TRIBULUS

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Cover Illustrations:

Front: A domestic goat, *Capra aegagrus*, in the UAE - an under-estimated threat to local biodiversity.
Picture by Michele Ziolkowski

Back: A Moustached Warbler, *Acrocephalus melanopogon,* at Al Qudra, Dubai, December 2017.
Picture by Mohammed Ali Reza Khan

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Editorial

This latest issue of ***Tribulus*** marks the completion of a quarter of a century of publication, during which time, we would claim, it has established a growing reputation as a source of information on a wide variety of topics related to the history, natural history, archaeology, geology and other aspects of the United Arab Emirates. It coincides, too, with the celebration of the 40th anniversary of the foundation of its publisher, the Abu Dhabi-based Emirates Natural History Group, the UAE's oldest non-governmental organisation of its type.

A comment on the ENHG from the UAE's Minister of Tolerance, Sheikh Nahyan bin Mubarak Al Nahyan, who has been our much-valued Patron for over 30 years, is included.

For this volume, ***Tribulus*** moves away from the tradition of recent issues, of having one major, and often very lengthy, contribution from the prolific Gary Feulner, to return to our more usual practice of a series of shorter papers covering a wide variety of topics.

A particular focus, with three separate papers, is on the under-studied topic of the impact of the Second World War on the Emirates. While there was no conflict here on land, there was, as new contributor Ali Iqbal and Peter Hellyer report, conflict at sea related to submarine warfare, in which Sharjah-based British planes played an active role. Another paper, from Iqbal, Hellyer and Laurence Garey, unveils the story of the casualties from a previously-overlooked fatal aircrash in Sharjah while Garey reports on further investigation of an American bomber crash west of Abu Dhabi. While there is an increasing amount of publication on the UAE's history in the post-War period and, for that matter, on earlier history, there is much from the period from 1939-1945 which would benefit from further study.

Also from the period of the War, another paper reproduces a report on an adventurous voyage by a young British Political Officer by dhow from Sharjah to Bahrain, providing an interesting insight into the hazards of traditional maritime transport in the Gulf. How times have changed!

In the sphere of natural history, Oscar Campbell and Hellyer provide an introduction to the fauna and flora of the island of Balghelam, with a particular focus on its birds. Authorship is shared with the late Simon Aspinall, a regular contributor over many years whose collected data on the UAE's birds, and much else, continues to be of lasting value. Reza Khan reports on the way in which bird species have moved into the site of the new Dubai Safari, following the rehabilitation of the large waste dump that formerly occupied the site. Gerard and Katherine Whitehouse-Tedd report on the successful breeding and raising of an Egyptian vulture at the Kalba Birds of Prey Centre, for the first time in Arabia, an important step towards conservation of this regionally threatened species.

Regular contributor Mohammed Shahid reports on a study of flora in Ra's al-Khaimah's Wadi Ghalilah, providing convincing evidence of the severe threat posed by goats to local floral biodiversity. The impact of urban development, road construction and quarrying of the UAE's mountains on the country's native fauna and flora is well-known, but perhaps it's time that the impact of over-grazing by herds of goats, camels and other animals received more attention.

Shahid also examines the differences between two distinct populations of *Salicornia europaea* (samphire) in Ra's al-Khaimah and Umm al-Qaiwain, and, with N.K. Rao, reports on the apparent disappearance of Halfa grass in the wild – and its preservation in controlled conditions, which may allow for future re-introduction.

Other papers cover a record of an uncommon species of Odonata in Abu Dhabi, by Campbell, a study of rays and guitarfish off Umm al-Qaiwain, by Roxanne Whelan, Rima Jabado, Chris Clarke and Sabir bin Muzaffar, and a new record of the Egyptian Tomb Bat in Dhofar, by Saeed Al-Shanfari, Hanne and Jens Eriksen and Andrew (Drew) Gardner.

Finally, Hellyer draws attention to what may be the earliest report, in the mid-1930s, of the Bronze Age tombs at Umm al-Nar island, where the UAE's archaeology first began in the late 1950s.

We are delighted to welcome some new names to our expanding list of contributors and would encourage others to offer us the results of their research, whether as lengthy papers or as short notes. The nine page Index of Volumes 16-25 contained at the end not only gives an indication of the wide range of topics covered by ***Tribulus*** over the last decade but also provides a full list of authors. To them all, and to the Corporate Sponsors whose support has permitted the publication of ***Tribulus*** for the last 25 years, we offer our thanks.

Peter Hellyer

Goats: a threat to biodiversity in the United Arab Emirates

by Dr. Mohammad Shahid

Abstract

Goats have a severe negative impact on the environment since they graze on native vegetation, preventing regeneration. To examine the effect of goats and other grazing animals on local flora, a study was conducted at Wadi Ghalilah in the emirate of Ra's al-Khaimah. For the purpose, five abandoned, but fenced, farms and two unfenced farms were studied to determine the number of plant species growing there. In the enclosed farms, 74 plant species were noted that represent more than 9% of the recorded United Arab Emirates (UAE) flora, while in the open farms only two taxa were recorded.

Two of the recorded species from the area are rare, while four species have only recently been recorded in the UAE for the first time. The fenced plots can be described as islands of biodiversity, with between 20 and 44 species of flora present, thus helping to protect the wild plant species of the region. The surrounding area is dominated by *Tephrosia apollinea*, a poisonous plant species disliked by goats and other browsing mammals. Controls on the numbers of goats present may help to ensure the survival of the local flora, contributing to preservation of biodiversity in the region.

Picture 1. Goats feeding in Wadi Ghalilah

Introduction

Unrestrained grazing by goats (*Capra hircus* L.) can have a serious impact on native plants and wildlife. Goats have been identified as a serious pest in many parts of the world and are included in a list of the 100 worst invasive species (Lowe *et al.* 2000). Goats have a major impact on local flora through soil damage and overgrazing of native plants. This over-browsing leads to soil erosion (Bayne *et al*. 2004) and prevents plant regeneration (Harrington, 1979).

In many parts of the United Arab Emirates (UAE), people raise goats for meat and milk. In some areas of the northern emirates, farmers may have herds of between 20-100 goats which are generally left to roam freely, feeding on the natural vegetation (Picture 1). In areas where the goats are free to move around, most of the native flora has been consumed, with only plants unpalatable to goats surviving. The goats also have an indirect impact on native fauna.

Thus, for example, they compete for food and water with Arabian tahr, *Arabitragus jayakari,* a near-endemic species classified as Endangered by the International Union for the Conservation of Nature, IUCN, whose numbers have fallen to an estimated 50 in the UAE. Tahr eat only the upper parts of plants, while goats browse plants to such an extent that they do not regenerate.

Wadi Ghalilah, part of the emirate of Ra's al-Khaimah, is situated in the Hajar Mountains, which stretch from the UAE into north-eastern Oman, and opens onto the coastal plain around five kilometres from the Arabian Gulf coast. Within the wadi are numerous small farms (Picture 2), with

Picture 2. Farms in Wadi Ghalilah

Picture 3. Fence around a farm in Wadi Ghalilah to exclude grazing animals

Table 1. Information on fenced and open farms that were studied for wild flora in Wadi Ghalilah, Ra's al-Khaimah

		Coordinates			
S.N.	***Farm type***	***N***	***E***	***Elevation (ft)***	***Area (m2)***
1	Fenced 1	25°59.102	056°08.316	403	1,200
2	Fenced 2	25°58.373	056°09.034	543	2,400
3	Fenced 3	25°58.626	056°09.057	590	1,500
4	Fenced 4	25°58.380	056°07.240	290	1,400
5	Fenced 5	25°58.377	056°08.556	531	2,750
6	Open 1	25°58.225	056°09.082	813	1,000
7	Open 2	25°58.361	056°09.053	590	750

an area of between 700-5,000 sq.m. The majority of these are fenced, to keep grazing animals, in particular goats, away from the crops. At present, many of the farms are not being actively cultivated, allowing wild plant species areas in which to grow.

The presence of farms which are fenced and abandoned or unfenced allows an assessment to be made on the impact of grazing animals, primarily goats, on local wild flora.

Materials and Methods

Five enclosed farms which have been used for the growing of crops in the past or are still being used were selected for the study (Table 1). Where necessary, new fences were erected, to prevent access by goats (Picture 3). For control, two unfenced farms were also studied to see the effect of browsing on plant species (Table 1).

The study was carried out during February-May, 2017. Specimens of different plant species growing in the open and fenced plots were collected, using Jongbloed, 2003 and Karim and Fawzi, 2007 for identification. Observation of the populations of the plant species were also made. A Garmin GPS 72H was used to record the co-ordinates of each location.

Results and Discussion

The botanical exploration of Wadi Ghalilah with emphasis on the five enclosed and two open abandoned farms provides an indication of the biodiversity that may have existed in the region without goats. Goat numbers are believed to have increased considerably in recent years. The study of the fenced farms indicated the presence of a rich native flora while the paucity of flora in unfenced plots exposes the threat to biodiversity in the valley.

Fenced Farms

Farm 1

Thirty-nine plant species were found, belonging to 20 different families (Table 2; Picture 4). With 11, the Poaceae family had the largest number of species in the plot followed by the Asteraceae, with 5. The dominant species in the plot was *Malva parviflora*. Two of the species, *Melanocenchris abyssinica* and *Rostraria cristata*, found in the farm are rare in the UAE (Jongbloed, 2003), and may require proper documentation and protection.

