. It is not often that a person's contributions to a magazine are nearly twenty years apart.

This issue also includes notes on ostrich shells finds, new plant species and a new scorpion for the UAE - all in line with our recording philosophy. How many more species remain to be discovered ? There must be hundreds, probably many thousand.

**Tribulus** 8.2 also brings with it an expanded news section and other improvements, but remember, your comments and suggestions are always welcomed.

Last, but hardly least, **Tribulus** is now a refereed journal. Four referees have agreed to serve on a refereeing panel (see p.32) - to them all we are extremely grateful.

**A.R. WESTERN**

## Corporate Members of the ENHG

Production of **TRIBULUS**, and many of the other activities of the Emirates Natural History Group, 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 invaluable support of the following companies and bodies:

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# Provisional Checklist of the Macro-heterocera [Lepidoptera] of the UAE

by Albert Legrain and Edward P. Wiltshire

## Abstract

For the first time, 219 species of Macro-heterocera are recorded from the UAE and adjacent Omani territories.

## Introduction

The Macro-heterocera from the Kingdom of Saudi Arabia and the Sultanate of Oman have been studied by E.P. Wiltshire (1977-1994), but no publication has yet dealt exclusively with moths from the UAE.

Thanks to the amiability and the hospitality of Drs. Kamil and Jehanne Al Rustom-Boussard (Sharjah), A.L. had the opportunity to make nine short lepidopterological trips to the UAE specifically to observe Macro-heterocera.

The investigated biotopes are mainly :

- the maritime desert north of Ajman ;
- the sand-desert west of Dhaid (Calligonetum) ;
- the mountains around Masafi (500-600m).

Also visited were :

- the hills south of Dibba ;
- the mangroves near Khor Kalba ;
- Wadi Khabb Shamsi and Aqabat Oso (1100 m) in the Omani enclave of Musandam (N of Dibba) ;
- Shuwaiyah and Madha (Oman) in the Hajar Range, south of Hatta.

The dates of the journeys were: 11-17.11.1988, 1-5.4.89, 23.2-2.3.91, 1-6.12.91, 27.4-4.5.92 (with Jacques Plante and Dr François Aulombard), 29.3-4.4.95, 11-19.10.95 (with Eric Stassart), 11-20.4.96 (with Philippe Fastré), and 7-14.11.96; (no observations were made in January or June-September).

Biogeographically, the UAE territories belong to the Hajar sector (=N.Omani sector), approximately NE of a line between Abu Dhabi and Al Ashkhara.

## Symbols

- \*\*\* = species or sub-species new to science
- \*\* = species new for Arabian fauna
- \* = species (or ssp.) new for Hajar sector (= N.Oman)
- e = species endemic to Hajar sector
- o = recorded from N. Omani adjacent territories, but not yet from UAE.

## COSSIDAE

*Holcocerus gloriosus* (Erschov, 1874) (=laudabilis Staudinger, 1899, =mesopotamicus Watkins & Buxton, 1921)

- \* *Lamellocossus aries* (Püngeler, 1902) (=cheesmani Tams, 1921)

*Dyspessa* (Eremocossus) *vaulogeri* Staudinger, 1897 (=blanca Daniel, 1949, =baloutchistanensis Daniel, 1949, =foeda Auct.)

أول قائمة تتضمن بعض فراشات الإمارات

والمناطق المجاورة ، وتتضمن ٢١٩ نوع ، ٦ أنواع

وفصيلتين تعتبران من الاكتشافات العلمية الجديدة.

*Dyspessa* (Eremocossus) *reibellii* (Oberthür, 1876) (=proleuca Hampson, 1896)

*Meharia semilactea* (Warren & Rothschild, 1897) (=incurvariella Chrétien, 1915)

- o *Azygophleps inclusa* (Walker, 1856)

## METARBELIDAE

- \* *Salagena guichardi* Wiltshire, 1980

## PSYCHIDAE

- \* *Amicta mauretanica* (Rebel, 1940) ssp. *arabica* Wiltshire, 1949

*Amicta murina* (Klug, 1832)

*Urobarba longicauda* (Warren, 1888)

## LASIOCAMPIDAE

*Chilena laristana* Daniel, 1949

- \* *Lasiocampa* sp. nr. *serrula* Guenée, 1858

e\*\*\* *Bufoidia larseni* Wiltshire & Legrain, *in press* (=Dendrolimus bufo Auct., =ledereri Auct.)

*Streblote siva* (Lefébvre, 1827)

## GEOMETRIDAE

*Pingasa lahayei* (Oberthür, 1887) ssp. *multispurcata* Prout, 1913

- o *Gnophosema isometra* Warren, 1888 ssp. *leucites* Wiltshire, 1980

*Phaiogramma discessa* (Walker, 1861)

*Neromia pulvereisparsa* Hampson, 1896

*Neromia simplex* Brandt, 1938

*Microloxia ruficornis* Warren, 1897 (=halimaria

Chrétien, 1909, =herbaria Auct., =indecretata Auct.)

*Hemidromodes sabulifera* Prout, 1922

- \* *Idaea sordida* (Rothschild, 1913)

*Idaea mimetes* (Brandt, 1941)

*Idaea sanctaria* (Staudinger, 1900) ssp. *crassisquama* Warren & Rothschild, 1905

*Idaea illustris* (Brandt, 1941)

- \*\* *Idaea eremica* (Brandt, 1941) (=hathor Auct.)

e *Brachyglossina rowlandi* Wiltshire, 1977

*Zygophyxia relictata* (Walker, 1866)

*Scopula ?distracta* (Butler, 1881)/*similata* (Le Cerf, 1924)

- e *Scopula omana* Wiltshire, 1977

*Scopula minorata* (Boisduval, 1833) ssp. *ochroleucaria* Herrich-Schäffer, 1847

*Scopula adelpharia* (Püngeler, 1894)

*Scopula caesaria* (Walker, 1861) ssp. *walkeros* Wiltshire, 1980

- Glossotrophia chalcographata* Brandt, 1938
- \*\* *Glossotrophia gracilis* Brandt, 1941 (=buraimana Auct.)
- Traminda mundissima* (Walker, 1861)
- Pseudosterrha paulula* (Swinhoe, 1886) (=ochrea Warren, 1888)
- Pseudosterrha rufistrigata* (Hampson, 1896) (=xerophilaria Püngeler, 1902, =marcida Warren & Rothschild, 1905, = elbaensis Rebel, 1948)
- e *Anisephyra sublutearia* Wiltshire, 1977
- eo\*\*\* *Rhodostrophia* sp. nov. Hausmann, in press (=cuprinaria Auct.)
- Rhodometra sacraria* (Linnaeus, 1767)
- \* *Lithostege fissurata* Mabille, 1888 ssp. *inanis* Prout, 1941
- Xanthorhoe wiltshirei* (Brandt, 1941)
- \*\* *Xanthorhoe periplea* (Brandt, 1941)
- Xanthorhoe rhodoides* (Brandt, 1941)
- o\*\* *Nebula saidabadi* (Brandt, 1941)
- o *Protorhoe unicata* (Guenée, 1857) ssp. *centralisata* Staudinger, 1892
- \* *Eupithecia maerkerata* Schütze, 1961
- e *Eupithecia mekrana* Brandt, 1941 ssp. *amiralis* Wiltshire, 1986
- Eupithecia* sp. nr. *relaxata* Dietze, 1903
- Calliclystis palaeartica* (Brandt, 1938)
- \* *Gymnoscelis ? ruffasciata* (Haworth, 1809) (=pumilata Hübner, 1813)
- Zamarada minimaria* Swinhoe, 1895
- Semiothisa latimarginaria* (Rebel, 1931)
- Tephрина disputaria* (Guenée, 1857)
- Tephрина perviaria* (Lederer, 1855)
- \* *Tephрина pulinda* (Walker, 1860) ssp. *deeraria* Walker, 1861
- o\*\*\* *Gnopharmia musandamensis* Wiltshire & Legrain, in litt.
- Atomorpha hedemanni* (Christoph, 1885) ssp. *baloutschistana* Wehrli, 1953
- o *Coenina collenettei* Prout, 1931
- o\*\* *Phaselia erika* Ebert, 1965
- Hyperythra swinhoei* (Butler, late 19th C.) ssp. *muselmana* Brandt, 1938
- \*\* *Cleora cornaria* (Guenée, 1857)
- \*\* *Dichrognophos wiltshirei* (Wehrli, 1938) (?=orthogonius Wehrli, 1939)
- \*\*\* *Cnestrognophos chalcograptus* Wiltshire & Legrain, in litt.

#### SPHINGIDAE

- Agrus convolvuli* (Linnaeus, 1758)
- Acherontia styx* Westwood, 1844
- Daphnis nerii* (Linnaeus, 1758)
- o *Macroglossum stellatarum* (Linnaeus, 1758)
- Hyles livornica* (Esper, 1870)
- Hippotion celerio* (Linnaeus, 1758)

#### NOTODONTIDAE

- Sumeria dipotamica* Tams, 1938

#### LYMANTRIIDAE

- Casama innotata* (Walker, 1855) (=flavipalpata Staudinger, 1896)
- Casama vilis* (Walker, 1865) (=richteri Daniel, 1960)
- o *Lymantria daraba* Wiltshire, 1952
- Ocnerogyia amanda* Staudinger, 1891

#### NOLIDAE

- \*\* *Nola turanica* Staudinger, 1887

#### ARCTIIDAE

- Utetheisa pulchella* (Linnaeus, 1758)
- Cretonotos arabicum* (Hampson, 1896)
- Cretonotos gangis* (Linnaeus, 1763)
- o\*\* *Argina astrea* (Drury, 1773)

#### NOCTUIDAE

##### Noctuinae

- Euxoa canariensis* (Rebel, 1902) ssp. *diamondi* Boursin, 1940
- Agrotis ipsilon* (Hufnagel, 1766)
- o\* *Agrotis trux* (Hübner, 1823-24)
- Agrotis spinifera* (Hübner, 1803-08) (=biconica Kollar, 1844)
- \* *Agrotis segetum* (Denis & Schiffermüller, 1775)
- \* *Agrotis herzogi* Rebel, 1911 (=saracenic Tams, 1925)
- \* *Agrotis haifae* Staudinger, 1897
- Agrotis sardzeana* Brandt, 1941
- \*\* *Dichagyris singularis* (Staudinger, 1877)

##### Hadeninae

- Discestra trifolii* (Hufnagel, 1767)
- Cardepiia* sp. nr. *sociabilis* (De Graslin, 1850)
- Cardepiia* sp. nr. *arenaria* (Hampson, 1903)
- \* *Hadena avempacei* (Tams, 1925) (=pampaninii Krüger, 1933)
- \*\*\* *Hadena lypra* (Püngeler, 1904) ssp. *hajara* Hacker & Legrain, 1996
- \* *Mythimna (Sablina) brandti* Boursin, 1963 (?=citrinotata Hampson, 1905)
- (e) *Mythimna (Morphopoliana) larseni* Wiltshire, 1985
- Leucania (Acantholeucania) loreyi* (Duponchel, 1827)

##### Cucullinae

- \* *Cucullia syrtana* Mabille, 1888
- o\* *Cucullia boryphora* Ficher de Waldheim, 1840
- o\* *Cucullia hemidiaphana* Graeser, 1892 (?=efflatouni Wiltshire, 1948)
- \*\* *Cucullia kasyi* Wiltshire, 1976
- Cleonymia chabordis* (Oberthür, 1876)
- Metopoceras omar* (Oberthür, 1887) (=felix Standfuss, 1893, =sacra Staudinger, 1895, =caspica Alpheraky, 1895)
- e *Metopoceras ioptera* Wiltshire, 1977
- \*\* *Metalopha liturata* (Christoph, 1887) (=plusina Staudinger, 1892, =kashmirensis Hampson, 1894)
- Rhabinopteryx subtilis* (Mabille, 1888)
- o *Bornolis crinomima* (Wiltshire, 1946) (=jabalyia Wiltshire, 1987)

\*\*\* *Polymixis (Eremophysa) gracilis* (Brandt, 1941),  
*ssp. nov.*

e *Polymixis (Eremophysa) omanensis* Boursin, 1970

#### **Amphipyridae**

\* *Aucha polyphaenoides* (Wiltshire, 1961)

\* *Callopietria latreillei* (Duponchel, 1827)

*Monocondica illecta* (Walker, 1865)

*Platysenta viscosa* (Freyer, 1831) *ssp. persicola* Wiltshire, 1952

\*\* *Anamecia ferdovsi* Brandt, 1941

\* *Scythocentropus inquinata* (Mabille, 1888)

\* *Sesamia cretica* Lederer, 1857

*Spodoptera littoralis* (Boisduval, 1833)

*Spodoptera mauritia* (Boisduval, 1833)

*Spodoptera exigua* (Hübner, 1808)

*Spodoptera cilium* Guenée, 1852

*Caradrina (Platyperigea) soudanensis* (Hampson, 1918)

\*\*\* *Caradrina (Platyperigea) africarabica* Plante, *in press*

*Caradrina (Platyperigea) oberthueri* (Rothschild, 1913) *ssp. persica* Boursin, 1942

*Caradrina (Paradrina) flava* Oberthür, 1876

\*\*\* *Caradrina (Paradrina) eremica* Plante, *in press*

*Caradrina (Eremodrina) bodenheimeri* Draudt, 1934  
(=*chlorotica* Boursin, 1936)

*Dysmilichia phaulopsis* Brandt, 1938

\*\* *Dysmilichia mira* (Brandt, 1938)

#### **Heliothinae**

*Heliothis peltigera* (Denis & Schiffermüller, 1775)

*Heliothis nubigera* Herrich-Schäffer, 1851

*Helicoverpa armigera* (Hübner, 1827) (=obsolata Auct.)

\* *Heliocheilus confertissima* (Walker, 1865)  
(=*mekrana* Brandt, 1941, =*designata* Brandt, 1941)

*Masalia albida* (Hampson, 1905)

\* *Masalia philbyi* (Brandt, 1941)

#### **Acontiinae**

\* *Eublemma cochylioides* (Guenée, 1852)

*Eublemma parva* (Hübner, 1808)

\* *Eublemma ostrina* (Hübner, 1808)

o\* *Eublemma bifasciata* (Moore, 1881)

*Eublemma rushi* (Wiltshire, 1961)

*Eublemma ?leucota* Hampson, 1910

*Eublemma bistellata* (Wiltshire, 1961)

\* *Eublemma khalifa* (Wiltshire, 1961)

\* *Eublemma bulla* (Swinhoe, 1884)

*Eublemma apicipunctalis* (Brandt, 1939) (=guichardi Wiltshire, 1977)

*Eublemma gayneri* (Rothschild, 1901)

*Thalerastris tamsina* Wiltshire, 1948 (=tamsi Brandt, 1941)

e *Thalerastris ochrizona* (Hampson, 1910)

*Thalerastris diaphora* (Staudinger, 1879)

(=*atribasalis* Hampson, 1896)

*Pseudozarba mesozona* (Hampson, 1896)

(=*mediana* Staudinger, 1898)

*Ozarba sancta* (Staudinger, 1900)

*Hoplotarache caeruleopicta* Hampson, 1916 *ssp. hemipentha* Wiltshire, 1947

o *Metapioplasta philbyi* Wiltshire, 1988 (=marmoralis Auct.)

*Acontia biskrensis* (Oberthür, 1887) *ssp. orientalis* Brandt, 1939

*Acontia lucida* (Hufnagel, 1766) (=insolatrix Hübner, 1819-22)

*Acontia umbrigeri* Felder, 1874 (?=*catenula* Walker, 1865)

#### **Euteliinae**

*Eutelia blandiatrrix* (Guenée, 1852)

#### **Sarrothripinae**

*Characoma nilotica* (Rogenhofer, 1882)

*Bryophilopsis tarachoides* Mabille, 1900 *ssp. scotina* Wiltshire, 1980

#### **Chloeophorinae**

\* *Earias vittella* (Fabricius, 1794)

*Earias insulana* (Boisduval, 1833)

e *Churia gallagheri* Wiltshire, 1985

#### **Plusiinae**

*Chrysodeixis chalcites* (Esper, 1789)

*Trichoplusia ni* (Hübner, 1802)

*Trichoplusia daubei* (Boisduval, 1840)

\* *Cornutiplusia circumflexa* (Linnaeus, 1767)

#### **Catocalinae**

*Ulotrichopus tinctipennis* (Hampson, 1902) (=stertzi Püngeler, 1907, =arabica Rebel, 1907)

*Achaea catella* Guenée, 1852

*Dysgonia torrida* (Guenée, 1852)

*Mocis frugalis* (Fabricius, 1775)

*Ophiusa tirhaca* (Cramer, 1780)

*Clytie devia* (Swinhoe, 1884)

*Clytie benenotata* (Warren, 1888) (=moses Staudinger, 1895)

*Pericyma signata* Brandt, 1939 (?=*albidens* Walker, 1865)

*Heteropalpia vetusta* (Walker, 1865) (=sacra Staudinger, 1898)

e *Heteropalpia robusta* Wiltshire, 1988 *ssp. omana* Wiltshire, 1988

*Heteropalpia acrosticta* (Püngeler, 1903)

*Heteropalpia exarata* (Mabille, 1890)

*Tyroca dispar* (Püngeler, 1903)

o\* *Tyroca fasciolata* (Warren & Rothschild, 1905)

*Gnamptonyx innexa* (Walker, 1858) (=vilis Walker, 1865, =obsolata Hampson, 1913)

\* *Anydrophila fouadi* Wiltshire, 1947

\*\* *Anydrophila sirdar* Brandt, 1939

- \* *Cerocala algeriae* Oberthür, 1876 (=biskrensis Culot, 1916, ?=insana Herrich-Schäffer, 1856)
- \* *Cerocala rothschildi* Turati, 1924 (=sana Auct.)  
*Drasteria kabyalaria* (Bang-Haas, 1907)  
*Drasteria yerburyi* (Butler, 1892) (=albofasciata John, 1917, =pica Brandt, 1939, =albifasciata Gaede, 1939)  
*Anumeta asiatica* Wiltshire, 1961  
*Anumeta atosignata* Walker, 1858 (=arenosa Brandt, 1939)  
*Anumeta spilota* (Erschov, 1874) (=harterti Rothschild, 1913, =azelikoula Dumont, 1920)  
*Anumeta cestis* (Ménétrières, 1849)  
*Anumeta hilgerti* Rothschild, 1909 (=comosa Dumont, 1920)  
*Epharmottomena tenera* (Brandt, 1939)  
*Epharmottomena leucodonta* (Hampson, 1926) (=funesta Brandt, 1939)  
*Iranada turcorum* (Zerny, 1915) ssp. *atrior* Wiltshire, 1977
- \* *Riadhia diehli* Wiltshire, 1961  
*Acrobyla kneuckeri* Rebel, 1903 (=ariefera Hampson, 1926)
- e *Drasteriodes ellisoni* Wiltshire, 1977  
*Armada maritima* Brandt, 1939  
*Armada fletcheri* Wiltshire, 1961  
*Armada philbyi* Wiltshire, 1979  
*Catephia pericyma* Hampson, 1916 (?=cana Brandt, 1939)  
*Thria robusta* Walker, 1857 (=Pandesma anysa Auct. )  
*Thiacidas postica* Walker, 1855 (=Raphia cheituna Brandt, 1939)  
*Tathorhynchus exsiccata* (Lederer, 1855)
- e *Autophila luxuriosa* Zerny, 1933 (=einsleri Amsel, 1935) ssp. *hornuza* Wiltshire, 1977
- o\*\* *Autophila depressa* (Püngeler, 1914)  
*Autophila cerealis* (Staudinger, 1871)  
*Autophila ligaminosa* (Eversmann, 1851)  
*Acantholipes circumdata* (Walker, 1858)  
*Africalpe vagabunda* (Swinhoe, 1884) (=nubifera Hampson, 1907, =intrusa Krüger, 1939)
- \*\* *Plecoptera reflexa* Guenée, 1852  
*Antarchaea conicephala* (Staudinger, 1870)  
\* *Antarchaea fragilis* (Butler, 1875)  
*Antarchaea erubescens* (Bang-Haas, 1910)  
\* *Myana sopora* Swinhoe, 1884 (=Raparna amseli Brandt, 1941)

#### Hypheninae

- Hypena lividalis* (Hübner, 1796)
- Rhynchodontodes revolutalis* (Zeller, 1852) (=transcaspica Brandt, 1941)
- Rhynchodontodes orientis* (Brandt, 1938) ssp. *richteri* Wiltshire, 1961

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We hope our modest observations will be useful to fellow researchers and to the authorities responsible for nature conservation in the UAE.

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# An Illustrated Checklist of the Damselflies & Dragonflies of the UAE

by Graham B. Giles

Several papers have been published on the dragonfly fauna of Oman, Saudi Arabia and the Yemen. In 1987 Walker & Pittaway produced 'Insects of Eastern Arabia', a useful handbook published by Macmillan. Alas this is no longer available. Since then, new discoveries have been made, and no doubt others will follow. The following list incorporates observations made in 1996-98 and is, I believe, the first to specifically cover the UAE.

The accompanying photographs depict those species of dragonfly found in the UAE. It should be noted, however, that dragonflies may vary in colour with both age and sex, and also from one geographic location to another. In some cases, identification requires expert examination of anatomical details, particularly wing venation.

## ZYGOPTERA — Damselflies

### PROTONEURIDAE

- 1 *Arabineura khalidi* (Schneider 1988)

### PLATYCNEMIDIDAE

- 2 *Arabicnemis caerulea* (Waterston 1984) Powder blue damsel

### COENAGRIIDAE

- 3 *Ichnura evansi* (Morton 1919) Blue banded Ishnura

## ANISOPTERA — Dragonflies

### GOMPHIDAE

- 4 *Lindenia tetraphylla* (Van der Linden 1825) Arabian lobetail
- 5 *Paragomphus genei* (Sélys 1841)
- 6 *Paragomphus sinaiticus* (Morton 1929)

### AESHNIDAE

- 7 *Anax imperator* (Leach 1815) Emperor
- 8 *Anax parthenope* (Sélys 1839) Lesser Emperor
- 9 *Hemianax ephippiger* (Burmeister 1839) Vagrant Emperor

### LIBELLULIDAE

- 10 *Pantala flavescens* (Fabricius 1798) Globe skimmer
- 11 *Orthetrum sabina* (Drury 1773) Oasis skimmer
- 12 *Orthetrum chrysostigma* (Burmeister 1839) Girdled skimmer
- 13 *Orthetrum taeniolatum* (Schneider 1845) Azure (Blue) skimmer
- 14 *Diplacodes lefebvrei* (Rambur 1842) Purple darter
- 15 *Trithemis annulata* (Beauvais 1807) Purple blushed darter
- 16 *Trithemis arteriosa* (Burmeister 1839) Gulley darter
- 17 *Trithemis kirbyi* (Sélys 1891) Orange darter
- 18 *Crocothemis erythraea* (Brullé 1831) Carmine darter
- 19 *Selysiothemis nigra* (Van der Linden 1825) Desert darter
- 20 *Zygonyx torridus* (Kirby 1889)

رسم يوضح أول قائمة لفراشات التين وفراشات

الفتيات في الامارات.

### Notes:

- 1 This new species was only fully described in 1994 when the female was found. It was probably overlooked previously due to dark colouring and the habit of remaining close to water or in shaded areas. Common in the wadis of northern U.A.E. where J.N.B. 'Bish' Brown found it in 1988. One of the two endemic species.
- 2 Discovered in 1984 by Rodger Waterston. Unmistakable vivid blue male, paler female. One of the two endemic species.
- 3 Common and widespread throughout Arabia. The thorax of the female can be orange/brown.
- 4 Distinctive side projections at the end of a greenish slender body. About 72mm long. The only migratory *Gomphid*, occasionally seen in the UAE. It prefers to breed in pools in open areas of desert. I found several patrolling a deep fast flowing *falaj* in Wadi Abyadh (Oman).
- 5 A Mediterranean species with sand dwelling larvae. Bluish head, green thorax, yellow and black body with hooked appendage. 37-41 mm long. Recently established.
- 6 An African species known in Egypt and Sudan to Sinai. Similar to, but not as colourful as 5, being greyish brown and black all over, with orange hooked appendage. Usually camouflaged well as males perch on rocks close to running water, returning to the same spot when disturbed. Established only in the last few years.
- 7 Common in Europe. The iridescent blue of patrolling males is noticeable at most areas of water. Aggressively defends its territory. 73-80 mm long. Newcomer to UAE, now plentiful in Hajar Mountains.
- 8 Widespread from Mediterranean to Asia. Noticeable blue collar on greenish brown body, about 66-75 mm long. Migratory, often in swarms.
- 9 Difficult to distinguish from 8 without close examination, but smaller 61-66mm. An Afro-Asian species which makes long migratory flights into Mediterranean areas and northwards even as far as Iceland, where it was the only dragonfly captured there. Collections at E.R.W.D.A. from desert environments in Abu Dhabi suggest that it is the predominant *Aeshnid* there.
- 10 A very successful migrant with almost worldwide tropical distribution. Often found in groups flying several metres high. Constantly feeding on the wing, it is difficult to observe. Yellowish in colour, but males can be quite red in Arabia. When close, a yellow face is very noticeable. 49-52mm long. Has been found in India at 18,000 feet!

- 11 Very common and tolerates poor water quality. Easily identified with greenish yellow and black segmented body. Sexes alike. Prefers to 'hang' like *Anax* species, rather than perch.
- 12 Common. Male is blue, female brownish. Upper abdomen 'pinched' or waisted behind wings to give its common name. Medium sized 39-43mm. Mature females can develop the powdery blue appearance of the males.
- 13 Smaller than 12, and similarly coloured. Abdomen tapers evenly without a 'waist'. More difficult to find. Several recent sightings.
- 14 Smallest *Libellulid* with a variable colour and size. Some males almost black. It perches like other darters. Both sexes easily confused with 19. Close examination of wings necessary to distinguish them.
- 15 Very common. Males reddish purple and aggressive to intruders in their territories. Like all *Trithemis* species the body is held almost vertically when perched. Females difficult to find.
- 16 Common, especially in upper mountain wadis. Narrowest body of the three *Trithemis*. Has black marks between segments. Varies in colour according to locality. Females yellow and black with four noticeable yellow wing patches in UAE.
- 17 Common. Bright red male, yellowish brown female. Obvious large orange/brown patches on all 4 wings near the body. The size of these varies slightly. In Arabia they are intermediate between those of the type locality of India and the African subspecies *ardens*.
- 18 Common and numerous, the vivid orange red body of the male is very noticeable. Abdomen wider than other members of the family, flattened and tapering to end. Female yellowish with two paler marks on top of the thorax. Able to tolerate poor water quality.
- 19 A small dragonfly which can easily be confused with 14, but not so common. It does not frequent waterways, but is found in open spaces settling on stunted grass. Less likely to be found in mountain areas. Wings clear and shiny making the veins difficult to see. Males are blackish, females yellow/brown. Widespread in eastern Arabia, migratory over large distances.
- 20 A body about 50mm long makes this a large *Libellulid*. Sexes alike, with yellow spots on a dark abdomen and may develop powdery blue appearance. An Asiatic species which prefers to patrol near the surface of fast flowing streams and waterfalls. Like *Anax* in preferring to 'hang' rather than perch. Frequent in wadis of the Hajar Mountains.

**OTHER SPECIES FOUND IN NORTHERN OMAN**  
Some of which could occur in U.A.E. in the future.

**ZYGOPYTERA — Damselflies**

**COENAGRIIDAE**

- 21 *Ischnura senegalensis* (Rambur 1942)
- 22 *Pseudagrion decorum* (Rambur 1842)
- 23 *Ceragrion glabrum* (Burmeister 1839) Olive eyes

**ANISOPTERA — Dragonflies**

**LIBELLULIDAE**

- 24 *Orthetrum ransonneti* (Brauer 1865)
- 25 *Crocothemis sanguinolenta* (Burmeister 1839)
- 26 *Sympetrum fonscolombei* (Sélys 1840) Red veined darter
- 27 *Trithemis pallidinervis* (Kirby 1889)
- 28 *Tramea basilaris* (Beauvais 1817)
- 29 *Urothemis thomasi* (Longfield 1932)

**Notes:**

- 21 Very similar to 3 (*Ischnura evansi*) in size and colour, but pterostigma (wing markings) are darker. Quite rare in Dhofar and Northern Oman.
- 22 Looks similar to 3 but much bigger. Many locally established populations in wadis of N. Oman.
- 23 A striking orange damselfly found in Hajar mountain wadis. It is already on the Western side in Khatwa so only a short flight would add it to the UAE list. Like most damselflies, it stays close to shallow pools with plenty of emergent vegetation.
- 24 Uncommon in Arabia; found near Muscat in 1994.
- 25 New to Oman in 1976. Few found since.
- 26 A darter which is a well known migrant. Only odd specimens recorded. Found in Northern Oman near Muscat in 1977.
- 27 Found near Muscat in 1976 but none since. Occurs in Saudi Arabia & Yemen.
- 28 Another strong migrant. Two specimens in the Natural History Museum in Muscat from 1992, but one was also found in 1977.
- 29 Only a few specimens found in Oman to date. Rare migrant from Nigeria.

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1. *Arabineura khalidi* pair, male on right.



2. *Arabicnemis caerulea* pair, male on left.



3. *Ischnura evansi*  
left male,  
right female.



4. *Lindenia tetraphylla*



5. *Paragomphus genei*



6. *Paragomphus sinaiticus*



7. *Anax imperator*  
left male,  
right female.



8. *Anax parthenope*



9. *Hemianax ephippiger*



10. *Pantala flavescens*  
above male, left female.



11. *Orthetrum sabina* (sexes alike)



12. *Orthetrum chrysostigma* left male, right female.



13. *Orthetrum taeniolatum* left male, right female



14. *Diplacodes lefebvrei*  
male (female  
not shown).



15. *Trithemis annulata* left male, right female.



16. *Trithemis arteriosa*  
left male,  
right female.



17. *Trithemis kirbyi* left male, right female.



18. *Crocothemis erythraea* left male, right female.



19. *Selysiothemis nigra* female (male not shown)



20. *Zygonyx torridus* (sexes alike)



23. *Ceragrion glabrum*

# Wadi Fish of the UAE

by Gary R. Feulner

## Abstract

The three freshwater fish species native to the mountains of the UAE, *Garra barreimiae*, *Cyprinion microphthalmum* and *Aphanius dispar*, are described from a field perspective and their distribution is illustrated and discussed. *C. microphthalmum* is reported from the UAE for the first time. Introduced tilapia, probably *Oreochromis spp.*, are also described and their distribution illustrated. The recent recognition of introduced mollies *Poecilia spp.* is also noted. Finally, a newly observed fish believed to be a native species of goby *Gobiidae* found within Oman, adjacent to the UAE border, is described pending determination.

## Native Species

The scarcity of fresh surface water in the UAE (as in Arabia generally) limits both the number and variety of freshwater fish that are found. Only three native species of fish are known to occur in the mountain wadis of the UAE. These are *Garra barreimiae*, *Cyprinion microphthalmum* and *Aphanius dispar* (the Arabian killifish). The first two are members of the carp family (Cyprinidae), the third belonging to a large family commonly known as egg-laying toothcarps (Cyprinodontidae). Except for the Arabian killifish these species do not have common names either in English or, apparently, in Arabic [1]. No UAE wadis flow continuously at the surface throughout the year, so all local wadi fish must be able to survive for extended periods in isolated pools. However, little is known in detail about their adaptations and life histories and even basic information on diet, reproduction and longevity is presently lacking [2].

***Garra barreimiae*:** This is by far the most common species, and if fish are present in a mountain wadi in the UAE, *G. barreimiae* is normally, among them. First described in 1956 and named after the Buraimi oasis, it is endemic to the UAE and northern Oman. It is the only species seen in many wadis and may be the only local species that is able to survive regular and complete desiccation of its environment.

*G. barreimiae* is a bottom-feeder feeding by means of a specialised plate within the oral opening (called the "mental disc") which functions as a sort of suction device. *G. barreimiae* resembles a catfish as it nuzzles its way across gravel or over rock surfaces. The body is relatively long with a flat underside, blunt snout and a wedge-shaped head that is trapezoidal in cross-section, tapering upwards. Its large, heavy scales give it an armoured, somewhat primitive appearance. The pectoral fins are large ovals and the tail fin is forked symmetrically. The maximum size is estimated to be about 8.0 cm but the normal range is approximately 3.5-6.0 cm.

In colour it is a mottled brown, typically rather dark but varying with the surroundings. One consistent feature that is particularly useful in the field is a thin but distinct, pale transverse line just behind the head, that appears to demarcate the head from the body of the fish. The dark

وصف لثلاثة أنواع من الأسماك التي تعيش في

المياه العذبة وهي موجودة في جبال الامارات وهناك

نوعين جديدين بالاضافة الي نوع يعيش قرب حتا ويمكن

أن يكون من الاكتشافات العلمية الحديثة.

eye has a yellow or orange spectacle. Larger adults (>4.0 cm) characteristically have a red-tinged tail and pectoral fins, a white tip on the dorsal fin and a blue-white marking at the fork of the tail. The population in a given pool may exhibit consistent distinctive variations, e.g. orange head markings.

Larger adults are relatively sedentary and sometimes rest on the bed, whereas juveniles are more active, but all move frenetically when approached in a shallow pool where they are vulnerable to terrestrial predators. Occasionally, when feeding, they may be seen to twist sharply and rub their bodies against rocky surfaces or gravel, briefly flashing their white bellies. The purpose of this motion is unknown, but it may be an attempt to dislodge parasites. Larger individuals often appear to maintain at least temporary territories with a radius of several inches, within which they forage and chase away smaller intruders.

*G. barreimiae* can travel limited distances out of water. For example, they can easily negotiate damp rock surfaces between small puddles in shallow mountain rivulets. Khan has described a video taken by Mike Shepley in which *G. barreimiae* are seen to ascend a steep rock face during rain [3]. Gross suggests that it is a behavioural tendency of the fish to explore upstream in this manner. Captive *G. barreimiae* sometimes exit their tanks at points where water has dripped down the inside glass above the waterline [4].