Picture 4. The enclosed Farm 1 is dominated by *Malva parviflora*

Table 2. Plant species found in fenced Farm 1

	Species	Family	S.N.	Species	Family
1	*Periploca aphylla*	Asclepiadaceae	21	*Acacia tortils*	Mimosaceae
2	*Senecio glaucus*	Asteraceae	22	*Plantago ovata*	Plantaginaceae
3	*Reichardia tingitana*	Asteraceae	23	*Brachypodium distachyum*	Poaceae
4	*Launaea capitata*	Asteraceae	24	*Cenchrus setigerus*	Poaceae
5	*Launaea nudicaulis*	Asteraceae	25	*Aristida adscensionis*	Poaceae
6	*Pulicaria edmondsonii*	Asteraceae	26	*Erograstis barrelieri*	Poaceae
7	*Helitropium calcareum*	Boraginaceae	27	*Echinochloa colona*	Poaceae
8	*Erucaria hispaniaca*	Brassicaceae	28	*Panicum antidotale*	Poaceae
9	*Farsetia aegyptica*	Brassicaceae	29	*Cynodon dactylon*	Poaceae
10	*Sisymbrium irio*	Brassicaceae	30	*Eragrostis cilianesis*	Poaceae
11	*Polycarpon tetraphyllum*	Caryophyllaceae	31	*Rostraria cristata*	Poaceae
12	*Chenopodium murale*	Chenopodiaceae	32	*Melanocenchris abyssinica*	Poaceae
13	*Citrullus colocynthis*	Cucurbitaceae	33	*Cenchrus ciliaris*	Poaceae
14	*Cyperus rotundus*	Cyperaceae	34	*Zizyphus spina-christi*	Rhamnaceae
15	*Trigonella hamosa*	Fabaceae	35	*Gaillonia aucheri*	Rubiaceae
16	*Tephrosia apollinea*	Fabaceae	36	*Lycium shawii*	Solanaceae
17	*Medicago lanciniata*	Fabaceae	37	*Solanum nigrum*	Solanaceae
18	*Erodium laciniatum*	Geraniaceae	38	*Forsskaolea tenacissima*	Urticaceae
19	*Asphodelus tenuifolius*	Liliaceae	39	*Fagonia bruguieri*	Zygophyllaceae
20	*Malva parviflora*	Malvaceae			

Farm 2

This plot had the maximum number of wild plant species of all farms studied, a total of 44 species, from 21 plant families (Table 3; Picture 5). The Poaceae had the largest number of species (10) followed by the Asteraceae, with 5 (Table 3). Three of the species found in the farm were recorded quite recently for the first time from the UAE including *Helitropium lasiocarpum* and *Convolvulus fatmensis*, from the Convolvulaceae (Shahid and Rao, 2016a) and *Eleusine indica* of the Poaceae (Shahid and Rao, 2016b). Two taxa, *Valantia hispida* and *Malva parviflora,* were particularly abundant.

Picture 5. Different plant species growing in fenced Farm 2

Table 3. Plant species found in fenced Farm 2

S.N.	Species	Family	S.N.	Species	Family
1	*Calendula arvensis*	Asteraceae	23	*Malva parviflora*	Malvaceae
2	*Filago desertorum*	Asteraceae	24	*Acacia tortils*	Mimosaceae
3	*Pentanema divaricatum*	Asteraceae	25	*Prosopis juliflora*	Mimosaceae
4	*Senecio glaucus*	Asteraceae	26	*Ficus carica*	Moraceae
5	*Sonchus tenerrimus*	Asteraceae	27	*Moringa peregrina*	Moringaceae
6	*Helitropium calcareum*	Boraginaceae	28	*Plantago ovata*	Plantaginaceae
7	*Helitropium lasiocarpum*	Boraginaceae	29	*Avena fatua*	Poaceae
8	*Erucaria hispaniaca*	Brassicaceae	30	*Brachypodium distachyum*	Poaceae
9	*Sisymbrium irio*	Brassicaceae	31	*Cenchrus ciliaris*	Poaceae
10	*Arenaria deflexa*	Caryophyllaceae	32	*Cenchrus setigerus*	Poaceae
11	*Polycarpon tetraphyllum*	Caryophyllaceae	33	*Eleusine indica*	Poaceae
12	*Chenopodim album*	Chenopodiaceae	34	*Eragrostis barrelieri*	Poaceae
13	*Chenopodium murale*	Chenopodiaceae	35	*Eragrostis cilianensis*	Poaceae
14	*Convolvulus fatamensis*	Convolvulaceae	36	*Panicum antidotale*	Poaceae
15	*Citrullus colocynthis*	Cucurbitaceae	37	*Phalaris minor*	Poaceae
16	*Euphorbia granulata*	Euphobiaceae	38	*Setaria verticillata*	Poaceae
17	*Medicago lanciniata*	Fabaceae	39	*Emex spinosa*	Polygonaceae
18	*Melilotus indicus*	Fabaceae	40	*Rumex vesicarius*	Polygonaceae
19	*Tephrosia apollinea*	Fabaceae	41	*Zizyphus spina-christi*	Rhamnaceae
20	*Trigonella hamosa*	Fabaceae	42	*Valantia hispida*	Rubiaceae
21	*Erodium laciniatum*	Geraniaceae	43	*Ammi majus*	Umbelliferae
22	*Geranium mascatense*	Geraniaceae	44	*Forsskaolea tenacissima*	Urticaceae

Farm 3

Twenty species belonging to 14 plant families were documented (Table 4; Picture 6). Two grass species, *Digitaria sanguinalis* and *Brachypodium distachyum,* were abundant, while the Brassicaceae were the most common family (Table 4).

Picture 6. A view of Farm 3 with various wild plant species

Table 4. Plant species found in fenced Farm 3

	Species	Family	S.N.	Species	Family
1	*Reichardia tingitana*	Asteraceae	11	*Geranium mascatense*	Geraniaceae
2	*Helitropium calcareum*	Boraginaceae	12	*Acacia tortils*	Mimosaceae
3	*Brassica napus*	Brassicaceae	13	*Brachypodium distachyum*	Poaceae
4	*Erucaria hispaniaca*	Brassicaceae	14	*Digitaria sanguinalis*	Poaceae
5	*Sisymbrium irio*	Brassicaceae	15	*Rumex vesicarius*	Polygonaceae
6	*Convolvulus fatamensis*	Convolvulaceae	16	*Anagallis arvensis*	Primulaceae
7	*Chrozophora oblongifolia*	Euphobiaceae	17	*Zizyphus spina-christi*	Rhamnaceae
8	*Medicago lanciniata*	Fabaceae	18	*Galium setaceum*	Rubiaceae
9	*Tephrosia apollinea*	Fabaceae	19	*Valantia hispida*	Rubiaceae
10	*Erodium laciniatum*	Geraniaceae	20	*Forsskaolea tenacissima*	Urticaceae

Farm 4

This farm had 24 plant species from 15 different families (Table 5; Picture 7). One of the species, *Arenaria deflexa,* was identified as a first record for the UAE by the author one year ago (Shahid and Rao, 2016b). Interestingly, it was also the most abundant species in the farm. Fabaceae and Poaceae both were represented by 4 species each, the maximum number of taxa for any family found there.

Picture 7. The most abundant species in Farm 4 was *Arenaria deflexa*

Table 5. Plant species found in fenced Farm 4

	Species	Family	S.N.	Species	Family
1	*Launaea capitata*	Asteraceae	13	*Erodium laciniatum*	Geraniaceae
2	*Sonchus oleraceus*	Asteraceae	14	*Erodium laciniatum*	Geraniaceae
3	*Erucaria hispaniaca*	Brassicaceae	15	*Aspholdelus tenuifolius*	Liliaceae
4	*Sisymbrium irio*	Brassicaceae	16	*Malva parviflora*	Malvaceae
5	*Arenaria deflexa*	Caryophyllaceae	17	*Plantago ovata*	Plantaginaceae
6	*Convolvulus fatamensis*	Convolvulaceae	18	*Cenchrus ciliaris*	Poaceae
7	*Citrullus colocynthis*	Cucurbitaceae	19	*Brachypodium distachyum*	Poaceae
8	*Euphorbia granulata*	Euphobiaceae	20	*Aristida adscensionis*	Poaceae
9	*Melilotus indicus*	Fabaceae	21	*Eragrostis cilianensis*	Poaceae
10	*Trigonella hamosa*	Fabaceae	22	*Emex spinosa*	Polyogonaceae
11	*Tephrosia apollinea*	Fabaceae	23	*Zizyphus spina-christi*	Rhamnaceae
12	*Medicago lanciniata*	Fabaceae	24	*Parietaria alsinifolia*	Urtiaceae

Farm 5

Thirty-two plant species from 22 families were observed (Table 6; Picture 8). This uncultivated plot had the greatest diversity of plant families of the five enclosed plots that were studied. *Malva parviflora* was the most common species while the Poaceae had more species (5) than any other plant family growing in the farm.

Picture 8. A panoramic view of Farm 5

Table 5. Plant species found in fenced Farm 5

	Species	Family	S.N.	Species	Family
1	*Adiantum capillus-veneris*	Adiantaceae	17	*Plantago ovata*	Plantaginaceae
2	*Sonchus oleraceus*	Asteraceae	18	*Brachypodium distachyum*	Poaceae
3	*Urospermum picroides*	Asteraceae	19	*Cynodon dactylon*	Poaceae
4	*Helitropium calcareum*	Boraginaceae	20	*Eragrostis cilianensis*	Poaceae
5	*Erucaria hispaniaca*	Brassicaceae	21	*Panicum antidotale*	Poaceae
6	*Sisymbrium irio*	Brassicaceae	22	*Setaria verticillata*	Poaceae
7	*Chenopodium murale*	Chenopodiaceae	23	*Emex spinosa*	Polygonaceae
8	*Citrullus colocynthis*	Cucurbitaceae	24	*Rumex vesicarius*	Polygonaceae
9	*Tephrosia apollinea*	Fabaceae	25	*Ochradenus arabicus*	Resadaceae
10	*Medicago laciniata*	Fabaceae	26	*izyphus spina-christi*	Rhamnaceae
11	*Erodium laciniatum*	Geraniaceae	27	*Valantia hispida*	Rubiaceae
12	*Geranium mascatense*	Geraniaceae	28	*Scrophularia arguta*	Scrophulariaceae
13	*Aspholdelus tenuifolius*	Liliaceae	29	*Lycium shawii*	Solanaceae
14	*Malva parviflora*	Malvaceae	30	*Ammi majus*	Umbelliferae
15	*Acacia tortils*	Mimosaceae	31	*Forsskaolea tenacissima*	Urticaceae
16	*Ficus carica*	Moraceae	32	*Parietaria alsinifolia*	Urticaceae

Open Farms

Exploration of the two open (unfenced) farms found only two plant species. In unfenced Farm 1, *Tephrosia apollinea* and *Polycarpon tetraphyllum* were noted (Picture 9), while in Farm 2, only *T. apollinea* was found (Picture 10). In Farm 1, *P. tetraphyllum* covered the greater part of the land surface. Goats were the only grazing mammals seen moving freely in the open farms. It appeared that plants of *P. tetraphyllum* were too small to be browsed by goats while the other species, *T. apollinea,* is unpalatable. The lack of plant diversity in the open farms provides an indication of the impact of goats on the species found in Wadi Ghalilah.