The author once observed some two dozen or more medium size *G. barreimiae* attempt to climb a 4-metre waterfall consisting of several steep chutes. They ascended on the wet surface of the splash zone immediately adjacent to the main flow of water, sometimes wriggling, sometimes jetting forward, resting periodically with pectoral fins spread, the mental disc apparently engaged for suction, and the tail twisted and pressed flat against the rock. Most did not ascend more than about a metre but several managed to ascend almost 3 metres, although it was not clear that any fish were ultimately successful, owing to the difficulty of the uppermost chute. The fish were unfortunately not observed climbing until after one of the author's companions had settled into the pool at the base of the waterfall, and so it is not known whether their behaviour was entirely spontaneous. However, fish continued to embark on the falls intermittently over a period of 15 minutes or more, typically in small groups.

According to Khan, *G. barreimiae* are thought to lay their tiny eggs in wadi gravel, where they hatch only when conditions are suitable. Some of the eggs may adhere to the feet of birds that come to feed or drink, and so be transported and released in distant pools [3], although not everyone accepts this conventional wisdom. Gross notes that attempts to breed *G. barreimiae* have been

notoriously unsuccessful. Adults are reported to eat the eggs of their own species and Gross suggests that this is to be expected in a nutrient-poor environment like that of most UAE mountain wadis. He speculates that spawning is somehow triggered by rain or thunderstorms, thereby ensuring rapid dispersal of the eggs, which are known to hatch within 24 hours [4]. This hypothesis is apparently strengthened by recent successful breeding at the Breeding Centre for Endangered Arabian Wildlife in Sharjah, UAE [5], although would require a reservoir of freshwater and adult fish to exist year-round in every wadi in which *G. barreimiae* is found. It remains to be determined whether this criterion is satisfied in all cases.

The genus *Garra* is known from East Africa to South Asia [6]. A small number of species and subspecies are endemic to the mountains of southwestern Arabia [6]. The closest relative of *G. barreimiae* is thought to be *Garra persica*, a species widespread in southern Iran [6]. Early work distinguished two subspecies of *G. barreimiae* in the UAE and Oman, *G. b. barreimiae* and *G. b. shawkahensis*, as well as a second species of *Garra* from the south of the Jebel Akhdar, *G. longipinnis* [6,7]. However, the total number of *G. barreimiae* specimens was small, and these were collected from only five sites including Muscat, Buraimi and Wadi Shawkah. It remains to be seen whether work based on more extensive sampling and a better understanding of the widespread but disjunctive distribution of *G. barreimiae* within the Hajar Mountains will validate these early distinctions. Krupp has since described an additional subspecies, *G. b. gallagheri*, that inhabits the relatively distant and discrete Wadi Batha watershed in Oman, east of the Wahiba Sands [8]. The criteria by which experts generally distinguish subspecies of freshwater fish are arcane and often statistical, and are not well suited to field application by non-specialists. The author has not attempted to distinguish possible subspecies in the course of the present study.

*G. barreimiae* is caught and eaten by some mountain residents. Although this is presumably now relatively rare, the author has observed local fishermen harvesting this species from a stream, using a stone dam to channel the fish onto a portable sieve-like platform that can be made from palm ribs, wire mesh or nylon netting. The remains of such operations can be seen on occasion. This method can be very effective, eliminating virtually every fish in the affected area [4]. The author's own observations of recently fished streams, where only the smallest juvenile fish could be found, supports this claim. Discussion with local fishermen and examination of their catch indicates that only *G. barreimiae* is taken, even when other species are present in significant numbers.

*Cyprinion microphthalmum mascatensis*: *Cyprinion* is an Asian genus of the carp family. *C. microphthalmum* has long been known from Pakistan, Afghanistan, Iran and the Muscat area [6], but was only confirmed from areas near the borders of the UAE in 1995 [9] and from just inside the UAE itself (at Hatta and Hadf) by the author in 1998. Congeners are known from within its Asian range as well as the Levant, the Hadhramaut, and the east flank of the 'Asir range in Saudi Arabia. Specimens from the Hajar Mountains have been designated as a distinct subspecies, *C. microphthalmum mascatensis* [6].

*C. microphthalmum* is a free-swimming fish with a streamlined body and a large, transparent, deeply forked

tail. Individuals may be pale grey to mottled golden brown on top (smaller fish are better camouflaged), but when seen from the side they are a striking silvery white that may sometimes reflect like the flash of a knife blade. A dark yellow-black iridescent lateral line can be seen both in side view and from above. The individual body scales are prominent and have a dark outline, giving the pale sides a hachured appearance. The mouth is set forward but directed downwards. Close-up examination reveals a single pair of very thin barbels.

Adults are unmistakable, being larger than even the very largest *G. barreimiae*, up to an estimated maximum of 10-12 cm. Adults also exhibit a distinctive, elongated blue-white patch behind the eye as well as blue-white cheeks and lips, and sometimes blue-white pectoral fins. These colours appear to be independent of breeding status. In the aquarium setting breeding males are distinctly darker dorsally than females [5]. Young *C. microphthalmum* can be mistaken for young *Garra barreimiae*, with whom they are normally found. They are nevertheless relatively longer and thinner, golden rather than brown in colour, and they behave differently, swimming more continuously and without making contact with the bottom. *C. microphthalmum* is the least common of the native species and is normally absent from very small or shallow pools.

*Aphanius dispar* (Arabian killifish): The Arabian killifish is abundant in many UAE mountain wadis, but its primary environment is marine coastal lagoons and estuaries in around the Arabian Gulf, the Gulf of Oman and the Red Sea [6,7], where it may be the most common fish [10]. For this reason it is described as a "secondary" freshwater fish. Closely related species are found in similar environments throughout the Mediterranean and Asia Minor [6,7,16] and some other egg-laying toothcarps are kept as aquarium fish. Dispersal of the Arabian killifish from one wadi system to another is presumed to be aided by its ability to migrate along the seacoast, but this cannot satisfactorily explain its modern day presence in wadis on the west flank of the Hajar Mountains, far from the sea, except by reference to a much wetter climate in earlier times. This explanation has been invoked to explain the presence of many plants and animals, as well as most other freshwater fish, as relict species in isolated areas of the Arabian Peninsula, especially in the mountain regions of southern Arabia.

The Arabian killifish has been artificially introduced into certain UAE environments where fish would not otherwise occur, such as small agricultural runoff streams on the southern edge of the Ru'us Al-Jibal, and bulldozed ponds in coastal areas, where it has probably been introduced for mosquito control. This raises the possibility that it has been artificially introduced into some natural environments as well, although the author has not investigated the nature or extent of any such introductions.

The Arabian killifish is similar in size to most *Garra barreimiae*, adults being about 3.5-5.0 cm. Seen from above they are mottled golden brown in colour, always paler than any associated *G. barreimiae*. The tail is not forked, which can be the most useful feature in distinguishing smaller fish. The killifish typically swims somewhat higher in the water column than *G. barreimiae*, and may "hover" occasionally with the tail curved slightly to one side. The mouth is directed upwards and the killifish is a surface feeder by design, but in the wadi environment it is somewhat opportunistic. It may feed on the bottom

Wadi fish of the UAE. (Photos by Gary Feulner)



*Garra barreimiae*



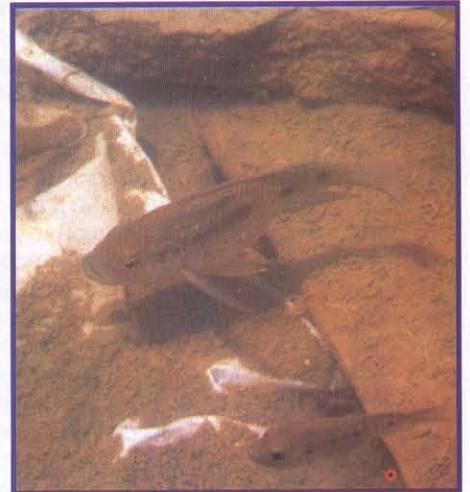
*Cyprinion microphthalmum mascatensis*



Arabian killifish *A. dispar* (male)



Arabian killifish *Aphanius dispar* (female)



Introduced tilapia *Oreochromis sp.*



The newly discovered Hatta goby (with a smaller *G. barreimiae*) — Photo: Christian Gross

from time to time, or scavenge dead insects, and it is known to eat mosquito larvae. The killifish has teeth in its jaws, which the other native fish do not.

Adult killifish exhibit marked sexual dimorphism. Males are pale and faintly white-stippled with a few vertical stripes near the tail. The tail fin itself is marked with 2-3 dark vertical bands which are diagnostic in the field. In breeding colour, the lips and fins are a vivid blue-white. The tail is fluttered like a matador's cape when displaying to females. Mature females show numerous dark vertical bands like zebra stripes on the side of the body, although these markings are variable in detail.

### Introduced Species

Two introduced varieties of freshwater fish are known to occur in the UAE. One, the tilapia, has been actively introduced and is now relatively widespread and well established in suitable habitats. It is thought to be represented by at least two or three species and their hybrids. The other, the molly, is so far known from only a single agricultural site.

Tilapia (*Oreochromis spp.*): The tilapiines are a subgroup of the very large and diversified family of fishes, the *Cichlidae*, most of which are native to tropical and subtropical Africa. The name tilapia is used to refer to several related genera including the genus *Tilapia*. A few tilapia species are bred commercially in large numbers as a food fish. In Arabia, tilapia have been introduced in modern times to many freshwater bodies of all kinds (including water tanks and irrigation channels) for purposes of algae, weed and mosquito control. Some are now bred locally for these purposes.

Tilapia are typically much larger than other local wadi fish, reaching in excess of 15 cm. The most common variety is a pale beige colour. Smaller and/or immature individuals are usually marked with a line of several diffuse dark blotches (or sometimes vertical bars) along the side of the body. Larger individuals show vertically striped and variably tinted dorsal and tail fins and the dark blotches on the body are reduced or absent. A few populations are a dull blue-green colour overall. A variety bred in Abu Dhabi in large numbers is black with red margins on the pectoral and tail fins. This variety has not been seen in the mountains, with the exception of the Wadi Shi reservoir near Khor Fakkan, but it can be found elsewhere in irrigation ditches and pond environments in certain agricultural areas. Tilapia colour patterns may vary with the emotional state of the fish, and in breeding colour local tilapia males of all varieties exhibit vivid blue-white lips.

Apart from colour, all of the tilapia found in the UAE are very similar in appearance. Seen from above, the large dark eyes are prominent. The body is widest at the head and tapers forward to a broad, blunt mouth. Seen from the side, the body is relatively deep in comparison with other local fish. The tail is unforked and the dorsal fin is greatly elongated. Sexual dimorphism is generally limited to features that are not always easy to observe under field conditions, e.g., males typically have longer pelvic and dorsal fins. The different colour varieties seen in the UAE can sometimes be found together. Black and pale individuals were observed in mutual courtship behaviour in a pond near Ruwayyah in Dubai, along with occasional intermediate, mottled forms. It is not known to the author whether the observed varieties represent different species or whether the less conspicuous pale form rep-

resents a colour reversion.

Identification of the tilapia species present in the UAE is uncertain and problematic. At least four species are reported to have been introduced elsewhere in Arabia: *Tilapia zillii* [6], *Oreochromis aureus* (the blue tilapia), *O. mossambicus* (the Mozambique tilapia), and *O. niloticus* (the Nile tilapia) [11]. Large scale commercial culture of tilapia is limited almost exclusively to the latter three *Oreochromis* species, with the Nile tilapia being by far the most common. Unfortunately, breeding stocks are not always pure, and tilapia species hybridise readily. As a result, it is often difficult to be certain what species may be present in a given population. Even experts do not rely confidently on appearance, but resort nowadays to biochemical methods [12]. At least two and possibly all three of the commercial *Oreochromis* species, as well as hybrids, may be present in the UAE. The black variety resembles the typical *O. mossambicus*, the most common pale variety is a reasonable candidate for *O. niloticus*, and the blue-green variety may correspond to *O. aureus*. These identifications remain to be confirmed, however.

Behavioural characteristics support the general taxonomy suggested above, and can also facilitate field identification of tilapia. At breeding time local tilapia males each excavate a shallow bowl in a sandy bottom area, which they then patrol as their territory and defend against other males. This appears to be true of all colour varieties seen in the UAE. In suitable areas, many territories may be established adjacent to each other, separated by less than a bowl's width, each patrolled by its resident male. This behaviour is typical of *Oreochromis* species, all of which are polygamous female mouthbrooding species in which the eggs are fertilised and hatched in the female's mouth, without further involvement by the male [13].

Tilapia are omnivores with a strong herbivorous tendency. The common varieties are notoriously voracious, hardy and prolific species native to African rivers that vary seasonally, predisposing the fish to be able to tolerate considerable fluctuations in temperature, salinity, water quality and food resources [13]. They can sometimes survive even limited temporary desiccation of their environment by burying themselves in damp mud. As a result, concern has been expressed that the introduction of tilapia will adversely affect the native fish population.

Molly (*Poecilia spp.*, formerly *Mollinesia spp.*): While not strictly a wadi fish, the molly is mentioned here because it is the only other freshwater fish presently known to occur in the UAE, and it may yet be found in mountain front areas in association with agriculture and human settlements. Mollies are native to tropical and subtropical America. The black molly, a selectively bred variety, is a popular aquarium fish available worldwide. It is live-bearing, prolific, and easily bred. Mollies were reported more than a decade ago from scattered wells and irrigation works in eastern Saudi Arabia, where they originated from private aquaria [11]. They are also known in similar circumstances from Bahrain [14]. In both places they have been observed to occur in three colour varieties - black (the commercial variety), pale beige (considered to be the original wild colour) and mottled black-and-pale. This represents a reversion of the aquarium stock to the original wild colour due to indiscriminate breeding [11].

In the UAE, mollies were recognised only in early 1998 [14] and exhibited the same three colour patterns as

mentioned above. They were seen in irrigation ditches at Ruwayyah, an agricultural area about 30 km inland from Dubai, and may also be present in other large agricultural areas in the Dubai hinterland. Surface water in these areas is maintained by pumping ground water, and the molly population is in this sense artificially sustained.

### Geographical Distribution of Species

Figure 1 shows the distribution of freshwater fish species in the wadis of the UAE and neighbouring Oman, where they have been observed by the author. Wadi Jizzi in Oman is shown for orientation but was not investigated. Most fieldwork was conducted during the period May 1996 to July 1998. The resulting compilation gives a reasonably comprehensive account of the existing distribution, although not all wadis are included nor were they all surveyed with wadi fish exclusively in mind. In the wadis shown, the fish fauna was observed conscientiously and the failure to observe a species is believed to indicate its absence. In a few instances local residents were consulted, and their information always confirmed the author's observations, even where this was not what was anticipated.

At least a few generalisations can be made from the distributions shown in Figure 1:

- (1) *Garra barreimiae* is the most common and widespread species, and is often the only species present. With few exceptions it is present at every location where any wadi fish at all are present. In addition, where *G. barreimiae* is present along with other freshwater fish, its distribution normally continues further upstream than that of the other species. Nevertheless, *G. barreimiae* is absent anomalously in several significant freshwater locations, including Wadi Safad and Wadi Hiluw on the East Coast of the UAE and Wadi Baraq on the west flank of the mountains. *A. dispar*, by contrast, is present and abundant in those three wadis. These sites bear further investigation.
- (2) *Cyprinion microphthalmum* is not found north of Wadi Hatta and the mountain corridor from Hatta to the Madam plain. Moreover, it has been found only in larger wadis and tributaries which support relatively large freshwater pools year round.
- (3) *Aphanius dispar* is not found on the west flank of the mountains except in the area from Wadi Hatta northwards. This corresponds to the area of wadis whose route to the sea, although intermittent, can still be discerned in the modern landscape.
- (4) Within the area studied, *A. dispar* and *C. microphthalmum* are found together only in the Wadi Hatta and Wadi Fayd watersheds. This appears to reflect the northern limit of the range of *C. microphthalmum* rather than a relationship of mutual incompatibility. Both species are present in significant numbers in Wadi Hatta and Wadi Fayd, and they are understood to co-exist in the many large wadis to the south along the Batinah coast of Oman [6,7].
- (5) No freshwater fish are present in the Ru'us Al-Jibal, i.e., the high peaks of the Musandam Peninsula, north and west of Dibba. This area differs both geologically and hydrologically from the mountains to the south. There are no permanent streams and very few permanent pools. Those pools which do exist have been the subject of field attention, and other

investigators confirm the absence of fish [1]. On the southern edge of the Ru'us Al-Jibal, *A. dispar* is present in Wadi Khabb and its tributaries in a few wells and small streams fed by runoff from groundwater pumped for agricultural use, but local residents confirm that these fish have been introduced. Freshwater fish may yet be introduced into modern cisterns or water tanks in other settlements within the Ru'us Al-Jibal, but this is not known to have occurred to date.

### Additional possibilities

No native freshwater fish species other than those listed above have been reported in the literature from the UAE or northern Oman. Several different species of *Garra*, *Cyprinion* and *Barbus* (another genus in the carp family), have been identified from the mountains of Yemen and western Saudi Arabia, where the somewhat less arid conditions may support a more diverse freshwater fish fauna than in the UAE. All authors are in agreement that there is no evidence for the exchange of freshwater species between the mountain regions of east and west Arabia [6,7,15]. Primary freshwater fish are not known from other areas of the Arabian Peninsula.

In the course of the present study, a previously unrecognised and apparently native fish was observed in nearby northern Oman, and might potentially be found in the UAE. This is described below in advance of professional investigation and definitive scientific determination.

### 'The Hatta Goby' (identification pending):

This fish was first observed in October 1997 in a remote section of Wadi Qahfi, a tributary of Wadi Hatta, several kilometres below the well-known Hatta Pools. This area is within the Sultanate of Oman, near the UAE border town of Hatta. Live specimens were collected in April 1998. Using the key contained in Krupp (1983) it was possible to identify the fish with reasonable confidence as a goby (Family Gobiidae). This conclusion was seconded by professionals at the Breeding Centre for Endangered Arabian Wildlife in Sharjah, where the specimens are now held.

The Hatta goby is typically found in deeper pools in the wadi bed (i.e., more than one metre deep) along with both *G. barreimiae* and *C. microphthalmum*. It is readily distinguishable by its size, colouration and behaviour. In most cases the gobies are the largest fish present, being approximately twice the length of the largest *G. barreimiae* and as much as one half longer than the largest *C. microphthalmum*. Maximum length is more than 15 cm. The body is flat-bottomed and elongated, tapering uniformly from the back of the skull to the base of the tail. In colour it is a mottled grey-brown with several brighter, broad, yellow-buff transverse bands across its back. Viewed closely, these are not solid colour bands but are made up of an overall camouflage pattern of yellow and brown.

The tail fin is small, faintly striped and blunt-ended. The pelvic fins are distinctive, being pale, rather round and oriented horizontally, resembling two decorative fans. Consistent with the distinguishing characteristics of gobies, the Hatta goby has two dorsal fins and its pelvic fins are positioned far forward and are fused to form a sucker or grasping organ, but these features are not easy to see in the field. The head is short and wedge-shaped and the skull tapers upwards like that of *G. barreimiae*. The eyes are small and narrowly set in a dorsal position. The snout is blunt and the broad mouth has a thick upper lip and is

set at the anterior ventral edge of the body.

Gobies, most of which are marine species, are typically solitary and territorial, living in holes or under stones [11]. The Hatta goby seems to follow this pattern. It is relatively sedentary, generally resting on the substrate. If approached by an observer while in shallow water, it will normally withdraw or seek cover. In an area of open sand or gravel, it may take cover by burying itself, which it can do almost instantly.

Krupp (1983) mentioned that "unidentified species of marine fishes entering freshwater were reported from Arabia (Gobiidae, Mugilidae) [i.e., gobies and mullets]". He gave no further details but included gobies in his identification key. The marine goby *Bathygobius fuscus*, which is distinct from the Hatta goby, has been reported from a tidal influenced drainage ditch in the Qatif oasis along the Arabian Gulf coast of Saudi Arabia [11]. In contrast, it should be emphasised that the Hatta goby is found in a *bona fide* mountain wadi environment of bedrock, boulders and medium to coarse gravel, more than 35 km upstream from the sea (25km inland and over 15 km within the mountain front itself) at an elevation of almost 300 metres.

Like wadis throughout the Hajar Mountains, Wadi Qahfi is subject to both torrential flooding and significant desiccation. Flash floods have claimed human lives in this wadi within the past decade, but for much of the year water does not flow continuously at the surface, being limited to intermittent shallow channels and isolated deeper pools. Moreover, the outflow from Wadi Qahfi and other tributaries of Wadi Hatta does not normally reach the sea across the broad Batinah coastal plain, except very briefly after exceptional rains. This is not a frequent phenomenon, nor is it believed to have been so in historical times. Archaeological and geological evidence indicates that the climate of southeastern Arabia turned distinctly more arid beginning approximately 4000 years ago, and it is generally accepted that the present day wadi systems of the Hajar Mountains were developed primarily during wetter periods in earlier times.

Against this background, it is significant that the goby population in Wadi Qahfi, although not large, seems well-established and consists of individuals of varying sizes, suggesting the maturation of multiple generations *in situ*. Assuming an ultimate marine origin, the question remains to be answered as to when and under what conditions the arrival and adaptation of this population occurred.

**Additional introduced species:** The presence of additional introduced species at discrete permanent freshwater sites in the UAE must be considered likely. Aquarium fish such as guppies (*Poecilia reticulata*) and platties (*Xiphophorus maculatus*), in addition to the mollies mentioned above, have been released to the wild in the Eastern Province of Saudi Arabia [11]. Another possibility is *Gambusia affinis*, which has been introduced elsewhere to control mosquitoes and in Iran is considered to have displaced *Aphanius dispar* from much of its former range [15]. All of the foregoing species are members of the live-bearing toothcarp family (Poeciliidae) and are prolific in captivity. In addition, it would be somewhat surprising if the many foreign agricultural labourers did not occasionally consider the unofficial introduction of species known to them from their home countries.

## Conclusion

The study of freshwater fish in the mountains of the UAE and northern Oman remains in its early stages. Scientific studies have so far emphasised western Arabia. Amateur observation remains important in establishing the ranges and behaviour of the various species. Little is known in detail about the life cycles and survival strategies of the local freshwater fish. All of the fish described here, with the exception of tilapia, are maintained at the Breeding Centre for Endangered Arabian Wildlife in Sharjah, which is attempting to learn more about *Garra barreimiae* in particular. It is hoped that the present contribution will stimulate additional interest and attention.

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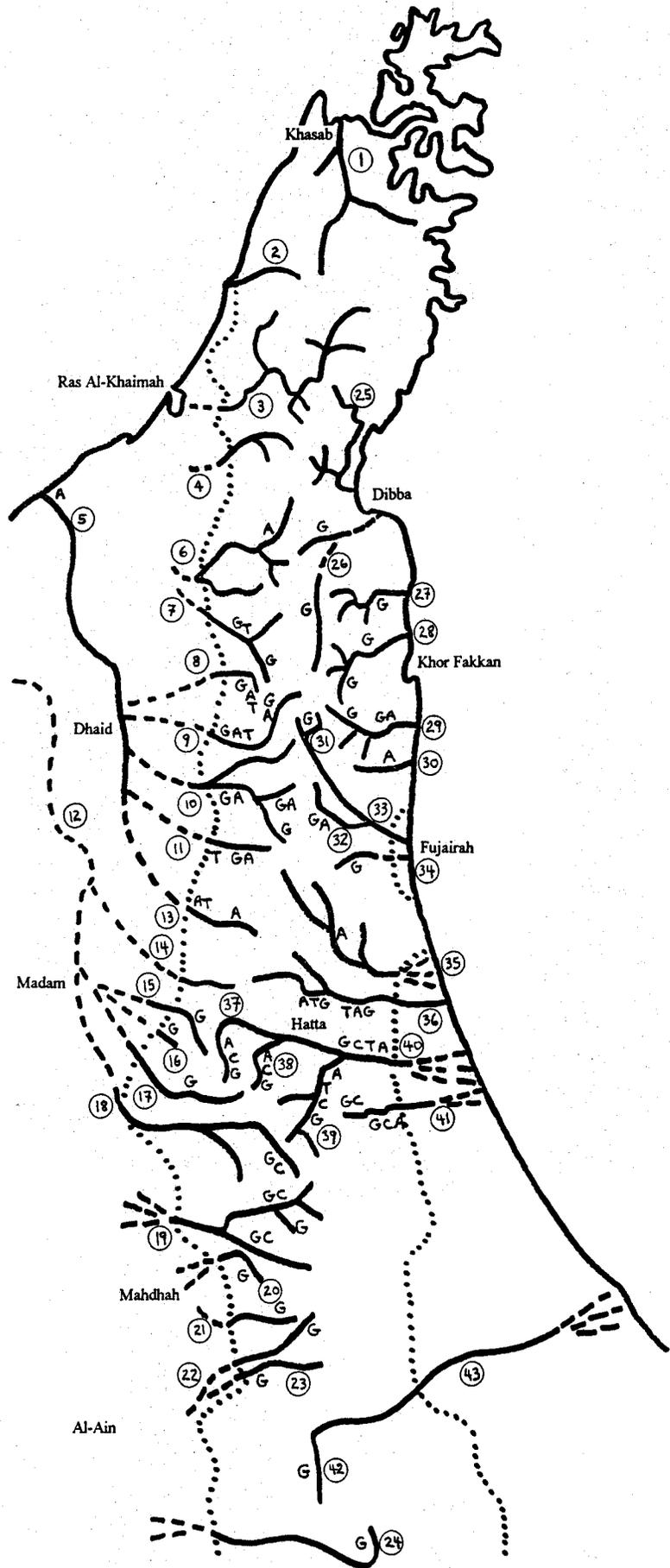
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**Fig.1: Distribution of wadi fish in the UAE and northernmost Oman.**

G = *Garra barreimiae*  
 A = *Aphanius dispar*  
 C = *Cyprinion microphthalmum*  
 T = *Tilapia Oreochromis spp.*  
 ●●●●● = Mountain front

**Key**

1. Wadi Khasab
2. Wadi Ghalilah
3. Wadi Bih/tributaries
4. Wadi Naqab
5. Wadi Lamhah
6. W. Tawiyeen/W. Khabb/tributaries
7. W. Ayim/W. Fara/W. Mowrid
8. Wadi Maydaq
9. Wadi Siji/tributaries
10. W. Ashwani/W. Asfani/tributaries
11. Wadi Shawkah
11. Wadi Fayah
13. Wadi Baraq
14. "Wadi Qawr West"
15. Wadi Umm Tarathith
16. Wadi Khadra and others
17. Wadi Mayhah
18. W. Sumayni/W. Shiya/W. Shuwayhah
19. W. Sharm/W. Khudayrah
20. Wadi Al-Ramthah
21. Wadi Musah
22. Wadi Musayliq (Khutwah)
23. Wadi Dhahr
24. Wadi Muqayleet
25. Wadi Khabb Shamsi
26. Wadi 'Abadillah
27. Wadi Zikt
28. Wadi Wurayyah
29. Wadi Madha
30. Wadi Safad
31. Wadi Daftah
32. Wadi Farfar
33. Wadi Ham
34. Wadi Hayl
35. Wadi Hiluw
36. Wadi Qawr
37. Wadi Hadf
38. "Power Sta. Wadi"
39. Wadi Qahfi
40. Wadi Hatta
41. Wadi Fayd
42. Wadi Sarfanah
43. Wadi Jizzi



# Snake bite — a case report from the UAE

by Uli Wernery and Maria Lipp

Incidents of snake bite in the United Arab Emirates are rarely reported, although anecdotal evidence suggests that they may be more common than reported incidents would suggest. The majority of the eleven snake species thus far recorded in the United Arab Emirates and in neighbouring areas of northern Oman are either non-poisonous, such as the **Sand Boa**, *Eryx jayakari*, or are only mildly poisonous, such as the **Arabian Rear-fang**, *Malpolon moilensis*. In the latter case, the position of the venom-bearing fangs at the back of the jaw make it unlikely that humans will be injected with venom even if bitten.

There are, however, two groups of snakes present in the area which are highly poisonous, the sea snakes **Hydrophiidae** and snakes of the viper family, of which four species have been recorded, the **Sawscale Viper**, *Echis carinatus*, the **Carpet Viper**, *Echis coloratus*, the **False Horned Viper**, *Pseudocerastes persicus*, and the **Horned Viper (Sand Viper)**, *Cerastes cerastes gasperettii*.

In the spring of 1998, perhaps as a result of a milder and wetter winter, observers reported more sightings of vipers than is usual. Two incidents of snake bite were reported. One, in a wadi near Fujairah, involved an Indian expatriate agricultural worker, who was not taken to hospital until 15 hours after he was bitten, and who died of renal failure and myocardial degeneration. The second incident involved a European expatriate who was bitten while stepping out of a pool on to gravel in an Omani wadi near Al Ain.

Medical case notes follow. These are reproduced partly as a warning that, contrary to the opinion of the doctor referred to in the notes, there are highly poisonous snakes in the area, and that caution is advisable.

## Friday 13.03.98 - 14.15 hrs

A suspected saw-scaled viper bit a healthy 40 year-old male, Josef, as he stepped out of a wadi pool and onto some gravel. The bite was underneath the ankle on the left foot. The pain was described as comparable to that caused by a needle. A belt was fastened around the upper leg and Josef walked for ca.10 minutes until he reached the car. From there he was driven for one hour to reach Tawam Hospital, in Al Ain.

**15.30 hrs** — Tawam Hospital. A South African doctor inspected the bite. According to him there were only non-poisonous and semi-poisonous snakes in the area and, therefore, there was no need to worry. Drugs were administered to combat the swelling and pain. The bite was inspected visually and no other steps were taken. However, the victim was advised that the swelling would get bigger and that they should consult a doctor if they were worried. He was discharged from Tawam at **15.50 hrs**.

On the drive back to Dubai, the leg was kept elevated. The swelling grew bigger as anticipated. During the evening the swelling continued slowly to the upper leg. By midnight the family was rather concerned and called the American Hospital. While getting up, Josef started vomiting, broke out into a cold sweat and he seemed to be quite dizzy. The pain was unbearable in an upright position and Josef had to crawl to the car. The

تقرير طبي عن لدغة ثعبان قرب العين.

vomiting continued. At the American Hospital he was directed straight to Rashid Hospital, which he reached around **00.45**.

Blood tests were made immediately and showed serious blood-clotting. Blood pressure was measured and proved to be very low. After discussions with the Emergency Doctor and Dr. Wernery, a general antivenom was administered to which Josef did not show any allergic reaction. The cold sweat and low blood pressure eased towards the early morning.

## Thursday 14.03.98

The following morning the "blood picture" had improved, but a second dose of antivenom was administered. The swelling had increased slightly and the leg was discoloured. The swelling remained the same for the next two days, slowly turning purple and yellow, mainly at the back of the leg. After 3 days the swelling started to reduce, but the discolouring stayed. The blood picture improved. Antibiotics were given in case the snake's fangs had infected the leg. The leg could neither be touched nor moved, as it was very painful.

Josef left the hospital on the fourth day and remained at home in bed for another four days with his leg up. After that he slowly started to move on all fours. Twelve days after the incident he began to take a couple of steps in an upright position. As the blood shot into the leg it still turned blue and was rather painful.

Sixteen days after the incident he managed to walk around quite well for some time. However, after being upright for a while he still needed to relax and put the leg up. The discolouring was nearly gone, except for a small area around the bite itself.



Snake bite above the ankle, probably by a saw-scaled viper (*Echis carinatus*). Swelling and haematoma caused by Ecarin, an anticoagulant (male patient, aged 40).  
Photo by Mrs. Kluge

**Table 1. Clinical signs of Envenomation by Saw-scaled Viper**

Signs and Conditions	Saw-Scaled viper <i>Echis carinatus</i>
Swelling and oedema at site	+3
Pain	+3
Discoloration	+2
Vesiculation	+2
Ecchymosis	+2
Prolonged clotting time	+3
Haemorrhage	+3
Hypotension	+2
Nausea and/or vomiting	+1
Necrosis	+1

## Conclusion

It is believed that a **Saw-scaled Viper** *Echis carinatus* bit Josef. Most of the clinical signs mentioned in Table 1 were observed during Josef's illness (Fowler, 1992).

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# A Late Stone Age Site south of the Liwa Oasis

by Anthony Harris

اكتشاف موقع أثري جنوب ليوا ويشمل آثار

من أواخر العصر الحجري وأواخر العصر الإسلامي.

## Introduction

*An examination of an inter-dunal plain south of the arc of the Liwa Oasis, in southern Abu Dhabi, has yielded archaeological artefacts provisionally ascribed to two periods, the Late Islamic period and the Late Stone Age. The material from the latter includes worked flint typical of the Arabian Bifacial Tradition, which is, as far as is currently known, the first of its type to be identified south of the Liwa on the Abu Dhabi edge of the Empty Quarter. An abandoned well was also located at the site.*

For over twenty years, albeit intermittently, I have searched for evidence of Late Stone Age ('Neolithic') activity in the United Arab Emirates. I was, therefore, delighted early in 1998 to identify clear signs of early hunting just south of the Liwa Oasis.

The site is, as far as I am aware, the first of its period yet to be found in the deep sands between Liwa and the international border with Saudi Arabia, although Late Stone Age sites have previously been identified in the Saudi Arabian portions of the Rub Al Khali (Empty Quarter) (1).

Late Stone Age artefacts have also been found in the Emirate of Abu Dhabi in the sands north of the Liwa, at Habshan, for example, (2), and more extensively, on the coast and islands (3).

Early in 1998, I visited Yaw Sahhab, a valley 9 km south-east of the settlement of Hameem, on the eastern end of the arc of the Liwa Oasis. The valley contains a plantation belonging to the Ruler's Representative in the Eastern Region of Abu Dhabi, the co-ordinates of which are 22 53 N 54 21 E. Approximately 500 m west of the plantation, on the floor of the valley, I noticed a small fragment of ostrich eggshell on the surface. The presence of ostrich eggshell is often an indication of previous human activity, sometimes, but by no means

always, dating to the Late Stone Age.

A detailed search of the surrounding area revealed the presence of one small flint arrowhead and a scattering of flint flakes, the first that I had ever seen in the Liwa area, as well as a number of pottery fragments spread over a restricted area roughly 100 metres in circumference.

During a number of subsequent visits to Yaw Sahhab, further more concentrated searches were made, leading to the discovery of many more fragments of pottery and tiny flint flakes.