A total of 74 different plant species were recorded from all the five enclosed and two open deserted farms, representing more than 9% of the UAE wild flora. A total of 30 families were recorded, representing over 33% of all plant families found in the UAE.

In the last year, records of four plant species previously unrecorded in the Emirates were made within a small part of the area. Further unrecorded species may be present.

Outside the fenced agriculture farms, most of the vegetation was comprised of poisonous or inedible plant species, which are disliked by the browsing goats. The majority of the plants growing in these areas were *Tephrosia apollinea* (Photo 11), a perennial legume species, which is toxic and is not grazed (Ghazanfar and Fisher, 1998). Other plant species found in small numbers included *Aspholdelus tenuifolius* (Liliaceae), *Calotropis procera* (Asclepidiaceae), *Citrullus colocynthis* (Cucurbitaceae), *Emex spinosa* (Polygonaceae), *Fagonia bruguieri* (Zyophillaceae), *Forsskaolea tenacissima* (Urticaceae), *Polycarpon tetraphyllum* (Caryophyllaceae), and *Schweinfurthia papilionacea* (Scrophulariaceae).

Conclusions

These findings demonstrate that goats have a serious effect on biodiversity. If goat numbers are controlled, there may be a rejuvenation of native plant life that may help to preserve a healthy ecosystem.

The data above are based on one year of research in a small area. Study of a larger area over a longer period may provide evidence of more undocumented plant species in Wadi Ghalilah.

Picture 9. A large part of the open Farm 1 was covered with small plants of *Polycarpon tetraphyllum*

Picture 10. In open Farm 2, only one species, *Tephrosia apollinea*, was growing

Picture 11. The toxic plant species *Tephrosia apollinea* growing outside a fenced farm in Wadi Ghalilah

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Naturally-occurring birds at Dubai Safari, a rehabilitated waste dump

by Mohammad Ali Reza Khan

Abstract

This paper tracks the rehabilitation of a solid waste dump in Dubai, United Arab Emirates, and its development as a new man-made 'safari' attraction, with particular reference to the increase in bird species now recorded at the location. Research into the area's birdlife, as well as into invertebrates, mammals and reptiles, is continuing.

Al Warqa Dump Site in 2013 before it was worked on by Dubai Municipality

Very fast preliminary design idea for the Dubai Safari in 2013. Both maps based on Google Map and DM appointed safari designer.

Figure 1 Left - the Al Warqa Solid Waste Site and, right- the first preliminary design idea for Dubai Safari

Introduction

Dubai is the second largest of the seven emirates that have, since 1971, formed the United Arab Emirates. By 2016, the urban conurbation of Dubai was estimated to have a population of around 2.7 million people, having grown dramatically since the formation of the federation (Government of Dubai, 2017).

The area discussed in this paper lies in the Al Warqa district, in the east of today's city. Prior to 1980, it was a desert habitat with undulating low dunes, similar to other areas now forming part of the city, like Mirdif, Al Warsan, Khawaneej, Barsha and Jebel Ali (Khan 1999, 2008). Lying around 15 km from the old city centre at Deira and Bur Dubai, its most easterly part was selected by the Dubai Municipality in the late 1970s as one of the first two solid waste dumps for the growing city. By the early 1990s, it was decided to seal off the area and to cease further dumping. The dump then covered an area of around 4 sq. km. (Figure 1).

The dump then remained undisturbed until May 2012, when His Highness Sheikh Mohammed bin Rashid Al Maktoum, Ruler of Dubai as well as UAE Vice President and Prime Minister, ordered that the dump and adjacent areas should be handed over to the Project Department of the Dubai Municipality, for the creation of the Dubai Safari project.

The area of the site included the area of the main dump itself, forming a tableland on which the Dubai Safari is situated, untouched areas of desert, with dunes, to the north and south-east and areas to the east and south-east where earth removed from the main dump site had been dumped, creating a few lower 'tablelands'.

In preparation for the original dumping programme, the Municipality had excavated the area to a depth of around 20 metres below the surrounding natural land surface. During the process of dumping of waste material, including building material, mainly concrete, rods, pipes, ceramics and wood, the dump eventually rose to a height of nearly 30 metres above the surrounding land surface, creating a roughly flat-topped tableland. The top of this tableland is the highest point in the city of Dubai.

The first phase of the Dubai Safari project site covers the main tableland and part of some of the lower tablelands, covering an area of around 4 sq. km. Subsequent phases of development will cover the whole of the 10 sq. km, area, including the surviving natural desert (Picture 1).

The east side also has some high dunes with slightly reddish sand. The area around the base of the main dump, or tableland, is flattish with very sparse vegetation and three clumps of native Ghaf trees *Prosopis cineraria* (Picture 2).

Currently (late 2017), the Dubai Safari project has two main features, the 'Safari Village', where visitors will able to view free-ranging animals from Africa and Asia from closed door vehicles with hardened glass, and the Arabian, Asian and African Villages, habitats which simulate a natural-looking, barrier-free zoo. A Kids Farm and a wadi of nearly one kilometre in length, with waterfalls and dense vegetation on both banks, are additional attractions. The wadi itself has a meandering, permanent stream with aquatic and wadi bank vegetation of local and exotic species (Picture 3).

The first structure built for the Safari project, in 2013, was a single-storey design and model exhibition centre housed in a 3-room eco-friendly thatched, but air-conditioned, shed at the entrance to the Safari park area. This was surrounded by an irrigated garden with hedges and ornamental plants which has attracted both birds and insects (Picture 4).

As a part of the landscaping, some solid waste from the top level of the tableland was removed and replaced with sweet desert sand suitable for planting. Almost the entire Safari area, other than the constructed structures, is now irrigated. All planted vegetation is irrigated with treated sewage water on a regular basis, while the lawns are watered by a sprinkler system.

Following the installation in 2014 of a number of caravans to serve as temporary office accommodation, my office was moved from the Dubai Zoo in Jumeirah to the site. This allowed me to make nearly daily visits to the Safari site to record the wildlife.

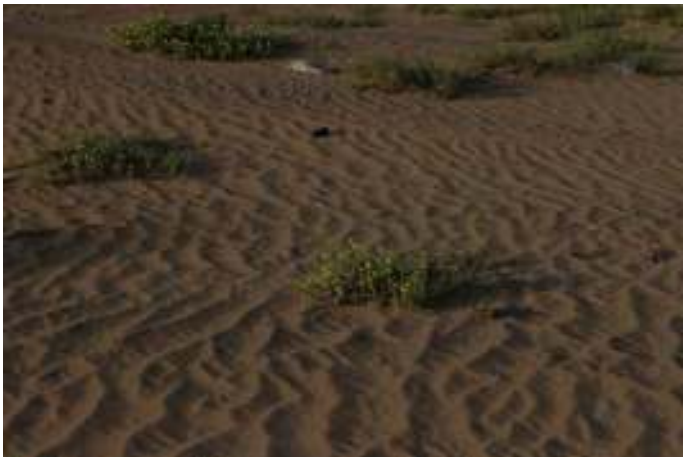
Study Area: Al Warqa Solid Waste Dump vis-à-vis the Dubai Safari

The Dubai Safari site in Al Warqa is located at N 25°10'37.8" and E 55°26'51.5". A roughly rectangular area covering nearly 10 sq. km., it is bounded on the north by Tripoli Street, to the south by Awir and Ras Al Khor Road, to the east by Academic City Road and to the west by the street linking the east end of Al Warqa with Awir Road and Tripoli Street (Figure 2).

Figure 2. The near-rectangular Dubai Safari site, with adjacent areas for future development, Al Warqa (based on Google Maps).

Preliminary Master Plan Design for the Dubai Safari based on "Safari Dubai www.dm.gov.ae" https://www.dm.gov.ae/wps/portal/ -- Accessed on 16 June 2017
Showing current phase of development

Figure 3. Preliminary Master Plan.



Picture 1. Surviving natural desert with *Tribulus arabicus*

Picture 2. One of the Ghaf clumps to the east of the Safari site area. In the background, 3 rows of planted *Conocarpus* trees, more than 6 m tall, will eventually screen the Safari from the neighbouring lower land.


Picture 3. Left- A view of the Wadi and, right, a general view of the Dubai Safari site


Picture 4. Left, The Design and Display Centre, the first structure built for Dubai Safari, in 2013, and right, the Centre in June 2016.

Methodology

While driving or walking through the area of Dubai Safari as development got under way, I recorded the presence of all birds, other animals and plants, paying particular attention to naturally-occurring species, including colonisation by native plant species.

From May 2012 to April 2013, I made monthly visits to the site as there was little sign of wildlife. From May 2013 to June 2016, I drove four times weekly along a nearly 4 km long winding safari trail, cutting at least once daily across the construction site for the Dubai Safari project first phase. When plantation begun in March 2015, I made one daily visit by car and walked through the area twice a week, noting naturally-occurring birds and other animals and plants. On some days, I made up to three visits, in the early morning, mid-morning and afternoon. Surveys by car lasted up to one hour with those on foot lasting up to two hours.

From July 2016, vehicle movement along the safari trail was halted as it was being converted to its final format of a rugged trail. From then until June 2017, I undertook a twice-weekly survey on foot, lasting an average of two hours. This paper records only the highest number of individual bird species seen during the surveys.

Notes of birds and other animals and plants are also being recorded in the northern and untouched 'desert belt' due to be used for an expansion of the Dubai Safari site over the next three to five years.

Identifications were made of plants using Jongbloed (2004), Khan (1999) and Western (1989). Birds were identified using Aspinall and Porter (2011), Khan (2008), the website www.uaebirding.com (Pedersen *et al*, 2017) and Handbook of the Birds of the World Alive (an online reference material at http://www.hbw.com/species).

Results

The naturally-growing plants mainly occur in the south-east, east and north of the current Safari site and in those areas due to be incorporated into it in the near future. These are dominated by typical desert species, including *Zygophyllum*, *Heliotropium*, *Cornulaca*, *Cyperus*, *Aerva*, *Salsola, Euphorbia, Tribulus, Fagonia, Neurada, Arnebia, Crotolaria, Hippocrepis, Indigofera, Farsetia, Rhynchosia, Gisekia, Eremobium, Senecio, Launea, Centauria, Pennisetum, Panicum, Aristida* etc., with some shrubby *Calligonum comosum, Leptadaenia pyrotechnica* and a few *Calotropis*. There are six clumps of Ghaf *Prosopis cineraria*, three of which are at the base of the main tableland (Picture 2) and the others being scattered throughout the remaining areas. Additionally, there are a few planted Mesquite *Prosopis juliflora* and *Salvadora persica* on the Warqa side and a remaining camel camp adjacent to the Awir road in the south. On the tableland, there were a few clumps of *Zygophyllum hamiense*, *Z. simplex*, *Cornulaca monocantha*, *Cyperus conglomeratus* and *Salsola imbricata* up to the time the project started taking shape with the beginning of plantation in 2014. The rest of the area was barren, strewn with wood, concrete blocks and other solid rubbish. On the near-vertical sides of other tablelands or large elevated mounds, examples of the last two species were present.

Since the commencement of work on the Safari project, over a thousand trees of over six metres in height have been planted. These include indigenous and exotic trees as required to meet the themes of the Safari e.g., Ghaf (*Prosopis cineraria*), Acacia (*Acacia arabica*, *A. tortilis*), Manila Tamarind (*Pithecellobium dulce*), Sidr (*Ziziphus spina-christi, Z. jujuba*), Figs (*Ficus* spp.), Baobab (*Adansonia digitata*), Silk Floss Tree (*Chorisia speciosa* or *Ceiba speciosa*), Ferfer (*Tecomela undulata*), Assyrian Plum (*Cordia myxa*), Indian Cork (*Mallingtonia hortensis*), Goldmohar (*Delonix regia*), Flame of the Forest (*Butea monosperma*), *Albizia* spp, *Dracaena*, African and Asian Palms, Bamboo, Sugarcane, Reeds, Bulrush (*Typha* sp.) and lianas. In addition, nearly one hundred species of indigenous and exotic shrubs and herbs as well as aquatic species have been planted. As a result of this, the whole area is now a man-made habitat with undulating, landscaped hillocks, dry and wet moats, wadis, marshlands and water bodies that are regularly provided with sewage treated water.

Up to 2013, just a dozen species of birds had been recorded at the Safari site, excluding its largely natural eastern side (Table 1). All of these 12 species are commonly found in and near human habitations and centres of human activity. Of these, Green Bee-eater, Collared Dove, Laughing Dove, Bank Myna and House Sparrow bred at the site.

Of the 12 species, only the Chestnut-bellied Sandgrouse has not been seen since development of the site began, although a few still visit the Al Warsan Lake adjacent to International City, a kilometre to the south-west.

Construction activity began in May 2014, with bodies of water being created. Planting of ground cover began in March 2015, with plantations being created in 2016. By June 2017, most of the construction and landscaping, including plantations, had been completed. Most of the bird species recorded below (Table 2), were recorded from the end of 2015 onwards.

Discussion

The data in this paper report those species which have thus far been recorded at the Dubai Safari site, including UAE resident species, passage migrants and winter visitors and migrant breeders. The data are intended to lay down a baseline for future studies of the site's avifauna. Comparisons can then be drawn with other man-made habitats, such as the nearby Al Warsan Lake and Al Ain Zoo & Safari Park.

Information has been included on birds flying over the site. Gulls, present in great numbers at the Al Warsan Lake in winter, on occasion make use of pools created on the site. Thousands of Black-headed Gulls, larger gulls and Great Cormorants fly past the Safari during early winter mornings, many using the nearby Al Warsan Lake and Al Warsan organic solid waste sorting area, along with the adjacent waste dump, to feed and as a roost.

From December 2013 up to June 2017, I have recorded 58 species of birds at or over the current phase of the Dubai Safari site (Table 2). Of these, half are passage migrants or wintering visitors while one, Blue-cheeked Bee-eater, is a migrant (summer) breeder in the UAE. Greater Flamingo and Cattle Egret have both resident and migratory populations.

In the UAE as a whole, 466 bird species have been recorded (Pedersen *et al.*, 2017).

Of the species recorded at the Dubai Safari site, 33 are primarily terrestrial species, the remainder being wetland or water-loving species, some being passage migrants and others over-wintering. Thus far, there has been little evidence of small migratory passerines making use of the site. This will be a topic for future research.

At a time when much of the natural habitat in the area of greater Dubai is under pressure, this study provides evidence of the ability of bird species to make use of areas formerly of little ecological value which are developed with a view to creating new habitats.

Acknowledgements

I am grateful to Dubai Safari and Dubai Municipality authorities for allowing me to do the required research for this paper and for permission to publish it. I also thank Peter Hellyer, Managing Editor of *Tribulus*, for accepting this paper for publication and for assistance with editing. My field companions Zarin Shah, Mohammad Shafwan, Kabilan Durai and Osman Ghani, all employees of Dubai Safari, provided invaluable support during the surveys.

Picture 5. Surviving natural land surface and vegetation in the lower, flatter areas of the site.

Table 1 Birds seen in 2012 and 2013 before construction of the Dubai Safari project commenced

Sp. no.	English Name	Maximum Number noted	Remarks (*including UAE status*)
1	Chestnut-bellied Sandgrouse	4	Formerly found on the flat-topped tableland, now covered by the Safari project. Resident
2	Laughing Dove	6	Resident breeders in the naturally-occurring Ghaf trees at the base of the tableland.
3	Collared Dove	8	As above
4	Great Cormorant	many	Migrant, seen flying over
5	Black-headed Gull	many	Migrant, seen flying over
6	Heuglin's/larger gulls	many	Migrant, seen flying over. Not recorded as landing.
7	Green Bee-eater	2	Resident breeders around the base of the tableland.
8	Crested Lark	2	Resident, on tableland and at base.
9	Pallid Swift	2	seen flying over, resident
10	Brown-necked Raven	2	seen flying over, resident
11	Bank Myna	c.100	Resident, breeding in bank at the base of an earth mound adjacent to the tableland.
12	House Sparrow	c.12	Resident, bred in Ghaf trees

Table 2 Birds recorded in Dubai Safari Site from May 2014 to June 2017

	Species	Maximum Number seen	Status in Dubai/UAE	Comments
Order Galliformes Family Phasianidae				
1	Grey Francolin *Francolinus pondicerianus*	7	Resident breeder	Only near display centre at the Safari entry. Introduced, naturalised species.
Order Anseriformes Family Anatidae				
2	Egyptian Goose *Alopochen aegyptiaca*	2	Resident breeder	Introduced, naturalised breeder. Seen once, stayed two days.
3	Northern Shoveler *Spatula clypeata*	1	Migrant/winter visitor	
4	Garganey *Spatula querquedula*	1	Migrant/winter visitor	1 seen January 2017
Order Phoenicopteriformes Family Phoenicopteridae				
5	*Greater Flamingo* *Phoenicopterus roseus*	17	Resident & Migrant	One group seen flying past site
Order Columbiformes Family Columbidae				
6	Rock Dove *Columba livia*	15	Feral, Resident breeder	Birds use the Safari area to feed, drink
7	Common Wood Pigeon *Columba palumbus*	1	Rare Migrant, occasionally released	1 seen 17 April 2017
8	Laughing Dove *Spilopelia senegalensis*	c.30	Breeding resident	Breeds in Safari site
9	Eurasian Collared Dove *Streptopelia decaocto*	c.100	Breeding resident	Breeds in Safari site
Order Pelecaniformes Family Ardeidae				
10	Grey Heron *Ardea cinerea*	1	Migrant, occasionally over-summers	One stayed in Safari marsh area for one week in 2017
11	Western Reef Heron *Egretta gularis*	2	Resident breeder	One bird stayed for 3 days in 2017
12	Cattle Egret Bubulcus ibis	c.12	Resident breeder, migrant	Visitor to the site, with roost at nearby sewage treatment plant. Breeds in private compound in Zabeel area. Up to 6 visiting up to June 2017.
Family Upupidae				
13	Common Hoopoe *Upupa epops*	c. 20	Breeding resident	2 pairs bred in Safari in 2017.
Order Coraciiformes Family Coraciidae				
14	Indian Roller *Coracias benghalensis*	2	Breeding resident, migrant	A sub-adult seen August 2016; pair bred in Safari 2017.
Family Meropidae				
15	Green Bee-eater *Merops cyanophrys*	8	Breeding resident	2 pairs bred in 2016 and 1 pair in 2017
16	Blue-cheeked Bee-eater *Merops persicus*	4	Summer migrant breeder	One juvenile seen summer 2016, possibly bred nearby. 2 seen June 2017, 11 September 2017.