A preliminary examination of some of the potsherds by the Abu Dhabi Islands Archaeological Survey, ADIAS, (4), suggested that all were Late Islamic in date, ranging from the 16th to 20th centuries. Some pieces were glazed, and were identified as being of the type known as Khunj/Bahla ware, which has been dated to the 16th-18th centuries (5). A few tiny pieces of glass, presumably also Islamic in date, were also found.

The flint flakes are small to minute in size, and almost all bear the marks of being struck by human agency. Some have a very clear percussion bulb and bulbous scars, effects caused by striking a larger piece of flint while tool-making. Almost all of these pieces are debitage, i.e. pieces discarded while a tool, such as an arrowhead (projectile point) or a scraper, is being made.

One or two pieces, however, seem to be small cores, i.e. lumps of flint from which flakes have been struck off, either to make bladelets or as part of a fire-lighting kit. Three small flakes bear the marks of having been re-touched, i.e. flaked so as to produce minute scrapers. These three flakes are, respectively, 20 mm, 17 mm and 16 mm long, and each is around 11 mm wide.

The single arrowhead found is finely worked, although one of the barbs is broken off. 19 mm long by 15 mm across, it

appears typical of tools from what is known as the Arabian Bifacial Tradition, dating to the Late Stone Age.

It is difficult to make a definitive judgement from a single, damaged, specimen, but the piece appears to bear some resemblance to Type 3 of a collection made at Nadqan, in eastern Saudi Arabia, several hundred kilometres west of the Liwa, and published several years ago (6).

No flint occurs naturally in the Liwa Oasis or in the surrounding sands, and the material used to produce the flakes and tools must, therefore, have been imported to Yaw Sahhab, presumably by human agency. Four clear types are distinguishable by colour.

There are a very few pale grey flakes that, on the basis of my own observations, appear to be not unlike some of the tabular flint to be found commonly along parts of the coastline of the Emirate of Abu Dhabi and on some of the adjacent offshore islands. They are, however, paler and of a more consistent colour than the often flecked tabular flint.

There are also a small number of very light brown, almost cream coloured, flakes, some of which are semi-transparent. Another form, much more common, is of brownish grey stones, some of which are irregular in colour, but not dissimilar to the caramel-coloured flint commonly found in the mountains near Al Ain, in particular in and around Jebel Huwayyah, 'Fossil Valley,' a site well known for evidence of Late Stone Age activity (7). Finally, and also very common, there are dark chocolate brown pieces in a variety of sizes, which seem similar in consistency to the caramel-coloured flint mentioned above. Although no source for flint of this colour is known to me, it may be reasonable to postulate, in advance of further study, that much of it may have originated in the Hajar Mountains of either Oman or the United Arab Emirates. The nearest plentiful source for flint nodules (as opposed to tabular flint, generally of lower quality for tool-making), is in the Hajar a little more than 200 km to the east of Yaw Sahhab.

As an amateur, but enthusiastic observer, I was immediately struck by the smallness of the flakes that were used as tools. There is, however, extensive evidence from elsewhere that Late Stone Age man made use of tiny blades for tasks like cutting notches in a bow for bowstrings, preparing arrow shafts and making slits into which the tangs of arrowheads could be fitted. It is reasonable to suggest that the flint flakes and small tools found at the Yaw Sahhab site are simply the remnants of what once might have been present.

Moreover, if, as the presence of Late Islamic potsherds on the site might suggest, Yaw Sahhab has been visited by man, perhaps intermittently, over a period of many thousands of years since the Late Stone Age, other usable flints on the surface are likely to have been examined in the past by users of flint who would have carried away everything of potential use for re-working. When, as in this case, there is no local supply, every flake is potentially a new tool in the right hands. The presence of flint projectile points in ethnographic displays at Al Ain Museum suggests that the use of flint continued in the Emirates until relatively recently (8).

Graphic confirmation of the ability of Late Stone Age Man to use such tiny tools has recently been found, which confirms results from detailed analysis carried out by lithics experts.

In September 1991, the frozen body of a man was

recovered from melting snow on the Hauslabjoch on the border between Austria and Italy. Exhaustive studies have conclusively dated the body to around 3,200 BC, or to the latter part of the Late Stone Age in Europe. Among items found in the well-preserved belt-pouch of the body was a small sharp flint flake, of dimensions 17 mm by 12 mm by 2 mm thick, comparable to the tiny flakes from Yaw Sahhab (9).

A detailed analysis of the tool kit carried by the 'Ice Man' of Hauslabjoch showed that he carried only small amounts of flint, including a scraper and knife-blanks which could be fashioned into arrowheads, as well as bladelets for a wide range of cutting tasks. The hunter also carried a pointed tool with which to re-touch his flint tools and, where necessary, to make fresh arrowheads. In a European context, such a tool would have usually been made of antler, bone or hardwood. No equivalent material has yet been identified for such tools in the context of the United Arab Emirates, although it has been suggested that the tusks of male dugongs might have been suitable (10).

The 'Ice Man' carried little with him, and it is reasonable to suggest that Late Stone Age man, moving in hunting parties around the Emirates, then less arid than they are today, after game like ostrich, gazelle and hare, would also have carried only the essential.

The collection of artefacts found at Yaw Sahhab spans a period that apparently stretches from the local Late Stone Age (5th - 4th Millennium BC) to the Late Islamic period. Although subjects such as the impact of climate change over that period and any shift in human settlement patterns to involve a greater or lesser degree of nomadism are, as yet, not fully understood, it seems unlikely that the site was used only at the beginning and the end of this six or seven thousand year period, even though no artefacts from intervening periods have yet been identified. This may, of course, be due, in part, simply to a failure to recognise ceramic or other material from other periods.

An extensive search of the rest of the Yaw Sahhab valley produced only one further piece of ostrich eggshell, with one more fragment in the next valley to the west. All the remainder of the material identified, whether pottery or flint flakes and tools, was found in the previously mentioned area of roughly 100 metres circumference.

This suggested that there might have been a particular reason for the concentration, and during a further visit in April 1998, I recognised on the site a surface feature which I had previously overlooked. The feature was situated on the floor of the valley around 40m from the base of the adjacent dune. It consisted of a slightly raised ring of hardened sand, around 20cm high and 4m across, within the middle of which, with a diameter of no more than 1 metre, was a shallow roughly circular depression. I identified the feature as being the remains of a dry fresh water well.

Anecdotal evidence from older residents of Liwa refers to the presence of fresh or brackish water wells at the base of the dunes in the area. These are, in some circumstances, evidently of some age. There is, for example, reference in Lorimer's *Gazetteer*, published in 1908, to the presence of wells in Liwa at settlements named as Hamaim, Qa'aisah and Jarrah (11). Water was available at a depth of only a few metres in the period

immediately prior to the recent oil-driven development of the area, and it is reasonable to assume that it was also available earlier, back to and including the period of the post-glacial 'climatic optimum' that coincided with the Late Stone Age in the Emirates.

At a depth of 2-4m or less, the indurated sand would easily have supported the walls of a well, there being no stone available locally for reinforcing deeper constructions. It is also likely that any well would have frequently been cleaned out by travellers, which would provide a possible explanation for the wider ring of slightly raised and hardened sand around the well site. Such a practice was certainly adopted at another desert well in Abu Dhabi, that of Tawi Beduwa Shwaiba, into recent times (12).

Organic detritus left at the Yaw Sahhab site by travellers, such as broken arrow-shafts or leather containers would have decayed over time, while wooden and bone tools would have been eaten, carried away or have decomposed, leaving only the more indestructible items like pottery, flint and glass. Metal items that had been abandoned on the surface might, similarly, either have disintegrated or have been carried away. Certainly there was no evidence of any such items on the surface.

Evidence from elsewhere has shown that flint continued to be used as a convenient cheap tool for fire-lighting and other tasks long after metal alternatives were available, and the same is likely to be the case in the United Arab Emirates. A struck flint core, possibly used for fire-lighting, has, for example, been found on the surface of a Late Islamic settlement site on Abu Dhabi's offshore island of Balghelam (13).

Further study of the pottery from the Yaw Sahhab site, and a refinement of dating, is required. It is, however, perfectly feasible, given the presence of a well, that the site was continuously, if irregularly, used over the entire period since the Late Stone Age until relatively recently. Enquiries of local Bedu may help to elucidate this point.

The Yaw Sahhab well site may have been one of a series on a route running across the southern Liwa region, and there is, indeed, still a rough vehicle track running past the site, which continues through a chain of similar valleys extending to the west for a distance of at least thirty kilometres. The well itself may have been abandoned for a variety of reasons, including increasing salinity, a fall in the water table or the identification of better wells further north.

Little has thus far been published about the archaeology and history of the Liwa region, although the Bani Yas tribal confederation are first reliably reported in the general area in the early 17th Century AD (14), a date which is consistent with the presence of sherds of 'Khunj/Bahla' ware on the Yaw Sahhab site. New routes leading through the palm gardens in the Liwa to the north may have meant that routes further south fell into disuse, although hunting parties would still have ventured out into the sands to the south and into the Empty Quarter in what is now Saudi Arabia, where, as mentioned earlier, there is plentiful evidence of hunting during the Late Stone Age.

It is, finally, worth noting that the floor of the Yaw Sahhab valley is clearly a palaeo-floor, which has been continuously deflated over the years. Mobile sand has been blown across the floor, leaving the flints and

pottery on the original land surface, which predates the formation of the great dune fields. This may suggest that the major dunes in this north-eastern edge of the Rub Al Khali may have moved only by a small amount over the course of the last few thousand years.

If this is, indeed, so, there may well be other archaeological sites similar to Yaw Sahhab in the open desert south of Liwa. Apart from a whitish colour and plentiful vegetation, mainly salt-bushes, (especially *Zygophyllum* sp.), the valley floor is otherwise indistinguishable from other inter-dunal valleys in the region. Several such valleys have been examined, but without any archaeological artefacts being found. It is possible, however, that investigation of a route leading westwards beyond Yaw Sahhab and on into the Empty Quarter may identify more ancient wells and archaeological sites.

### Acknowledgements

I am grateful to Peter Hellyer, Co-ordinator of the Abu Dhabi Islands Archaeological Survey, ADIAS, for comments and suggestions on a first draft of this note, for encouraging me to prepare it for publication, and for commenting on the ceramic assemblage. Jakub Czastka, also of ADIAS, kindly commented on the lithics from Yaw Sahhab, and has, on several occasions, provided me with the benefit of his own experience during field trips to search for lithics elsewhere in the Emirate of Abu Dhabi.

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4. The Abu Dhabi Islands Archaeological Survey was established on the instructions of UAE President Sheikh Zayed bin Sultan Al Nahyan in 1992, and operates under the patronage of UAE Chief of Staff Lt.-General Sheikh Mohammed bin Zayed Al Nahyan. Its Director is Dr. G.R.D. King, of the School of Oriental and African Studies at London University, and its Co-ordinator in Abu Dhabi is Mr. Peter Hellyer.
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Late Stone Age flints: arrowhead (centre top), scrapers and flakes from south of the Liwa oasis. Syrian Ostrich eggshell fragments from the Abu Dhabi desert. Photo: S.A.



# NOTES AND QUERIES

## New ostrich shell finds

The range of the Arabian race of the Ostrich *Struthio camelus syriacus*, the 'Syrian Ostrich', extinct for several decades, is known to have extended into the deserts of the United Arab Emirates, although the species probably disappeared from the UAE early this century, if not earlier. Occasional reports of ostrich shell fragments being found in desert areas of Abu Dhabi emirate testify to its former presence. It should be noted, however, that the presence of ostrich shell fragments is not in itself an indication of a former breeding site, since complete shells were formerly used as strong and serviceable containers for liquids by the country's nomadic population. Human artefacts, or a hearth site at least, almost invariably accompany the finds, so if you find shell fragments always be on the lookout for other items.

New finds have recently been reported by Chris Drew, of Abu Dhabi's Environmental Research and Wildlife Development Agency, ERWDA, by Jakub Czapka and Simon Aspinall from the Abu Dhabi Islands

Archaeological Survey, ADIAS and Anthony Harris (see p25-27). All are documented here.

Site	Coordinates	Notes
South-west of Al Wagan	23° 38' 04N 55° 21' 50E	hearth & flints
South-west of Tawi al Qisemah	23° 54' 04N 54° 53' 34E	
South-west of Bida Mutawa	23° 44' 12N 52° 34' 13E	
South-west of Bida Mutawa	23° 45' 38N 52° 34' 13E	Late Stone Age <sup>1</sup> flints
Northern Sabkhat Matti	23° 54' 27N 52° 22' 28E	charcoal & unworked flint
South of Liwa oasis	22° 53' N 54° 21' E	Late Stone Age flints

In order to keep records up to date, please report any findings to ADIAS, P.O. Box 45553, Abu Dhabi. If possible take a GPS reading. Although this may tell little about the ecology of an extinct<sup>2</sup> breed, it may prove of value to continuing archaeological investigations.

## Reference

Whybrow, P.J., Hill, A. & Al Tikriti W.Y. (1991). **Miocene fossils from Abu Dhabi**. *Tribulus* 1.1:4-9.

<sup>1</sup>Late Stone Age (Neolithic) is 5000+years BP

<sup>2</sup>Whybrow *et al.* (1991) reports the finding of fossil ostrich shell of late Miocene Age (5-7 million years BP) in beds of the Baynunah Formation. The shell was of inordinate thickness compared to that of modern ostriches, being respectively 3.56mm and 1.2mm thick.

SIMON ASPINALL

## New wetland plants for the UAE: *Potamogeton pectinatus* L. and *Zannichellia palustris* L.

In one of the recent *Tribulus* issues (*Tribulus* 7.1) I reported about a variety of different wetland systems and plants that occur in the Emirates, both marine and freshwater. The article discussed the lack of botanical knowledge concerning the country's wetlands. Also a few plant species, previously not known to occur in the UAE, were documented for the first time.

Two other new wetland species, *Zannichellia palustris* L., of the Zannichelliaceae family, and *Potamogeton pectinatus* L., of the Potamogetonaceae family were found in the months of February and March 1998 in Abu Dhabi Emirate.

*Z. palustris* was collected from a brackish water pool close to the Liwa at exactly 22°52'13.27" N and 54°22'27.59" E. The pool was a man-made bulldozed depression, 5m x 5m in size, with a water depth of about 1m. The pool edges (above the water line) were dominated by *Zygophyllum mandavillei* Hadidi, and there were also specimen of *Tamarix* sp. and *Cistanche tubulosa* (Schrenk) Hook. f. *Z. palustris* grew submerged in the pool. We found the water to be strongly saline. At the ERWDA laboratory we analysed the water for pH, electrical conductivity, and the NaCl concentration. The pH value was neutral with pH 6.5 at 25.8°C. The electric conductivity was 24.1 mS (milliSiemens), and the refractometer value was 1.4% NaCl.

Another species, *Potamogeton pectinatus* L. was found inundated in the brackish water pools of Ayn al Faida, close to Jebel Hafeet. The water tasted mildly saline, and we measured 0.0% NaCl, pH 6.6 at 25.1°C, and

11.8 mS electric conductivity. The remaining vegetation of the pool was dominated by *Phragmites australis* (Cav.) Trin. ex Steud., and the edges of the lake were dominated by *Tamarix* sp. and *Juncus* sp. above the water line.

*Potamogeton pectinatus* L. and *Zannichellia palustris* L. are to the author's knowledge not previously reported for the UAE, and are new plant species for the UAE check list. The findings once again confirm the lack of floristic knowledge of the Emirates. *Potamogeton pectinatus* L. was previously reported for Saudi Arabia (Collenette 1985; Mandaville 1990), and for Oman (Ghazanfar 1992), and *Zannichellia palustris* L. is known to occur in Saudi Arabia (Collenette 1985; Mandaville 1990), but not for Oman. The species are known to occur in fresh or brackish water.

Sincere thanks go to ERWDA colleague, Dr Ron Phillips, to Dr Shahina Ghazanfar in Muscat, who confirmed our identification, and to Steve Britsch who kindly helped with the water analyses.

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BENNO BÖER

## First Report of the Scorpion *Buthotus jayakari* in the UAE

The purpose of this note is to make a record of the presence of the scorpion *Buthotus jayakari* in the mountains of the United Arab Emirates. *B. jayakari* is a large scorpion (adults may exceed 8 cm) having a dark red-brown body, pincers and distal tail segments and pale yellow legs. The tail is robust and highly sculptured, like that of the UAE's more commonly seen large black scorpion, *Androctonus crassicauda*.

Barbara Tigar has recently written that only 1 family and 6-7 species of scorpions have so far been identified from the UAE, but she noted that Max Vachon, an expert on Arabian scorpions, recognized a total of 2 families and 14 species or subspecies from Arabia generally as of 1989 [1]. She speculates that additional species remain to be "discovered" in the mountains of the UAE.

In fact, Vachon had earlier identified *B. jayakari* among specimens collected from the Jebel Akhdar region of Oman [2], and although it has not previously been reported in the UAE, its presence here is not surprising. *B. jayakari* belongs to the Buthid family of scorpions (Buthidae), still the only family confirmed to be represented in the UAE.