Order Caprimulgiformes **Family Apodidae**				
17	Pallid Swift *Apus pallidus*	12	Migrant breeder	One sub-adult seen 2017
Order Suliformes **Family Phalacrocoracidae**				
18	Great Cormorant *Phalacrocorax carbo*	1	Migrant	An immature used Safari marsh for a month in 2017; 100s fly over safari, presumably to nearby Al Warsan Lake and/or Khor Dubai.
Order Charadriiformes **Family Recurvirostridae**				
19	Black-winged Stilt *Himantopus himantopus*	6	Breeding resident	1 pair bred in May 2017, 3 young.
Family Charadriidae				
20	Little Ringed Plover *Charadrius dubius*	2	Migrant, winter visitor	Only during winter of 2017
21	Little Stint *Caldris minuta*	2	Migrant, winter visitor	as above
22	Temminck's Stint *Calidris temminckii*	1	Migrant, winter visitor	as above
23	Common Sandpiper *Actitis hypoleucos*	6	Migrant, winter visitor	as above
24	Wood Sandpiper *Tringa glareola*	2	Migrant, winter visitor	as above
25	Green Sandpiper *Tringa ochropus*	4	Migrant, winter visitor	as above
26	Marsh Sandpiper *Tringa stagnatilis*	1	Migrant, winter visitor	as above
27	Common Redshank *Tringa totanus*	1	Migrant, winter visitor	Only during winter of 2016, 2017
28	Common Greenshank *Tringa nebularia*	1	Migrant, winter visitor	as above
29	Common Snipe *Gallinago gallinago*	2	Migrant, winter visitor	Made brief stopover, possibly for one night
30	Red-wattled Lapwing *Vanellus indicus*	10	Resident	1 pair bred in 2016, 4 pairs bred in 2017
Family Laridae				
31	Black-headed Gull *Larus ridibundus*	c.100	Migrant, Winter visitor	More than 100 stayed in pools in Safari for over a month in 2017; thousands fly past
32	Slender-billed Gull *Larus genei*	1	Migrant, winter visitor, some oversummer	Only 1 bird landed along with Black-headed Gulls, stayed for a day
33	Lesser Black-backed/ Heuglin's Gull *Larus fuscus*	1	Migrant. Winter visitor	100s fly past safari
Order Strigiformes **Family Strigidae**				
34	Pharaoh Eagle-Owl *Bubo ascalaphus*	1	Resident in nearby areas	First time seen on 11 and 18 June 2017

Order Accipitriformes **Family Accipitridae**				
35	Western Marsh Harrier *Circus aeruginosus*	2	Migrant, winter visitor	Flew past safari
Order Psittaciformes **Famliy Psittacidae**				
36	Rose-ringed Parakeet *Psittacula krameri*	3 flew past	Resident breeder	Introduced
Order Passeriformes **Family Laniidae**				
37	Southern Grey Shrike *Lanius meridionalis*	2	Resident, breeds nearby	Disperses locally
38	Isabelline Shrike/Daurian Shrike *Lanius isabellinus isabellinus*	4	Migrant	
39	Red-tailed Shrike/Turkestan Shrike *Lanius phoenicuroides*	6	Migrant	
Family Corvidae				
40	House Crow *Corvus splendens*	2	Resident nearby	Stayed for 2 days, mobbed by almost all other species present
41	Brown-necked Raven *Corvus ruficollis*	2	as above	Flew past
Family Hirundinidae				
42	Pale Rock Martin or Pale Crag Martin *Ptyonoprogne obsoleta*	c.12	Resident	Possibly breeds nearby
43	Barn Swallow *Hirundo rustica*		Migrant	
Family Pycnonotidae				
44	Red-vented Bulbul *Pycnonotus cafer*	10	Introduced resident	Breeding
45	White-eared Bulbul *Pycnonotus leucotis*	50	Introduced resident	One of the 1st breeders at the site
Family Aludidae				
46	Crested Lark *Galerida cristata*	c.20	Resident	2 pairs bred
47	Greater Short-toed Lark *Calandrella brachydactyla*	4	Migrant	Seen during spring of 2016
Family Sturnidae				
48	Bank Myna *Acridotheres ginginianus*	c. 200	Resident	Breeds within the Safari's boundary, in lower tablelands
49	Common Myna *Acridotheres tristis*	15	Resident	One of the 1st breeders in Safari area, introduced
Family Cisticolidae				
50	Graceful Prinia *Prinia gracilis*	10	Resident	2 pairs bred

Family Muscicapidae				
51	Rufous-tailed Rock-Thrush *Monticola saxitilis*	1	Migrant	In 2016
52	Spotted Flycatcher *Muscicapa striata*	1	Migrant	Stayed for 2 days in 2016
53	Black Redstart *Phoenicurus ochruros*	2	Migrant	
Family Nectariniidae				
54	Purple Sunbird *Cinnyris asiaticus*	20	Resident	One of the 1st breeders in Safari
Family Emberizidae				
55	Ortolan Bunting *Emberiza hortulana*	6	Migrant	Spring 2016
Family Passeridae				
56	House Sparrow *Passer domesticus*	100+	Resident	One of the 1st breeders in Safari
Family Estrildidae				
57	Indian Silverbill *Euodice malabarica*	30	Resident	One of the 1st breeders in the Safari site
Family Motacillidae				
58	White Wagtail *Motacilla alba*	8	Migrant, winter visitor	

A Blue-cheeked Bee-eater, a summer migrant breeder

A view of the African segment of the Safari Village of Dubai Safari.

A small flock of Black-winged Stilts that have become resident in Dubai Safari.

Indian Roller

A Red-wattled Lapwing nest

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The UAE in World War Two: A forgotten fatal air crash in Sharjah

by Ali Iqbal, Peter Hellyer and Laurence Garey

A general view of terrain in the area of the site of the crash of BA101 (Ali Iqbal)

Although in recent years there has been an increasing amount of research undertaken into the history and heritage of the United Arab Emirates, one relatively recent period has surprisingly, as yet, failed to attract significant attention, at least in terms of publication in English, — that covering the years of the Second World War, from 1939-1945. Extensive data available in British archives from the period provide insights into the economic situation, some of which has been published in Bowardi & Hellyer (2005) [**1**], although more publication is required.

This paper, together with Iqbal & Hellyer (2017) and Garey (2017), seeks to provide further information on the way in which the conflict itself impinged upon the country, with a number of casualties being recorded, both German and Italian and among Allied forces, although there was no fighting within the UAE itself.

The German and Italian casualties occurred as a result of anti-submarine activity offshore (Iqbal & Hellyer 2017). Other recorded military casualties during the War appear to have been confined to Allied Forces, including both the British and American, and to have been the result of air crashes, rather than of enemy action.

Several of these crashes have previously been reported (Garey & Hellyer 2004; 2005) [**2**] [**3**]. These include a civilian HP-42 airliner belonging to the British airline BOAC, carrying government officials and military officers, which disappeared en route from Jiwani, Pakistan, to Sharjah in March 1940, an RAF Wellington bomber which crashed near Dhadnah, Fujairah, in February 1943, with its navigator, Sergeant William Donnelly, dying of his injuries, and a C46 Curtiss Commando of the US Army Air Force with three crew members, which crashed near Dubai in July 1945, with the death of all on board. Subsequent investigations have identified the site of the Dhadnah crash, now marked by a memorial to Sgt. Donnelly [**4**]. Until now, Sgt. Donnelly was the only British and Empire (Commonwealth) World War Two serviceman whose death in the UAE had been published. This paper adds three more names to the casualty list.

For several years, a project by the British Library in London has been working on digitising and publishing records from the former (British) India Office Library relating to the Arabian Gulf, many of these records now being available in searchable format. During research into these records undertaken by **AI**, details on some previously unpublished World War Two plane crashes in the UAE have been identified, with further information being collected from a variety of other sources, including the UK-based Commonwealth War Graves Commission and the RAF Museum, this being supplemented by information supplied by Robert Quirk, who manages a website dedicated to RAF squadrons and other Second World War history: (http://www.rquirk.com/med/244sqn/244sqn.html)

As a result of this research, information has now been collected on three previously unpublished crashes by Bristol Blenheim (also known as the Bisley) aircraft in the UAE in 1943. In two crashes, in Umm al-Qaiwain (in July) and Sharjah, (in December) there were no casualties [**5**]. The crash in Umm al-Qaiwain was due to engine failure after a successful convoy escort [**6**]. The aircraft involved

Another general view of terrain in the area of the site of the crash of BA101 (Ali Iqbal)

in the Sharjah air crash ditched in the water, during bombing practice, presumably close enough to land as the survivors were able to swim ashore unhurt [**7**].

In the third crash, however, on 1st February 1943, three people died.

Bristol Blenheim Mark V, serial number BA101, belonging to 244 Squadron, was on its way from Sharjah to Jask on the Persian (Iranian) coast when it crashed "approximately 35 miles north East of Sharjah" [**8**].The purpose of the flight has not yet been determined, but the RAF maintained a base at Jask during the War.

Stanley-Price (2012) notes that the Blenheim V (Bisley) aircraft "had suffered from protracted storage in the region and had a tendency towards engine failure and the collapse of the undercarriage." [**9**].

Data provided by the RAF Museum in the UK state that 'failure of the port engine' led the pilot to make a forced landing, during which the plane overturned [**10**]. Of the five people on board, three died, Sergeant Anthony Henry Williams, the pilot, Flight Sergeant William James Hubbard, the navigator, and a passenger, First Lieutenant the Hon. Alan (also known as Allen) Balzano Hailey, of the Royal Pioneer Corps, who was Officer Commanding the detachment of the RAF Levies in Sharjah and Dubai [**11**] [**12**].

The recorded location of the crash is mentioned multiple times in correspondence provided to **AI** by the Commonwealth War Graves Commission. Two of the locations mentioned are in latitude and longitude and the other two in bearing and distance, presumably from the RAF base at Sharjah, now the Al Mahatta Museum. While the positions vary slightly, they are all within four or five kilometres of each other, within the Emirate of Sharjah and a few kilometres due west of Falaj al-Mu'alla.

The three casualties were buried next to the plane, according to information provided to **AI** by the Commonwealth War Graves Commission:

"Having looked into our archival information, I can confirm that the grave of the Honourable Lieutenant Alan Balzani (*sic*) Hailey was originally known to have been buried at an isolated spot in the desert near Sharjah Trucial Oman, next to his crashed aircraft, 25 miles on a bearing of 98° from Sharjah 25°- 20°N - 55° 45° E. He was known to have been buried next to Flight Sergeant W J Hubbard and Squadron Leader (*sic*) A H Williams from the same aircraft [**13**]."

There were two survivors, A.C.2 (Flight Mechanic) I.T. Crook and Sergeant Bernard Lee Landon, Wireless Operator/Air Gunner [**12**].

The aftermath of the crash is recorded in several documents. Crook appears to have been injured only slightly, unlike Landon. Staying at the crash site overnight, he then set out the next morning, helping his more-severely injured colleague, eventually encountering a local tribesman, Mohammed bin Lahij, who took them to his tent a few miles away. There his wife gave them shelter, while Mohammed bin Lahij, borrowing a camel from another tribesman, Saif bin Qarad, rode to Sharjah to report the crash.

RAF personnel arrived the next day, 3rd February, giving medical assistance to Crook and his colleague, and also going to the crash site. Following a service by an RAF chaplain, crosses were erected on the graves, with photographs being taken, with later documentation recording that one had been sent to Hubbard's father, and the RAF personnel then returned to Sharjah [**14**]. Copies of the photographs have not been traced.

A few weeks later, a letter sent by Wing Commander W.E.H. Muir, from the Rear Air Headquarters, RAF Iraq and Persia, on behalf of the Air Vice Marshal Commanding, Royal Air Force: Iraq and Persia, to the (British) Political Agent at Sharjah on 20th March 1943 asked for a reward to be given to Mohammed bin Lahij.

Reward for Assistance to Crew of Wrecked Aircraft [8]

1. *The Air Officer Commanding has had under consideration the conduct of a Bedouin Arab and his wife who on the 2nd and 3rd February 1943,rendered assistance to the two survivors of a Bisley (sic) aircraft BA101, which had crashed 35 miles east north east of Sharjah.*
2. *The Bedouin Arab took the survivors a distance of several miles to his tent, where he and his wife gave them shelter for the night, while the Bedouin journeyed to Sharjah by camel to bring assistance. But for the intervention of these Bedouins, one if not both survivors would probably have perished.*
3. *As a mark of appreciation felt by the Royal Air Force for this kind and effective help, the Air Officer Commanding has directed the payment to the Bedouin concerned of a reward of 200 Rupees.*
4. *It is requested that you will be good enough to read and hand to him a translation of this letter."*

Crook subsequently received a Commendation from the Air Officer Commanding, Air Vice Marshal H.V. Champion de Crespigny, CB, MC, DFC, for his behaviour following the crash.

> The text for the Commendation noted that he "*was a passenger in an aircraft involved in a crash on 1st February last. In this accident, two members of the crew and one passenger lost their lives.*
>
> *Although he was injured, A.C.2 Crook attended to the surviving member of the crew, who was seriously injured, and on the following morning started to walk with him towards the nearest town. He finally arranged for a Bedouin to take a message to the nearest Royal Air Force Station, and to shelter himself and his companion until the rescue party arrived. This action probably resulted in the life of the third member of the crew being saved.*
>
> *The Air Officer Commanding has ordered that A.C.2 Crook be commended for his intelligent and courageous behaviour, and that this commendation should be published in Routine Orders, and entered in the airman's record.*" [**15**]

Another letter from the British Political Agent in Sharjah makes it clear that the provision of a reward pre-dated receipt of the letter from Wing Commander Muir:

> *"As I was made to understand that the reward was to be collected by donations I asked the R.A.F. (Sharjah) to give Muhammad bin Lahij Rs. 100/- only which they did on 3rd (February) as soon as they finished work on the crashed aircraft. I fed Muhammad and his brother for one day and also gave them food for the road. This human act of Muhammad in helping the two R.A.F. men for five miles and also coming to Sharjah in that wet and stormy day deserved more than what I had recommended. Also Saif bin Qarad who willingly offered his camel may be given a sum of Rs. 50/-.*
>
> *On 6th March Muhammad, his father and brother came to see me. I entertained them and then gave them Rs. 30/- and also little rice, dates and coffee for the road."*

The Political Agent also noted that he had previously contacted the tribes to urge them to provide support in the event of emergency:

> *"Few days before the crash of this Blenheim I toured the area around Dhaid and talked to many of the Bani Qatab, Khawatir and Tunaij tribes about the help which they should render to the R.A.F. and other British officials they may find in the desert and also to send me information about them at once.*" [**8**]

That tour clearly had the desired effect.

Following the end of the War, a search was made for the graves of Hailey, Hubbard and Williams, presumably making use of the location details cited above, with the objective of exhuming them and taking them to a larger, formal, cemetery, perhaps the one associated with the RAF base at Sharjah.

"However, units of the Army Graves Service could find no trace of this grave when searched the location in 1945. It is possible that any marker on the grave may have been lost due to sand-storms, or had been perhaps removed by persons unknown" [**13**].

A further unsuccessful attempt was made later, following a request from Hailey's father, while as late as December 1948, Hubbard's father was still writing to the CWGC's predecessor, the Imperial War Graves Commission, to enquire whether there had been any progress in finding the graves.

Little information has so far been traced about two of the casualties of the crash, but a significant amount of data about the third casualty, Lieutenant the Honourable Alan Balzano Hailey has been found.

Born in 1900, in Lahore, Punjab, he was the only son of a member of the (British) Indian Civil Service, William Malcolm Hailey, later 1st Baron Hailey, OM, GCSI, GCMG, GCIE, PC, and his wife, Andreina Alesandra Balzani, the daughter of Count Hannibale Balzani, an Italian count.

His father was one of the most important figures in British India in the period between the two World Wars, being Governor of the Punjab from 1924 to 1928 and then Governor of the United Provinces from 1928-1934. Knighted in 1921, he was elevated to the peerage in 1936 as Baron Hailey of Shahpur in the Punjab and Newport Pagnell in the County of Buckingham.

During his service as Governor of United Provinces, India's oldest national park was created, initially known as Hailey National Park. It was later renamed Jim Corbett National Park.

The rest of his career was devoted to Africa, producing the influential 'African Survey' in the 1930s for the British Government [**16**].

Lord Hailey also served on the League of Nations Permanent Mandates Commission, which, in the inter-war years, was engaged in overseeing the governance of several former German colonies in Africa, such as Tanganyika, under British rule after 1918, and elsewhere [**17**].

Lord Hailey was not the only member of his family with a close connection to India.

His brother, Hammett Hailey C.I.E., C.B.E, spent his career in the Indian Civil Service, being awarded his C.I.E. (Companion of the Most Eminent Order of the Indian Empire) and his C.B.E. in 1919, while Director of Land Records and Agriculture, United Provinces [**18**].

Writing as H.R.C. Hailey, he was the author of numerous papers on aspects of Indian development, as well as a chapter on The Finances of India – 1858-1918, published in The Cambridge History of the British Empire, Vol. 5, published in 1929 (J.H. Rose [ed.], and republished in *The Cambridge History of India: The Indian Empire, 1858-1918* (H.H. Dodwell, *[ed.])* and in *The Cambridge History of India in 1960 (*M. Wheeler *[ed.]*).

One of Hammett's sons, Major Philip Cotes Hailey, O.B.E., joined the Indian Army in 1923 [**19**], being attached to the 18th Royal Gharwal Rifles as a 2nd Lieutenant in 1924 [20] and subsequently being placed on the Supplementary List of the Indian Army in 1932, as a captain [**21**]. In the Second World War, he served in the Intelligence Corps, rising to the rank of major, before being placed on the Indian Army Special List from which he retired in 1951 [**22**].

Like his father and uncle, he also served in the Indian Civil Service, one post, in 1946, being that of Political Agent, Western Kathiawar Agency, Rajkot [**23**].

Another of Hammett's sons, John Malcolm Hailey, joined the Royal Regiment of Artillery and served in Europe during the Second World War, winning a D.S.O.in Normandy, France after the D-Day Invasion in 1944 and retiring with the rank of Brigadier [**24**].

Lt. Alan Hailey too began his career in India. Educated at Rugby School between 1914-1916 and then, like his father, at Corpus Christi College, Oxford University, Alan Hailey volunteered for the Indian Armed Forces in 1917 but was turned down on health grounds, having failed his eye test. He remained at Corpus Christi until 1919, when he was summoned back to India by his father [**25**], being recorded as a passenger on the 'Chindwara', owned by the British-India Steam Navigation Company, now P & O, which left the UK on 30th January 1919, bound for Calcutta. There he worked for the Mines Survey branch of Bird & Co., a company founded in 1864 that still survives, though is it is now government-owned [**25**].

Somewhat confusingly, Hailey was gazetted as a temporary Second Lieutenant in the Oxfordshire and Buckinghamshire Light Infantry, OBLI, in March 1919, after he had arrived in India [**26**].

The OBLI had close relations with India, its 1st Battalion having been stationed in India at the outbreak of the First World War, as part of the 17th (Ahmednegar) Indian Brigade of the 6th (Poona) Division, Indian Army. It was later moved to Iraq, where it was among the British forces who surrendered at the battle of Kut al-Amara in 1916. A replacement battalion formed of reinforcements and details who were not captured remained in Iraq for the rest of the War. The Battalion sailed from Iraq to Bombay in March 1919, arriving in England in April [**27**].

However, the 1st (Garrison) Battalion of the OBLI, formed in England in 1915, was moved to India in February 1916, where it remained for the rest of the conflict and into the early post-war years.