The author encountered a 6.5 cm specimen of *B. jayakari* in February 1998 near sunset in Wadi Mayy, west of Khor Kalba on the East Coast, perched atop a large flat boulder on a wooded gravel terrace at an elevation of about 250 meters. It was in plain view but did not react at all to human presence, giving rise to speculation that it was sick or injured in some way. Even when gently prodded, it reacted only weakly. Photographs were ob-

tained with a close-up lens and flash, and these permitted comparison with photographs and a description of the Jebel Akhdar specimens by Vachon [3], which appear to be identical. Vachon subsequently referred his Jebel Akhdar specimens to the nominate subspecies, *B. jayakari jayakari*, first described from Muscat in 1895 [4].

A second, smaller specimen was found under a rock at the base of the west flank of Jebel Hafeet in March 1998. This appears to represent a distinct subspecies, *B. jayakari salei*, first described by Vachon from Dhofar [5], which is distinguished by pale yellow coloration of both the arm and forearm and the first three segments of the tail, as well as a somewhat more slender tail.

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GARY R. FEULNER



## Recent Publications

**The Shell Birdwatching Guide to the United Arab Emirates.** Colin Richardson & Simon Aspinall. *Hobby Publications, Dubai and Liverpool* (Dh 60). 96 pp. pbk.

Two of the UAE's top birdwatchers, both members of the Emirates Bird Records Committee, have joined together to produce this indispensable pocket-sized handbook for anyone interested in the country's birds. It combines an invaluable list of over 50 good birdwatching sites, complete with instructions on how to get to them, and an idea of what birders might expect to see, and at what time of year. Couple this with an updated checklist of the country's birds, a 'tick list' for handy reference and a selection of high quality colour pictures of the variety of habitat to be found around the country, and this guide is a publication that anyone interested in the UAE's birds cannot afford to be without, whether they are resident or simply visitors.

One can, of course, nit-pick a little. The check-list, updated to July 1998, has a few curious omissions (perhaps awaiting the original observer's documentation?), while there is a lack of clarity with some of the records included in Appendix One, (Species with Uncertain Status). Taxonomic decisions in the main list, on, for example, the 'Yellow-legged Gull' complex or the equally confusing but less well-studied *Catharacta* skuas, could also be open to question.

The introductory section on the UAE is somewhat skewed in favour of Dubai, which seems a little unfair to the UAE. Overall, though, it is a model of its kind: utterly essential. Shell Markets Middle East deserve thanks for having made it see the light of day. **Peter Hellyer**

**Abu Dhabi Islands Archaeological Survey: Season One.** G.R.D. King. *Trident Press, London*. 96 pp. hbk. (Dh 120 from ADIAS, P.O.Box 45553, Abu Dhabi). ISBN:1900724-14-6

Established in 1992, the Abu Dhabi Islands Archaeological Survey has made a major contribution to the discovery of the country's archaeological heritage. This book reports the results of the first preliminary season of survey on the islands of Merawah, Dalma and Sir Bani Yas, on all of which subsequent work has taken place.

ADIAS Director Dr. Geoffrey King provides a useful gazetteer of sites found, and, something of great interest to the general reader, also collects together for the first time all available historical information relating to these islands. Despite the explosion in archaeological activity in the Emirates over the past fifteen years, there have been few publications available outside academic journals to make the discoveries available to the wider public, and this book represents a useful contribution to that process.

ADIAS has moved on substantially since the survey season recorded in this book, but anyone interested in the country's history and heritage will find it fascinating. The book is published with the support of the Ministry of Information and Culture, which, it should be said, has an unusually enlightened approach to the publication of serious research into the heritage and natural history of the country. Long may it last! **Peter Hellyer**

**Waves of Time.** Ed. Peter Hellyer. *Trident Press, London*. ISBN 1-900724-20-0. 190 pp hbk (Dh125).

Subtitled 'The Marine Heritage of the United Arab Emirates', this fascinating volume, produced with the support of the Ministry of Information and Culture, fills a glaring hole in the existing literature about this ostensibly maritime nation. The jacket cover describes the book as an exploration of the ongoing relationship between the UAE's citizens and the sea, an objective which it achieves admirably well.

Eight chapters have been contributed by acknowledged local experts, these carefully edited into an authoritative monograph. As a historical and archaeological narrative it contains much information not readily available, and certainly not in any previous single volume. Man's existence and his changing patterns of resource use, back to his very earliest appearance in the land now known as the United Arab Emirates, have been painstakingly traced and concisely documented.

The style purposely avoids scientific jargon throughout, and only the sheer mass of information might confound the reader. A book that can be enjoyed by reading cover to cover, it is also a invaluable reference work. Colour photographs adorn at least every other page, with maps, figures and archive black and white photographs also used liberally, as the text itself dictates.

The accomplished life of the shrewd Ras Al Khaimah born navigator, Ahmed Ibn Majid; boat-building and seamanship; the history of pearling; the influence of Islam; the evolution of trading relations, including, remarkably, with far-distant China in the early centuries AD; the charting of the coast by colonial powers and their swapping fortunes and the dugong once butchered for dinner are just some of the topics making this publication a literary Aladdin's Cave (very usefully indexed). For once we have an academic account that can be read, easily understood and enjoyed by anyone, even confirmed non-historians. **Simon Aspinall**

### Publications Received

**Al Ain: Oasis City.** Peter Hellyer and Rosalind Buckton. *Motivate Publishing, Dubai*. (*Arabian Heritage* series) ISBN 1-873544-53-7. 92 pp.

**Arabian Archaeology and Epigraphy**, (editor-in-chief: Daniel T. Potts). Munksgaard, Copenhagen. Vol. 9.1 ISSN 0905-796. 140 pp. (UAE-related papers on: *The chronology and regional contexts of late prehistoric incised arrowheads in southeastern Arabia*, [P. Magee], *A study of the petroglyphs from Wadi al-Hayl, Fujairah*, [M.C. Ziolkowski], *New evidence of the initial appearance of iron in southeastern Arabia*, [P. Magee], *Des feux sacrificiels pour la divinite solaire a ed-Dur*, [E. Haerincq, L. Vrydaghes & H. Doutrelepont].

**Falco**, Newsletter of the Middle East Falcon Research Group. Issue No. 12. 18 pp. Fax: 00-441-267-233684. e-mail: office@falcons.co.uk. Run from the UK-based Falcon Facility of the National Avian Research Centre, part of Abu Dhabi's Environmental Research & Wildlife Development Agency. Papers include *The NARC Falcon Programme 1998* [Helen Macdonald] and the ERWDA/NARC research study *satellite tagging sakers in the Russian Altai* [Chris Eastham]. Membership of MEFRG is open to anyone interested in falconry and falcon conservation in the Middle East or elsewhere.

# Research News & Events

## Tribulus Referees

With this issue, **Tribulus** completes eight years of publication. Over that time, it has published an extensive amount of material, the bulk of which is available nowhere else - its lists of UAE dragonflies, inshore invertebrates and butterflies being recent examples. As a result, it has become of steadily increasing value to the scientific community. At the same time, the journal has continued its editorial policy of seeking to publish original material which is scientifically accurate, but which, at the same time, is comprehensible to the interested general reader. There is no other publication of its kind, and the growing frequency with which papers in **Tribulus** are cited in other journals and publications is evidence of its success, albeit with a small readership.

As part of continuing efforts to upgrade the journal, it has been decided to recruit academic referees to examine and comment on papers and notes submitted for publication. The purpose of this is two fold: to bring greater academic expertise to bear on contributions in the journal and, through the refereeing system, to make the journal more attractive as a publication to those working on scientific studies into the natural history, history and archaeology of the Emirates.

It is a pleasure to announce therefore that four referees have accepted our invitation to join a panel, with their services coming into immediate effect. It is the intention of the journal's editorial panel that more will be added later, when suitable people have been identified, have been approached and have agreed.

The first members of the new **Tribulus Advisory Panel**, are briefly profiled below.

**Daniel T. Potts**, Edwin Cuthbert Hall Professor in Middle Eastern Archaeology at Australia's University of Sydney, Daniel Potts is also founder and Editor-in-Chief of the journal **Arabian Archaeology and Epigraphy**. He has published extensively on Gulf archaeology, and has also excavated widely in the UAE, including sites at Tell Abraq, Al Sufouh and Awhala, as well as elsewhere in the region.

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## Research in Progress - Archaeology

### Ancient Marine Resource Exploitation in the Southern Arabian Gulf: An Archaeo-Zoological Perspective

This research attempts to model ancient marine resource exploitation in the southern Arabian Gulf by using archaeo-zoological methods to study fish bone assemblages recently excavated at sites in the UAE. This will provide for the first time a detailed insight into the status of past fisheries resources in the region as well as enabling the modelling of fishing strategies utilised by the early coastal inhabitants of the southern Arabian Gulf during the course of the past 6,000 years. A special focus is on the use of biometrical techniques to enable size reconstruction of economically important fish groups.

An integral part of this research so far has been the

**Jens Eriksen** is Associate Professor of Chemistry and Assistant Dean in the College of Science at Sultan Qaboos University, Sultanate of Oman, where he has now lived for over 12 years since leaving his native Denmark. Jens and his wife, Hanne, travel widely to study and photograph wildlife. They are frequent visitors to the UAE and their outstanding work has appeared in many UAE publications, *Natural Emirates* for example.

Jens served as Recorder for the Oman Bird Records Committee from 1989 to 1998, masterminding and entering 160,000 bird records onto a computer database from which a number of publications have resulted. Jens' main interests are natural history, in particular birds, and photography, for which he has won numerous awards.

\* \* \*

**Graham Evans** is Professor Emeritus in the Department of Oceanography at Britain's University of Southampton, specialising in sedimentology. Formerly Professor of Geology at London University, he conducted the first studies of the *sabkhas* of Abu Dhabi in the early 1960s, commencing more than three decades of involvement with studies of the UAE's geology.

He is currently engaged in studies of the late Pleistocene and Holocene geology of Abu Dhabi's coast and islands in association with the Abu Dhabi Islands Archaeological survey.

\* \* \*

**Dr. Saif Al Ghais**, from Ras Al Khaimah, is currently Secretary General of the Environmental Research and Wildlife Development Agency in Abu Dhabi. Immediately prior to this he lectured in biological and environmental sciences at the UAE University, serving as head of the Marine Environment Research Centre. He obtained his first degree from Seattle Pacific University in the US and then his doctorate in marine biology from the University of Liverpool in the UK.

Dr Al Ghais' research interests include mangrove ecosystems, turtle conservation, impacts of pollution and the taxonomy of fishes. He has published many research papers, serves on the Species Survival Commission of IUCN and advises the UAE government on environmental protection and management.

creation of an osteological comparative collection of modern Arabian Gulf fishes. So far the collection covers a total of 46 families, 72 genera and 104 species. Following completion of the research programme, which is supported, among others, by The British Council, the comparative collection will be deposited with the Environmental Research and Wildlife Development Agency, ERWDA, in Abu Dhabi, where it will provide the nucleus of a national reference collection.

Fish bone assemblages from a total of 22 archaeological sites are currently being analysed. These include material from the following sites (arranged in chronological sequence):

Dalma, Abu Dhabi, site DA11 (5th-4th millennium BC, "Ubaid" settlement, excavated by the Abu Dhabi Islands

Archaeological Survey [ADIAS]).

Umm al-Qaiwain, site UAQ1 (5th-4th millennium BC, "Ubaid" midden/cemetery, excavated by Carl Phillips, Institute of Archaeology, UCL, London).

Kalba, Sharjah, sites K4 and KK1 (3rd-2nd millennium BC, settlement, excavated by Carl Phillips).

Shimal, Ras al-Khaimah, site UAN2 (3rd millennium BC, Umm an-Nar tomb, excavated by Derek Kennet/Christian Velde, National Museum of Ras al-Khaimah).

Shimal, Ras al-Khaimah, site SH602 (2nd millennium BC, tomb, excavated by Derek Kennet, National Museum of Ras al-Khaimah).

Ed-Dur (north), Umm al-Qaiwain, site EDN (1st millennium BC, "Iron Age" enclosure, excavated by Carl Phillips).

Umm al-Qaiwain, site UAQ2 (1st millennium BC, "Iron Age" settlement, excavated by Carl Phillips).

Wadi al-Qawr, Ras al-Khaimah, sites RFQ2.1 and WQ (1st millennium BC, "Iron Age" settlement, excavated by Carl Phillips).

Sir Bani Yas, Abu Dhabi, sites SBY3, SBY4, SBY7 and SBY9 (6-7th century AD, early Christian/pre-Islamic

monastery and associated settlement, excavated by ADIAS.)

Jazirat al-Hulaylah, Ras al-Khaimah, site JHU (5-17th century AD, early-late Islamic settlement, excavated by Prof. Tatsuo Sasaki and Hanae Sasaki, Kanazawa University, Japan).

Kush, Ras al-Khaimah (9-19th century AD, early-late Islamic settlement, excavated by Derek Kennet).

Julfar, Ras al-Khaimah, site JJ (mid 14 - early 16th century AD, Islamic settlement, excavated by Prof. Tatsuo Sasaki and Hanae Sasaki).

Balghelam, Abu Dhabi, site BG12 (16th-19th century AD, Late-Islamic settlement midden, excavated by ADIAS.).

Liffiyah, Abu Dhabi, site LIF (16th-19th century AD, Late-Islamic settlement midden, excavated by ADIAS.).

Merawah, Abu Dhabi, sites MR14, MR15 and MR16 (16th-19th century AD, Late-Islamic settlement midden, excavated by ADIAS.).

**Mark Beech (PhD thesis),**

**Departments of Archaeology and Botany,  
University of York, UK**

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### **Prehistoric metallurgy in the Oman Peninsula**

A previous study of metal objects from the site of Tell Abraq in the United Arab Emirates (U.A.E.) has revealed significant use of tin-bronze during all periods of occupation, from the third millennium BC onwards. Such an occurrence is unprecedented in the archaeological record of the Oman Peninsula, and the analyses raise a number of questions regarding the production and supply of copper and bronze in the region during the local Bronze and Iron Ages. The current thesis aims to investigate the trade in tin and tin-bronze in the region through Proton-Induced X-Ray Emission (PIXE) analysis and lead isotope analysis (LIA). Samples for PIXE analysis have been obtained from sites across the U.A.E. and from the early second millennium BCE settlement of Saar in Bahrain. The compositional analysis of these samples using PIXE should allow for an examination of the distribution of tin-bronze in the region.

LIA is being undertaken on 80 samples from Tell Abraq, from third, second, and first millennium BCE contexts. The samples include completed objects of copper and tin-bronze, as well as pieces of waste from metal refining and casting processes carried out at the site. It is hoped that LIA will provide evidence on changes through time in the sources of copper and tin used at the site. The potential exists, additionally, to relate the LIA data from the Tell Abraq samples to LIA data on ore deposits in the U.A.E. and Oman, in order to assess the use of locally smelted and refined copper. Finally, it is envisaged that the metallurgical evidence from Tell Abraq and elsewhere in the U.A.E. will be combined with evidence from other facets of the local archaeological record, in order to assess changing patterns of prehistoric trade and contact within the Oman Peninsula and wider Western Asia.

**Lloyd Weeks, University of Sydney. (PhD thesis)**

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### **Molluscan evidence for subsistence strategy and seasonality at the Iron Age site of Muweilah, Sharjah**

The research project that I have undertaken aims to shed light on the settlement patterns of the prehistoric

people of southeastern Arabia. At the Muweilah study site, where a team is excavating an Iron Age site (c600-800BC), I have developed an expertise in studying subsistence refuse, principally the molluscan fauna.

In an area of the world where environmental changes between the seasons are so strong, human adaptation to these changes are customarily important. Aspects of this information can be revealed through the analysis of growth structure in shellfish that contributed to the prehistoric diet and remain in the archaeological record.

The application of two independent though complementary techniques known as growth line analysis and oxygen isotope analysis allows the season of shellfish procurement to be determined. Before the archaeological samples can be analysed for evidence of prehistoric human behaviour, however, modern shellfish specimens must be analysed in the same way in order to determine the natural behaviour of the shellfish in relation to broad seasonal changes. Once this can be established, useful results should follow.

**Emma Thompson, University of Sydney (PhD thesis)**

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### **Islamic sites on the UAE East Coast**

The primary aim of the research is to document and examine Islamic period (AD 7th Century to present) sites on the East Coast of the United Arab Emirates. The main focus involves recording and analysing coastal sites in order to contextualise them within an archaeological timeframe. This includes the results of the coastal survey I conducted during the 1997/1998 season in Fujairah and the forthcoming excavation season at the Portuguese fort at Bidiya.

During the 1997/1998 field season, I conducted a survey of the East Coast from Fujairah in the south to Dibba in the north. This included the documentation of visible structures and surface collection of artefacts. A total of 65 sites were recorded, including settlements, towers, cemeteries and mosques. The ceramics collected included locally-produced Julfar and post-Julfar wares, turquoise glazed sherds and Sgraffiato. Imported wares

included Chinese blue and white porcelain and Celadon wares from Thailand.

A limited amount of excavation was also carried out in order to obtain charcoal samples from key sites in the region. Samples were collected from Fujairah Fort, Qurayyah fort and Al Bidiya Mosque. These are being analysed utilising Accelerator Mass Spectrometry (AMS) at the Rafter Radiocarbon Laboratory in New Zealand.

The above-mentioned analysis forms the background of my thesis. However, such a survey needs to be complemented by detailed excavation. The site chosen as most appropriate for such an examination is the

Portuguese Fort at Bidiya. The systematic excavation of this site would provide important information regarding the ceramic sequence, military aspects and the influence of foreign contact and trade in the region.