Garrison Battalions were comprised of soldiers who were unsuitable for front-line duty, and were sent to various parts of the British Empire to release soldiers fit for the front-line [**28**]. It seems probable, therefore, that, upon arriving in India early in 1919, Hailey volunteered for the OBLI 1st Garrison Battalion, his acceptance being formalised by the announcement in March in London that he had been gazetted as a temporary 2nd Lieutenant. His poor eyesight may not have been considered a barrier to his recruitment to a Garrison Battalion.

The April 1919 Indian Army List shows 18 such battalions, including that of the OBLI, some of which served in the 3rd Afghan War of that year. Whether or not Hailey served in that conflict has not yet been confirmed. Nor has his period of work for Bird & Co. been identified.

This phase of his career certainly did not last long, for he appears to have transferred out of the Oxford and Bucks the next year, being gazetted in August 1920 as a temporary Second Lieutenant in the Infantry of the Indian Army Reserve of Officers (The Quarterly Indian Army List, 1921) [**29**].

He then returned to London where he subsequently qualified as a solicitor, although little has been traced of his work in the 1920s and 1930s.

Following the outbreak of the Second World War, Hailey volunteered for the armed forces. Initially serving in the Middlesex Regiment, where he became a Sergeant, he was transferred to the Kensington Regiment of the Royal Pioneer Corps as a Second Lieutenant on 27th April 1941 [**30**].

By late 1942, he had arrived in the Middle East, and, as a First Lieutenant, (the date of his promotion has yet to be ascertained), was subsequently seconded to the Iraq Levies as the officer commanding of the detachments in Dubai and Sharjah [**11**].

The Iraq Levies, or the Assyrian Levies, as they were often known, because they eventually became dominated by recruits from Iraq's Assyrian minority, were a British-officered force set up at the end of the First World War to guard RAF bases in Iraq.

In early 1942, there was extensive discussion between the British military and civilian authorities in London, Cairo, Delhi and Baghdad, in particular, about the need for the force to be expanded to provide protection for other RAF bases throughout the region. One issue of concern was the suitability of using an Iraqi-raised force outside Iraq, while there were also concerns that the Government of Iraq might object. It was eventually decided that new recruits should be sought from the Gulf states, for service in Kuwait, Bahrain, Muscat, Sharjah and Dubai, with

The locations mentioned in the British records have been roughly plotted on this map.

Possible Locations for Crash Site indicated by the yellow stars

other recruits being sought from Persia and British-ruled Baluchistan (now part of Pakistan) for service at the RAF base at Jask, on the southern Iranian coast.

It was noted that recruits from the Gulf were to be used "solely for the defence of Gulf aerodromes"[**31**]

The name of the force was formally changed in March 1943, after Hailey's death, to the RAF Levies, in acknowledgement of the fact that their sphere of operations was no longer confined to Iraq. The original suggestion of the change of name came in early 1942 from the Air Officer Commanding.

Four companies were raised in the Gulf, 3 Arab Company of the Levies serving in Sharjah and 5 Arab Company in Dubai, these forming part of 6 Battalion. They remained in Sharjah and Dubai until a few months after the end of the war.

However, there appear also to have been Assyrian (and Yezidi) companies of the Levies which served in Sharjah, the website http://assyrianlevies.info/history.html stating that on 1st August 1945 that the 29th Assyrian/ Yezidi Company, the 29th Assyrian/Yezidi Squadron, 2 flights of the 19th Assyrian Squadron and 2 platoons of the 19th Assyrian Company, all from the 5th Battalion of the Levies, were stationed at Sharjah. The rest of the 19th Assyrian Company and 19th Assyrian Squadron were based at Jask.

Further research is required to determine whether these units were in Sharjah and Dubai at the time that Lt. Hailey was commanding officer.

The name of Lt. the Honourable Allen Hailey is inscribed on the CWGC 1939-1945 Brookwood Memorial in Britain, which commemorates nearly 3,500 men and women of the land forces of Britain and the Empire who died during the Second World War and have no known grave, the circumstances of their death being such that they could not appropriately be commemorated on any of the campaign memorials in the various theatres of war. As the son of a peer, his name also appears of a list of war dead in the Royal Gallery in the British Houses of Parliament.

The names of Hubbard and Williams, like that of Sgt. Donnelly, who died in the February 1943 crash at Dhadnah, are inscribed on a memorial at Al Alamein, in Egypt, erected to commemorate British and Commonwealth airmen who died in the Middle East, Greece, Somalia, Sudan and East Africa during the War but who have no known grave.

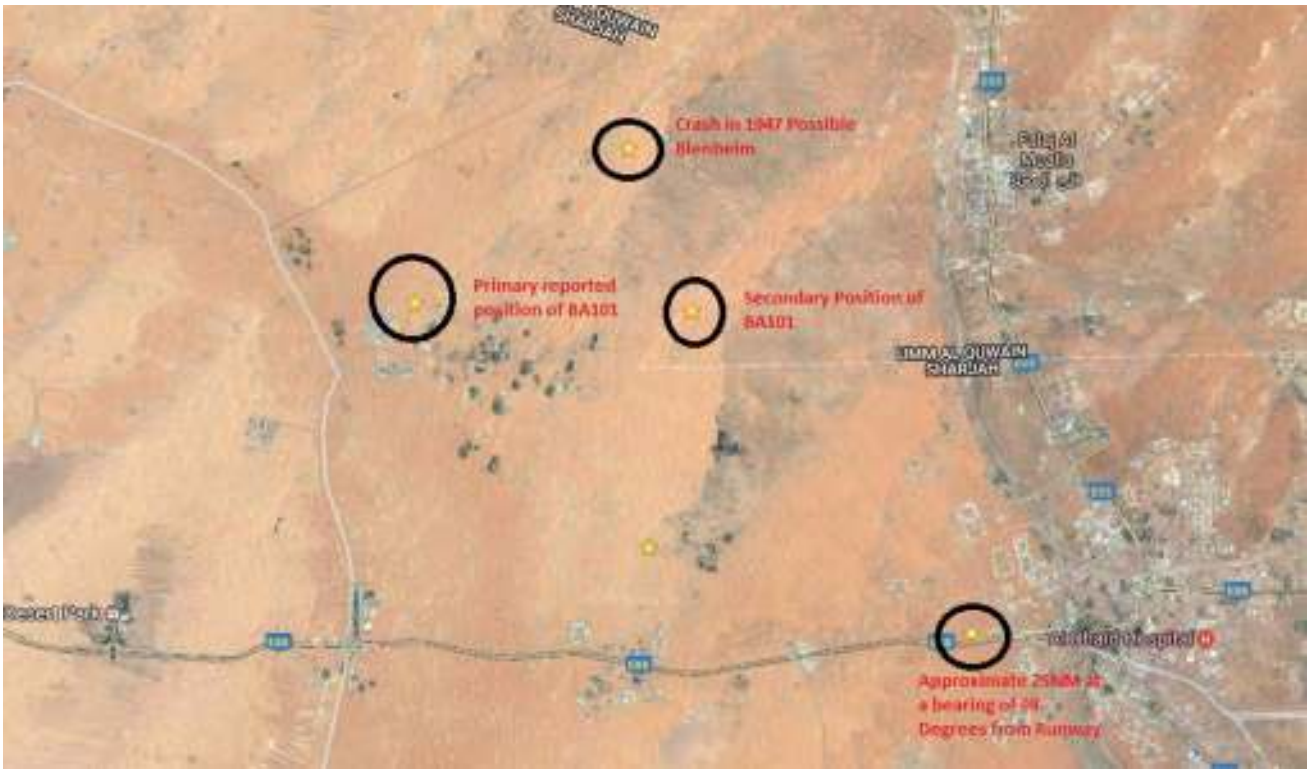
Following the crash, the then Ruler of Sharjah, Sheikh Sultan bin Saqr Al Qasimi, sent a letter of condolences to Lord Hailey, through the British Political Resident in the Gulf, receiving a note of acknowledgement in reply. While documents in the UK National Archives and in the possession of the Commonwealth War Graves Commission refer to these letters, the texts have not been traced [**32**]. Ruler since 1924, Sheikh Sultan may well have been aware of Lord Hailey's illustrious career in India.

In April 2017, following the collection of the majority of the data mentioned above, **AI** spent several hours visiting the general area of the crash to try to identify the location. The terrain was characterised by low mobile sand-dunes, interspersed with trees.

No trace of the crash was identified.

However, prior to recent research by **AI** and **PH**, Laurence Garey (**LG**) had been asked by Hazelle Page from Sharjah's Al Mahatta Museum to identify remnants of a crashed aircraft in their possession that had been found on a farm in the vicinity of the area marked on the map above. There was also a handwritten note in Arabic which the farm owner had which said "It had three people in it. None died in it. They were carried to Sharjah's Al Mahatta on camels. Pots and pans were made out of it. 1947. Civilian plane coloured white. 52" .

WW2 Related Sites:



After enquiries made by LG on The Aviation Forum (www.keypublishing.com) the consensus was that the main part in the possession of the Al Mahatta Museum was an undercarriage frame from a Bristol Blenheim. This was confirmed by comparison with photographs of similar wreckage found in England and Libya, as well as consultation with the relevant Air Publication (AP1530B, Vol 1, Sect 7, Chap 4, Undercarriage structure, Fig 2). However, the date of 1947 could not be correct, for the Blenheim was out of service well before then.

There were two marks of Blenheim with 244 Squadron at Sharjah in 1942-1943, the Mark IV and the ill-reputed Mark V (Bisley). No Blenheim IV (the commonest version) is recorded as crashing in that area in 1942 or 1943.

However, citing the records of the RAF Museum, Hendon, the 244 Squadron Newsletter [**33**] confirmed that BA101 had, indeed, crashed in this area in 1943. The Newsletter states that eight Bisleys had crashed during this period, including BA101, which "Crashed in forced landing 35 miles N.E. of Sharjah 1/2/43."

This leaves the discrepancy of the Arabic note with the date 1947, and "white civilian" aircraft, whereas 244 Squadron's Bisleys were camouflaged. We can only assume that the eye witness evidence may not be reliable.