**Michele Ziolkowski, University of Sydney (PhD thesis)**

*The East Coast Islamic sites research is being undertaken with the permission of Supreme Council member and Ruler of Fujairah His Highness Sheikh Hamad bin Mohammed Al Sharqi, and with the support of Ahmed Khalifa Al Shamsi, Director of Antiquities and Heritage of the Government of Fujairah, and Salah Ali, Chief Archaeologist, Fujairah Museum.*

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## Research in Progress - Environment

### Studies of Desert Hares

Hares are currently being caught and fitted with radio-transmitters in a study site near Sweihan. Data has been collected on the movements of 15 different hares. The results suggest an 'island population' situation, with no movement of (marked) animals out of the area, a small part of an interdunal plain. A single individual was translocated in a separate experiment. This animal established a home-range within 200m of the release site before moving again and establishing another home-range less than 500m away. Dietary and nutritional studies are also in progress. The plants eaten by wild hares have been recorded and made available to captive individuals in a controlled study to relate reproductive output to diet quality.

**Chris Drew, ERWDA (PhD thesis)**

### Floral research in the UAE

Until recently, around 600 plant species had been reported for the UAE. Rob Western, first to provide a comprehensive flora, counted 501 species, with a more recent but unpublished checklist of Marijcke Jongbloed containing 583 species. Several species new to the UAE have been reported since, with, from 1994 onwards systematic surveys conducted of the country's major ecosystems by ERWDA and the Saudi National Herbarium producing a further 55 new species (Böer & Chaudhary *in press*).

Some of these records are new to Arabia. Additional, undocumented records are also known to exist. However, bryologically the UAE is very poorly studied, whilst sea-grasses, marine and freshwater algae and aquatic phanerogames are basically unknown.

Notwithstanding, a comprehensive flora of the UAE should certainly be compiled. This would follow the recommendations of the first IUCN Arabian Plant Specialists' Group workshop, Riyadh in June 1996. Further details can be obtained from ERWDA, P.O. Box 45553, Abu Dhabi.

**Benno Böer, ERWDA**

### OTHER WILDLIFE NEWS

#### Success for Sharjah's Breeding Centre

Sharjah's Breeding Centre for Endangered Arabian Wildlife reports the birth of two Arabian leopard cubs at the centre on July 15th, one of which, a male nicknamed "Andy", survived. It was suspected that the mother may not have been producing any milk and the decision was therefore taken to hand-rear the cubs. Sadly, Andy's sister died before the two could be safely separated from their mother. Neither of two previous litters produced by

this same mother survived.

The father is a leopard on loan from the government of Oman, the female herself having been obtained from Yemen by the Arabian Leopard Trust under the terms of a captive breeding agreement. The centre, which was inaugurated by His Highness Dr. Sheikh Sultan bin Mohammed al Qassimi in only May of this year, has also recorded breeding successes with Blanford's fox, white-tailed mongoose and Arabian oryx.

The Breeding Centre falls under Sharjah's new Department of Environment and Protected Areas, which has responsibility too for the Natural History Museum, Children's Farms and Wildlife Centre. Abdul Aziz Al Madfa is the department's first director.

#### Al Ghar lakes declared as protected area

During the summer, UAE President His Highness Sheikh Zayed bin Sultan Al Nahyan declared the Al Ghar lakes, near Mafraq water treatment plant, a protected area on account of its national and regional importance for migrant and breeding waterfowl. The reserve is to be managed by Abu Dhabi's Environmental Research and Wildlife Development Agency, ERWDA. Well-known to Emirates Natural History Group members, the reserve will be warded during the breeding season at least, and when access may be completely denied. Arrangements for visiting at other times will be publicised in due course.

#### Siberian Peregrine Falcon reaches Abu Dhabi

A young female Peregrine Falcon *Falco peregrinus* trapped on the island of Qarnein in the Arabian Gulf on about 11 November 1997 had been ringed by NARC researchers as a 35 day-old nestling in the Taimyr peninsula of Siberia, Russia on 8 August 1997. The straight-line distance between these two locations is over 6000km. The race involved, *calidus*, one of the largest forms and hence popular with Gulf falconers, is known to reach southern Africa in the non-breeding season. This bird was subsequently released on the Sharjah island of Sir Abu Nu'air.

A second juvenile female also ringed by NARC in the Taimyr (on 14 August 1997) was discovered at the WVRI falcon hospital, UAE during the 1997/98 hunting season, although where it had been trapped was unknown. Many birds enter the UAE from SW Asian markets, rather than being trapped locally.

Satellite-tracking techniques are being used to discover the migration routes of the Taimyr peregrine population.

**Source: NARC Falcon Facility, UK.**

# Archaeology Review

As usual, the summer has seen little new archaeological fieldwork taking place. The *Archaeology Review* in the last issue of *Tribulus* (pp. 31-32) provided a brief summary of work last winter, and there is little to add.

Near Al Ain, according to press reports, the Department of Antiquities and Tourism of the Diwan of the Ruler's Representative in Abu Dhabi's Eastern Region continued work at the Iron Age village and *falaj* site near (Qarn) Bida Bint Saud, confirming the dating earlier ascribed to it.

Two brief surveys took place under the aegis of the Abu Dhabi Islands Archaeological Survey, ADIAS. One involved a further examination of surface evidence of occupation on the island of Qarnein, where a site from the early 1st Millennium BC has been recorded (*Tribulus* 7:2 pp. 25-26). The presence of archaeological remains on Qarnein was first noted during an ENHG trip to the island in 1989. A previously unnoticed low wall was identified close to the former site of a breeding colony of **Socotra Cormorants** *Phalacrocorax nigrogularis*, with one possible interpretation being that it was built to facilitate collection of cormorant guano. The presence of 'manganese purple' pottery from the 17th-18th Century was also noted, confirming multi-period usage of the main site.

The second survey, preliminary in nature, was carried out on Abu Al Abyadh, largest of Abu Dhabi's islands, to prepare for further work during the 1998-1999 winter season. A number of sites were identified, all coastal middens and settlements or camp sites, with a range of pottery ascribed to the Late Islamic and recent periods.

Finally, as reported elsewhere, (p. 25-27), a Late Stone Age and Late Islamic occupation site was identified south of the Liwa by former UK Ambassador Anthony Harris.

While fieldwork has been sparse, knowledge of local archaeology has moved forward as a result of the presentation of papers at academic symposia. The annual Seminar for Arabian Studies in London had presentations on excavations at the late pre-Islamic/early and mid-Islamic tell at Kush, in Ras Al Khaimah, by Derek Kennet, archaeological adviser to the National Museum of Ras Al Khaimah, on the presence of Third Millennium BC pottery from the Indus Valley in the UAE and Oman, by Sophie Mery, of the French Centre National des Recherches Scientifiques, on the analysis of tin-bronzes from Third Millennium BC sites, particularly in Sharjah and

Fujairah, by Lloyd Weeks of the University of Sydney, and on the origins of an Iron Age bowl from Ad Door, in Umm Al Qaiwain, by Carl Phillips, of London University's Institute of Archaeology. There was also an anthropological presentation on the Shihuh by William Lancaster, the first time for many years that new information about local anthropology has been released.

Among other papers presented at symposia was one by Mark Beech of ADIAS and the University of York at the International Congress of Archaeo-Zoology in Victoria, Canada, which examined evidence from the Late Stone Age settlement at Dalma and from Kush, Ras Al Khaimah on ancient fishing strategies.

New publications included three papers in the May 1998 issue of the journal **Arabian Archaeology and Epigraphy**. One, by Michelle Ziolkowski of Sydney University, was an analysis of petroglyphs in Fujairah's Wadi al-Hayl, accompanied by comparative information on petroglyphs from elsewhere in the UAE. While there is still much work to be done on UAE petroglyphs, Ziolkowski's paper represents an important record of this overlooked aspect of the UAE's archaeological, and artistic, heritage. Two other papers, both by Dr. Peter Magee, also of Sydney, dealt with the chronology and regional context of late prehistoric incised arrowheads from the UAE and adjacent parts of Oman and new evidence, from Muwailah, near Sharjah Airport, of the initial appearance of iron in the area.

Initial reports on planning for the winter 1998-1999 season suggest that, once again, there will be extensive activity in the UAE from late October 1998 until April 1999. Regrettably, although there is increased support for archaeology at the top of Government, both federal and local, there is still no indication that the country's higher education institutions are considering the inclusion of studies of UAE archaeology in their curricula. Unless this issue is tackled rapidly (and all foreign and Arab archaeologists working in the Emirates, whether from overseas institutions or working with local Departments would be delighted to help provide formal training), a major opportunity to train UAE citizens in their own archaeology will be lost.

Peter Hellyer,

Co-ordinator, ADIAS,

P.O.Box 45553, Abu Dhabi, U.A.E.

## ENHG Meetings - April to September 1998

7 April	Eid Holiday
21 April	Travels in the UAE - Hazards & Highlights, by Steve James
5 May	The Reluctant Entomologist, by Michael Gillett
19 May	Fossils in the UAE, by Valerie Chalmers
2 June	The Sun - Our Star, by Chris Webb
16 June	Scorpion Stings & other Lethal Weapons of the Natural World, by Nigel Shanks
7 July	Wildlife Video, by Billy King-Harman
SUMMER BREAK	
8 Sept.	Getting around in the UAE, by Charles Laubach
22 Sept.	From -40 to +40. Reminiscences of a Wandering Biologist, by Dave Morris

# BIRD REPORT

## April - September 1998

*Many records remain unsubstantiated. The EBRC should be consulted prior to quoting from this summary report.*

### APRIL 1998

After a very wet winter, followed by a very warm spring, April continued with above average temperatures. 40C was recorded inland from 2nd-5th (30C+ at the coast). A blustery *shamal* then brought temperatures down to 28C for a few days. Southerly winds dominated from mid month and temperatures soared to 43C (at Al Awir) on 22nd. Cooler conditions resumed to end the month.

The **Wire-tailed Swallow**, first reported at Al Ain camel track on 7th February (3rd record), was refound on 2nd April. Al Ghar Lake held large numbers of birds, including on 3rd 765 **Greater Flamingos**, 22 **Black-necked Grebes**, 1,470 **Little Stints**, 730 **Curlew Sandpipers**, 5 **Avocets** (a pair later nested) and a young **Lesser Spotted Eagle** (8th record). One of the **Forest Wagtails** (10th record) stayed at Khalidiyah until at least the 4th. Two **Semi-collared Flycatchers** and a **Grasshopper Warbler** were in Mushrif Palace Gardens on 8th, while in Dubai one of two wintering **Crested Honey Buzzards** (5th record) stayed in Mushrif Park until 11th. A **White-crowned Wheatear** was on Das island from 8-13th April (7th record). A **Kittiwake** (1st record) found at Fujairah on the 9th remained until 17th when joined at Kalba by a long-staying **Common Gull** (8th record). 1,300 **Sooty Gulls**, 20 **Little Terns** and 6 **Arctic** and 3 'Pom' **Skuas** were at Kalba on the 9th and a **Long-tailed Skua** (4th record) off Umm Al Qaiwain on 10th.

Four young **Bruce's Scops Owls** were found at Hamraniyah on 10th and six **Bar-tailed Desert Lark** breeding territories were identified inland from Ghantoot on 15th. A single 'bar-tail' also turned up on Das on 19th. Other interesting reports concerned a recently fledged **Lesser Short-toed Lark** at Taweela on 23rd and a juvenile **Cream-coloured Courser** at Al Wathba on 24th.

A flurry of interesting migrants arrived mid-month, with **Hume's Lesser Whitethroat** at Ruwais on 10th, a **Little Gull** (5th record) at the Emirates Golf Club (EGC) from 11th-21st, **Imperial Eagle** at Al Habab on 11th and a **Namaqua Dove** and three **Blyth's Pipits** at Al Wathba on 12th. On 14th, three **Alpine Swifts** (14th record) made a very brief appearance at the EGC, as did a **Lesser Spotted Eagle** (9th record) at Khor Dubai on 20th. Two **Crested Honey Buzzards** (6th record) were seen over the Sharjah - Dhaid road on 7th. On Das, a **Cinereous Bunting** was present from 19-24th, **Icterine Warbler** 24-25th and **Hume's (Yellow-browed) Warbler** until 30th. Two **Black-winged Pratincoles** (5th record) were at Al Wathba on 29th with another **Little Gull**, at Al Ghar on 30th.

### MAY 1998

After a relatively cool but humid start to May, temperatures built-up to early summer norms of 37C+ from 11th, but, on 22nd, it had reached 44C at Kalba by only 1000.

Passing through Das were a **Garden Warbler** on 1st, up to four **Whinchats** from 1st-5th and a **White-throated Robin** on 5th. Passage increased on the mainland, particularly of **Spotted Flycatchers** and **Redstarts**, with up to 20 of each at the EGC on 2nd. On 6-9th, an **Avocet** was

at Khor Dubai, with a rather late **Spotted Eagle** at Zabeel fishponds on 6th. The EGC's wintering **Indian Pond Heron** was last seen on 9th. Two days later the course had over 200 **Marsh Warblers**. A late **Pallid Harrier** was at Ajman on 10th, with a male **Namaqua Dove** at Al Ain on 11th. Khor Dubai held 150 **Pacific Golden Plovers** and Safa Park had an **Icterine Warbler** on 12th. **Thrush Nightingales** and **Red-backed Shrikes** appeared together in mid-May, with up to 3 individuals of both on a few dates at Khalidiya. **Barred Warblers** were somewhat scarce. **Cream-coloured Coursers** started arriving from the desert after their early breeding season, with four near Sharjah University on 15th. A pair of **Bruce's Scops Owls** was guarding three unfledged young at Mushrif Park on 14th. Another pair was found with three young at Kalba on 22nd. The beach that day held hundreds of terns and gulls, including some 600 **Sooty Gulls**. A pair of **Red-rumped Swallows** built a nest in a culvert near Masafi but this 1st UAE breeding attempt ultimately failed. A **Desert Eagle Owl** was flushed at Jebel Ali on 21st & 22nd with a **Barn Owl** in Abu Dhabi on 28th.

Rarities in May included **Blyth's Reed Warbler** at Khalidiyah on 9th (11 previous records), **Green Warbler**, also at Khalidiyah, from 11-13th (4th record) and a **Long-toed Stint** (13th record) from 21-22nd at the Equestrian Club. At Al Ghar Lake, waterbirds prospered - 523 **Black-winged Stilts** and 805 **Kentish Plovers** allowing the one ultimately successful pair of **Avocets** nesting space.

Escapes which caused a flap were five **Yellow-billed Storks** at Khor Dubai and a **Large-billed (Jungle) Crow** in Abu Dhabi (both species still present into October).

### JUNE 1998

Most days were hot and still, temperatures reached 40C at the coast (46C inland). Cumulo-nimbus clouds over the mountains from 20th signalled the onset of the SW monsoon in the Indian Ocean, but no measurable rain fell.

A male **Namaqua Dove** at Al Wathba on 1st was a good start, only to be followed by two on Das 5-9th. A barometer of bird migration, Das conjured up **European Nightjar** on 3rd, dozens of **Swallows** from 5th, **Lesser Short-toed Lark** on 6th, a juvenile **Steppe Grey Shrike** from 5-13th, **Sparrowhawk** 9-12th and a **Black-headed Bunting** on 20th. 356 nests of **White-cheeked Tern** were counted there in June. On 10th, the new lagoon at Khor Dubai hosted 680 **Greater Flamingos**, possibly the highest number ever recorded in summer there. Surprises at Zabeel were a **Lesser Spotted Eagle** (9th record) on 15th and a **Shikra** on 20th. Breeding range extensions were confirmed for **Little Green Bee-eater** and **Red-wattled Lapwing**. **Short-toed Lark** was suspected of breeding at Al Wathba. On 26th, Hamraniyah fields produced 800 **Collared Doves**, 50 **Turtle Doves** and 50 **European Bee-eaters**. Slightly out of our jurisdiction, Oman's Wadi Dhahr north of Buraimi, had a male **Cuckoo** at (ABBA square WA25) on 19th. 42 **Blue-cheeked Bee-eaters** (including many juveniles) were in Wadi Qawr between 26-29th, with ten at Hatta Lake on 29th, new breeding areas for this expanding species.

The earliest ever juvenile **Greater Sand Plover** was on Carnein on 11th, while a **Honey Buzzard** remained in

Abu Dhabi from 27th (until late September at least). A distant view of a **Brown-throated Sand Martin** at Khor Dubai mid-month is a potential UAE 1st.

#### JULY 1998

The weather continued very hot (38C+) in early July, with very humid mornings. Inland temperatures regularly reached 42C at midday. Dry south-easterlies blew from 11th and temperatures reached 44C most days, peaking at 47C in Dubai on 21st.

Highlights of the month included another **Namaqua Dove** on Das on 5th, a **Pale Rock Sparrow** at "Hanging Gardens" (Oman) on 6th and a **Little Bittern** at Zabeel ponds on 10th. A **Nightingale** was in Mushrif Palace Gardens for most of the month. The autumn's first returning **Whiskered Tern** was at the EGC on 7th, two **Purple Herons** from 11-15th, and a record flock of 185 **Red-wattled Lapwings** on 17th, while the fairways had up to 25 **Cream-coloured Coursers** daily from mid-month. An adult **Socotra Cormorant** and another young **Purple Heron** were at Zabeel on 16th, a moulting adult **Black Tern** (5th record) at Ramtha lagoons on 19th, along with a **Squacco Heron**, two **Little Bitterns**, 23 **Western Reef Herons**, 45 **Lesser Crested Terns**, 400 **Sandwich Terns**, 32 **White-cheeked** and 20 **Saunders' Little Terns**. The pair of **Red-rumped Swallows** were still present at Masafi on 24th. Other finds in the hills that day were two **Upcher's Warblers** and an unseasonally early adult **Woodchat Shrike**. Noteworthy at Kalba on 24th were 10 **Collared Pratincoles**, over 230 **Common Terns** and a juvenile **Black Tern** (6th record). A **European Roller** was on Das on 6th, with two at the Fujairah National Dairy Farm on 24th. Noteworthy were **Barn Owl** at Khatt on 26th, 13 early **Red-necked Phalaropes** at Al Jazeerah Khor and 12 **Kestrels** and 30 **European Bee-eaters** high over the Ru's Al Jebel (Musandam), Oman on 31st.

#### AUGUST 1998

August was as hot as usual and the month for returning shorebirds. Many species put in their first appearances of the autumn. A **Stone Curlew** was on Das on 1st, with **Whimbrels** noted in Abu Dhabi and **Green Sandpiper** in Wadi Bih from 2nd and **Common Sandpiper**, juvenile **Redshanks** and **Curlew** all from 4th at least. **Wood Sandpipers**, **Curlew Sandpipers** and **Little Stints** all arrived the following week. **Blue-cheeked Bee-eaters** flocks were numerous from the first week of the month, smaller numbers of **Rose-coloured Starlings** and many **Swallows** and **Sand Martins** also being noted.

Juvenile **Black-headed Buntings** were regular on Das from 5th. Six **Squacco Herons** and a **European Roller** were there on 6th, whilst a **Cattle Egret** in Abu Dhabi, also on 6th, was the first to return.

On 7th, a **Montagu's Harrier** was at Al Ain camel race-track, while a count of Khor Dubai found, among others, 330 **Curlew Sandpipers** and 246 **Broad-billed Sandpipers**. Also that day, 3 **Great White Egrets** were at Ramtha with a male **Shikra** being seen well at Zabeel, where 7 **Ruppell's Weavers** were a surprise, in entirely suitable breeding habitat. A juvenile female **Shikra** was seen later on in the day at Safa Park, almost certain proof of local breeding (but are these *Accipiters* escapes or colonising vagrants from Asia?). Single stray **Lesser Sand Plover** and **Sanderlings** were present at the EGC also on 7th.

**Reed Warbler** and **Isabelline Wheatear** arrived on Das on 9th, while at Khalidiya a **Namaqua Dove** on 10th was

the capital's second record. A distinct lull in migration was noted over the following week, with little turnover, shorebirds excepted, although **Blue-cheeked Bee-eaters** remained abundant in many sites. **Woodchat** broke the lean spell, appearing on Das on 17th, with **Isabelline Shrike** there the next day, two days ahead of the first on the mainland. **Yellow-legged Gulls** also began appearing in numbers, three weeks later than is usual. A **Namaqua Dove** at Al Wathba on 21st was possibly the same male as reported there intermittently since the spring. A dozen **Chestnut-bellied Sandgrouse**, 2 juvenile **Collared Pratincoles** and 2 immature **Marsh Harriers** were also present here. No fewer than 200 **Chestnut-bellied Sandgrouse** and 4 **Collared Pratincoles** were here on 27-28th, when a **Long-legged Buzzard** was also present. A **Pacific Golden Plover** was at the Equestrian Club on 19th, with **Citrine Wagtail** there on 25th, two days after the autumn's first, predictably out on Das.

Passerine migration was mostly desultory, accelerating only toward the month end. On 25th, Khalidiya produced the first returning **Grey Wagtail**, a rare passage **Booted Warbler** and **Yellow-throated Sparrow**. Das came up with a **Scarlet Rosefinch**, followed by **Common White-throat** on 26th, 6 **Black-headed Buntings** 27th, **North-ern Wheatear** 28th, **Short-toed Lark** and **Golden Oriole** 29th and **Eurasian Sparrowhawk** 31st. A **Spotted Flycatcher** was in Bateen Gardens from 27th with a **Willow Warbler** at Khalidiya from 29-31st. Immigrant **Great Grey Shrikes** came in right on cue, although only one **Lesser Grey Shrike** was reported, at the Jebel Ali Hotel on the 31st. Das produced its second-ever **Graceful Warbler** along with two **Coursers** toward the month end. The EGC produced 10 **Spotted Redshanks** on 31st, while, along the coast, **Sanderling** numbers peaked, with **Terek Sandpipers** also numerous. Other waders widely reported were **Pacific Golden Plovers**, **Red-necked Phalaropes**, **Common Snipes**, **Black-tailed Godwits** and **Temminck's Stints**, but only at one venue, the EGC pools, were they all present together. **Green Sandpipers** were numerous at wadi pools and dams. Tern passage on the East Coast included large numbers of **White-cheeked Terns**, these roosting ashore with hundreds of **Common Terns**. Finally, **Little Grebes** coalesced in favoured sites late in the month, 60 at Kharran being the largest aggregation.

#### SEPTEMBER 1998

No rainfall was recorded away from the mountains, where a few typical monsoon-related cloudbursts occurred. Along the Gulf coast temperatures remained high, while there was little respite from high humidity.

Six **Little Egrets**, 6 **Purple Herons** and 2 **Collared Pratincoles** all appeared at the EGC on 2nd, followed in by 7 **Night Herons** on 5th and a flock of 24 **Little Egrets** next day. Passerine migration was distinctly sluggish on the mainland, but offshore was quite different. Firsts of the autumn were **Nightingale** and **Red-throated Pipit** on Das on 6th and 7th respectively. **Black-headed Buntings**, **Rose-coloured Starlings** and **European Bee-eaters** continued to feature during early September and **Blue-cheeked Bee-eaters** remained all month in good numbers, 'krooping' loudly even over Abu Dhabi city centre. An early **Siberian Stonechat** was at Khalidiya on 4th with a **Blyth's Reed Warbler** found here two days later. Sixty **Pale Rock Sparrows** at Khatt lake around the 4th was a good record. An unprecedented build-up of **Turtle Doves**

الفراشات المهاجرة وتأتي بأعداد كبيرة الي الجزر الساحلية . أما جاري فولنر فقد كتب عن الأسماك التي تعيش في المياه العذبة. العديد منا قد توقعوا بجانب وادي الجداول ولكن كم منا فكر بالأنواع التي تحويها هذه الجداول التي توجد بالجبال؟

أما اولي ويرنري وماريا ليب فقد كتبنا عن لدغة الثعبان. كم منا عندما يذهبون للنخيم يعرفون الثعابين السامة من غير السامة؟

أما الآثار في هذا العدد فهي بقلم انتوني هاريس رئيس جمعية الامارات للتاريخ الطبيعي، عن موقع آثار اكتشاف جنوب ليوا. واهتمام توني هاريس بالتاريخ وما قبل التاريخ يرجع الي زمن بعيد . ففي عام ١٩٧٧ كتب اربعة مقالات لمجلة (بوليتين) وهي المجلة التي سبقت تريبيولس . وفي عام ١٩٧٨ كتب عن تاريخ اقدم جامع في مدينة أبو ظبي وفي عام ١٩٧٩ ألقى محاضرة عن ليوا ، والآن وبعد عشرين عاما يكتب مرة ثانية عن ليوا.

وهذا العدد يتضمن ملاحظات عن اكتشاف لقشر بيض النعام وأنواع جديدة من النباتات ونوع جديد من العقارب محاضرة عن ليوا ، والآن وبعد عشرين عاما يكتب مرة ثانية عن ليوا.

وهذا العدد يتضمن ملاحظات عن اكتشاف لقشر بيض النعام وأنواع جديدة من النباتات ونوع جديد من العقارب وكل هذا يأتي من فلسفة المجلة لتسجيل كل الأنواع . يا تري كم نوع بقي لم يتم اكتشافه؟ المئات وربما الآلاف.

عدد تريبيولس ٨٠٢ يأتي بالعديد من الأخبار المتنوعة وأيضا بعض التحسينات ولكن تذكروا أننا نرحب دائما بمقترحاتكم وتعليقاتكم.

وأخيرا وليس آخرا يجب أن نقول أن تريبيولس أصبحت مجلة لها هيئة مستشارين، فقد وافق ٤ أساتذة للعمل ك لجنة مستشارين للمجلة ونحن نشكرهم كثيرا علي ذلك. (روب وسترن)

ان نظرة دولة الامارات العربية المتحدة للبيئة للقرن القادم قد تم تحديدها في الاستراتيجية الوطنية وخطة العمل البيئي والتي تم نشرها في الصحف حديثا.

وهناك ثلاثة مراحل لهذه الاستراتيجية. المرحلة الأولى هي برنامج وطني للبيئة يهدف لوضع الأولويات وتحليل الموارد لمشاريع محددة. المرحلة الثانية هي ايجاد استراتيجية للتنمية البيئية المستدامة. أما المرحلة الثالثة فهي تأسيس خطة وطنية مبنية علي تلك الاستراتيجية .

الصناعة، البلديات، البترول، المياه، الزراعة، الصحة والتعليم كل هذه القطاعات معنية بهذا الموضوع وقبل نهاية ١٩٩٨ سيصدر تقرير شامل عن المرحلة الأولى.

وهذا بالطبع عمل يلقي كل الترحيب فهو مؤشر علي أن الأشياء تسير في الاتجاه الصحيح وأن هناك وعي بان دولة الامارات دولة صغيرة من حيث الحجم وقد تكون في خطر من ازدياد التنمية والتصنيع.

ونحن في جمعية الامارات للتاريخ الطبيعي نشعر باننا نقوم بواجبنا لتسليط الضوء علي المواضيع التي تخص البيئة في الامارات رغم أن هدفنا الأساسي هو تسجيل ماذا يوجد في الأرض أو الماء أو الهواء.

وهذا العدد من تريبيولس يحوي العديد من المواضيع التي نرجو أن تتال رضا قراننا.

فموضوع الفراشات قد تم تناوله من قبل ولكن في هذا العدد وضعنا قائمة عن الفراشات الكبيرة الحجم المتواجدة في بالامارات وهذا الموضوع بقلم اليرت ليجرين وادوارد ويلتساير.

وهناك قائمة أخرى من جراهام جيلز وهي عن فراشات التنين وفراشات الفتيات. وهذه القوائم وضعت لتعمل كمرجع لجمعية التاريخ الطبيعي أو أي شخص آخر ولتسجيل هذا النوع من الفراشات. فمثلا بعض الناس يعتقدون أن فراشات التنين تتواجد في الواحات فقط ولكنها في الحقيقة من

at Al Wathba peaked at a record 740 on 3rd. The first Eastern Pied Wheatear arrived back at Qarn Nazwa on 8th, sharing the hill with a Lesser Grey Shrike.

Waders received much attention. Crab Plovers reached 175 at Khor Al Beidah by 4th, with smaller groups at Dhabbiyah, on Futaisi island and at Khor Khuwair. A Caspian Plover was at Ruwayyah on the 8th, while no fewer than 38 Coursers were still dodging balls at the EGC then, being joined by a second Caspian Plover up until the 15th. Eleven Coursers had found the new golf course at the Jebel Ali hotel, with some still present at Nadd Al Shiba. A Glossy Ibis was at Al Ain camel racetrack on 10th, together with five Collared Pratincoles, seven more Coursers and a stray Caspian Tern. Marsh terns were in short supply, perhaps partly due to the continued infilling of Ramtha, now a poor shadow of its former self, although 430 Saunders' Little Terns were there on 11th. A Hobby was at the EGC on 13th, when 80 Pacific Golden Plovers and an early Black Redstart also showed. Eighteen White Storks arrived at Ras Al Khaimah airport on 14th, and were probably those subsequently reported from Al Ain into October.

Small numbers of Golden Orioles were noted from mid-month. Two Alpine Swifts overflew Khor Khuwair on 17th

(c15th record) with a Short-toed Eagle also being seen. Sixteen Indian Pond Herons were at Khor Kalba on 18th, while the capital's Cattle Egret roost could muster only 8 birds by then, and its first Night Heron was not back until 24th. A Booted Eagle was seen at Ras al Khaimah on 21st, whereas an odd raptor at the EGC on 22nd, not identified until almost a month later, was a second year White-eyed Buzzard (perhaps the escaped juvenile first seen nearby late last year). Also in September, passage Pied Wheatears arrived in the west but only sparsely in the north, and, late on, the first European Kingfishers took up winter territories as the first Pallid Swifts started returning to breed.

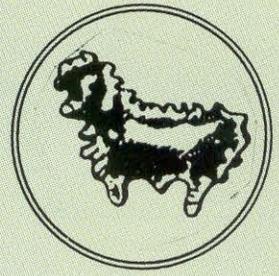
Colin Richardson & Simon Aspinall

Since very few records were received during the summer months, the Mammal Report has been held over for the next issue.

Please send your mammal and reptile records to:  
ENHG, P.O. Box 2380, Abu Dhabi.

Bird records should be sent as usual to:  
EBRC Recorder, P.O. Box 50394, Dubai.

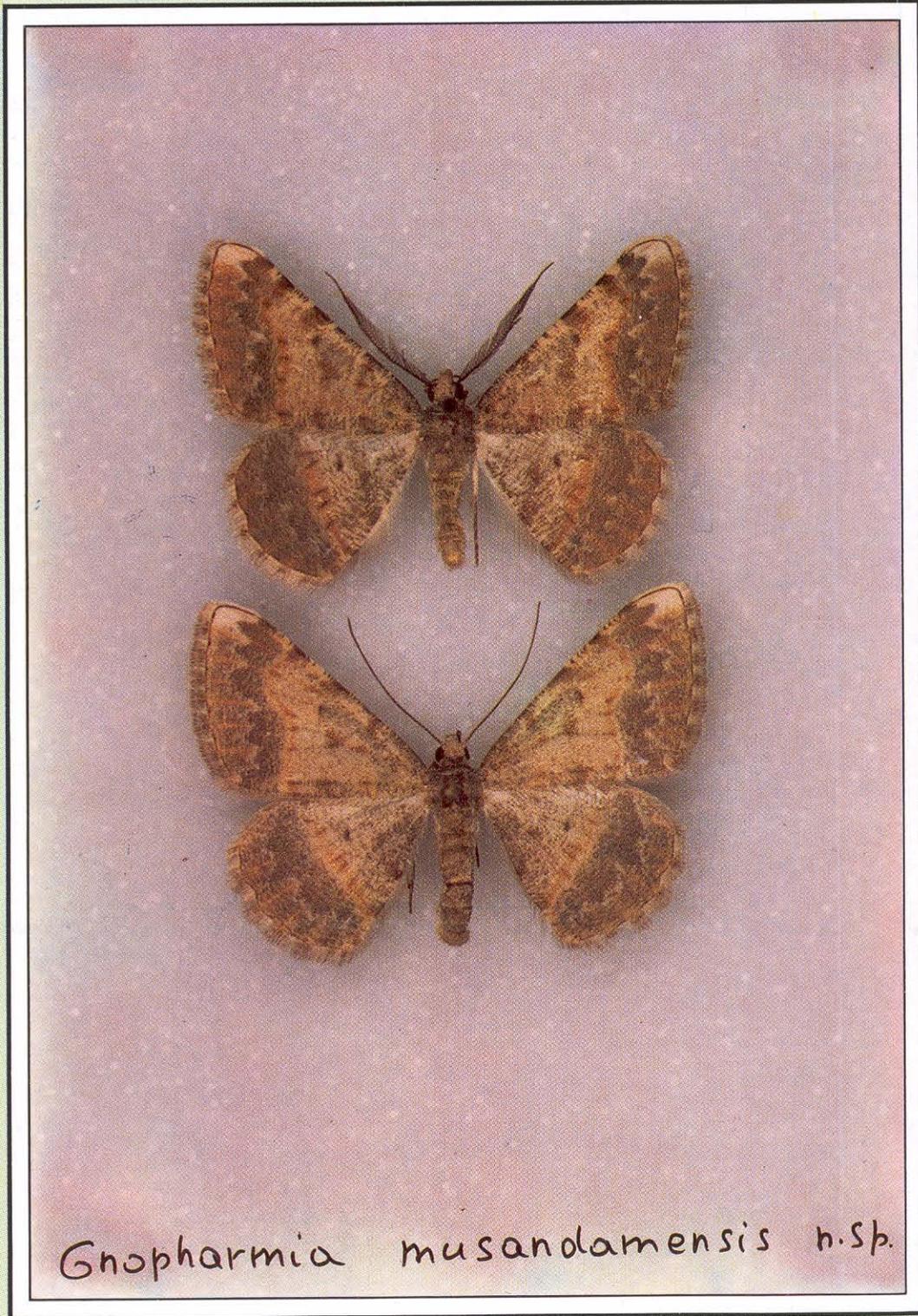
# تريبيكوس



جمعية الإمارات للتاريخ الطبيعي

اكتوبر ١٩٩٨ م

العدد: ٢، ٨



*Gnopharmia musandamensis* n.sp.