Local inhabitants now know the site of the crash as Nad At Tayyara or "The Mound of the Aircraft".

On 30th December 2017, Ali Iqbal, accompanied by Dr. Saif Bedwawi of the UAE Military Museum and Hazelle Page, visited the crash site with a local farmer. Small pieces of debris from the plane were still visible, with a few pieces being collected for the Sharjah Museums Department, although nothing to identify the graves of the three casualties was identified.

The farmer and his father said that the daughter of Mohammed bin Lahij is still alive, and Dr. Bedwawi will contact her to enquire if any photographs of her late father are available.

A further search for the graves is planned.

The identification of the three casualties from the BA101 crash now brings the number of British and Empire / Commonwealth servicemen known to have died on active service in the United Arab Emirates during the Second World War to four, with at least two further Allied airmen, from the United States, also known to have died. Of these, the only army officer was Lieutenant the Hon. Alan Hailey, with the other British casualties being from the Royal Air Force, all Sergeants.

Three other casualties occurred outside the UAE and its adjacent waters but which should be mentioned because they were members of the Sharjah-based 244 Squadron of the RAF.

On 17th September 1942, a Blenheim, No. Z7418, took off from RAF Sharjah for a regular Anti-Submarine Patrol in the Gulf of Oman and adjacent waters off the coast of Iran. Data available in the 244 Squadron logbooks indicate that, while on patrol, the aircraft had sent a message to base requesting signal strength and acknowledged receipt. There were no further communications. An aerial search found no trace of the aircraft, which was presumed to have crashed in the sea.

On 23rd September, a report from the detachment of 244 Squadron based at Jask, on the Iranian coast, reported that a piece of floating rubber had been identified at sea, this subsequently being identified as part of the cover of a Blenheim fuel tank. Whether this was part of Z7418 was never confirmed.

The three-member crew lost in the crash were Pilot Officer Anthony Hollis Pontius and Sergeant Arthur Henry George Genny, from the Royal Air Force, and Sergeant Hunter Rutledge McGowan, from the Royal Australian

Air Force. They are commemorated on the El Alamein memorial in Egypt [34].

A number of other Allied servicemen are believed to have died at the Sharjah RAF base from various ailments, although no full list has yet been compiled.

At least one Emirati is also known to have died as a result of the war. “On 12th February (1943) an Arab of Sharjah was killed by a bomb during a practice by the R.A.F. The relatives were paid Rs. (Rupees) 400 and there were no repercussions” (Mishaps to R.A.F. aircraft).

Other documents further identify him as Khamis bin Said abas-Safi and say that he was seriously wounded by bomb splinters while going to cut grass on the bombing range and that he died of his injuries on 19th February (Mishaps to R.A.F. aircraft).

There is clearly scope for further research into this little-known period of the UAE’s recent history.

Acknowledgements

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The UAE in World War Two: The War at Sea

by Ali Iqbal and Peter Hellyer

The Commanding Officer of 244 Squadron RAF with the Sheikhs of Dubai and Sharjah. Picture courtesy of http://www.rquirk.com [5]

Although in recent years there has been an increasing amount of research undertaken into the history and heritage of the United Arab Emirates, one relatively recent period has surprisingly, as yet, failed to attract significant attention, at least in terms of publication in English, that covering the years of the Second World War, from 1939-1945.

This paper and two others in this volume, Iqbal, Hellyer and Garey (2017) and Garey (2017), seek to provide further information on the way in which the conflict itself impinged upon the country, although there was no fighting within the UAE itself. The focus of this paper is on the war at sea, with particular reference to maritime activity.

From the outset of the war, German submarines were active in the waters of the Gulf of Oman, including areas off the UAE's East Coast, and the Arabian Sea, threatening Allied shipping. A particular target was the shipments of oil coming down the Gulf from fields in Iran [**1**].

Following the entry of Italy into the war on 10th June 1940, Italian submarines that were part of the Red Sea Flotilla, based in the port of Massawa, in Italian-ruled Eritrea, joined the fray until the Allied defeat of the Italian forces in East Africa in November 1941.

Following Japan's entry into the war on 7th December 1941, Japanese submarines were also present in this part of the Indian Ocean until at least early 1944.

This paper reports on three submarines, one German, one Italian and one Japanese, known to have operated in the waters of the UAE or nearby, and presents previously unreported information and photographs that have recently come to light.

German submarine U-533

Although not the first chronologically, the fate of the German submarine, U-533, is most directly connected to the UAE because it was sunk by a plane of Britain's Royal Air Force flying from Sharjah.

This paper supplements and expands on the information contained in two previously-published articles, one on 18th December 2009 in Der Spiegel Online, by Dubai resident Bernhard Zand [**2**], and one by Vesela Todorova in The National [**3**].

Concern about the possibility of enemy submarines in the area was reflected in instructions from British Intelligence to monitor all shipments of distilled water from India to the Gulf, in the fear that this could be used to enable submarines to recharge their batteries [**1**],while in May 1943, concerns were voiced about Danish citizens operating a fish canning factory in the Iranian port of Bandar Abbas, because Denmark was at the time occupied by Germany [**1**].

A report in the records of the old (British) India Office, held at The British Library in London, suggests that there had been various sightings of U-boats from 1942 and 1943 off the coast near Ormara (Pakistan), Porbandar,

The U-533 commander: Kapitänleutnant Helmut Hennig [7]

India and Jask in Iran. These submarines were reported as having stopped and questioned dhows travelling to and from the Trucial States (now the UAE), presumably to gain knowledge of Allied shipping routes [**1**].

Reports of submarines in the region, all unconfirmed, continued as late as August 1944, with one referring to a group of one large and three small vessels seen by a pilot from the US Air Transport Command [**1**].

Because of the threats to Allied shipping coming down the Gulf, including tankers carrying oil that was much needed for the war effort, 244 Squadron of the British Royal Air Force, RAF, was based in Sharjah from 1942 to carry out maritime patrols and convoy escorts [**4**]. Between 1942 and 1944, the Squadron was equipped with Blenheim (also known as Bisley) light bombers.

On 16th October 1943, a Blenheim Mark V bomber of 244 Squadron, piloted by Sergeant Lewis William Chapman, of the RAF Volunteer Reserve, RAFVR, with Sergeants Bonynge and Murrell as crew, was patrolling off the UAE Coast when it found the German submarine U-533 on the surface around 50 nautical miles from Fujairah at co-ordinates 25 0 28 ' N, 56 0 50' E [**6**].

U-533 was a Type IXC/40 submarine, built in Hamburg and commissioned on 25th November 1942, under the command of Kapitänleutnant Helmut Hennig. After training with the 4th U-boat Flotilla in the Baltic Sea, U-533 was transferred to the 10th flotilla for front-line service on 1st May 1943.

On 15th April 1943, U-533 departed Kiel for its first patrol in the Atlantic, being attacked by Allied aircraft three times before arriving at her new home port of Lorient, in German-occupied France, on 24th May.

On 5th July, she commenced her second patrol, as part of the Monsun Gruppe (Monsoon Group) 'wolf pack' of German submarines assigned to operate in the Indian Ocean, setting sail from Lorient, through the Atlantic, around the Cape of Good Hope and up to the mouth of the Arabian Gulf.

Once sighted by Sergeant Chapman and his colleagues on 16th October, the U-boat rapidly dived, but the four 250 lb. depth charges dropped by the plane stove in the pressure hull. Of the crew of 53, only one survived: Matrosengefreiter (a rank roughly equivalent to Private First Class) Günther Schmidt, who was with an officer in the conning tower. The officer succeeded in opening the hatch, even though the submarine had sunk to a depth of 60 metres (200 ft). Without escape sets, the water pressure shot both men to the surface. Schmidt kept the unconscious officer afloat for an hour before he died. Schmidt swam and stayed afloat without a life jacket for 28 hours until he was rescued by HMIS Hiravati near Khor Fakkan [**2**].

Schmidt remained a Prisoner of War for the rest of the conflict, Stanley-Price [2012, p. 98] commenting that during his sojourn at Sharjah "Not only was the young German prisoner handsomely entertained in the camp but his presence also boosted (244) Squadron morale as a visible reminder that it was playing an active role in a war taking place far away" [**8**].

Sergeant Chapman was subsequently awarded the Distinguished Flying Medal, DFM, the citation reading:

Sergeant Lewis William CHAPMAN, Royal Air Force Volunteer Reserve, No. 244 Squadron. In October, 1943, this airman was the pilot of an aircraft which successfully attacked a U-boat during a patrol. His effort, brilliant in its execution, was worthy of great praise (The London Gazette, 1944).

Chapman was promoted to Pilot Officer on 20th June 1944 and died in July 1944, when a C-47 Douglas Dakota of 44 Squadron of the South African Air Force, SAF, in which he was a passenger, crashed into cliffs while trying to land at Salalah, Oman. He is commemorated on the Allied War Memorial at El Alamein, in Egypt [**5**].

The wreck of the U-533 still lies at a depth of over 100 metres offshore and has been visited by divers (Vesela Todorova, 2015). It was the only German submarine to be sunk in the Arabian Sea during the Second World War. Jeffery Catanjal a diving instructor based in Fujairah, has dived to the U 533 on several occasions, and has mentioned the technical expertise required to dive to that depth, mentioning a bottom time of only 12 minutes to explore the wreck on each dive (*pers.comm*.)

The story of the U-533 has been incorporated into the Internet-based game of 'geocaching', described as a real-world, outdoor treasure hunting game using GPS-enabled devices. Participants navigate to a specific set of GPS coordinates and then attempt to find the geocache (container) hidden at that location" (https://www.geocaching.com/guide/)

One such geocache buried in Abu Dhabi is linked to an imaginative tale suggesting that the U-533 called into Abu Dhabi before it was sunk, with the captain and another officer burying a box containing 'Nazi Gold' in Sharjah, where, the tale suggests, they were discovered in 1994. https://www.geocaching.com/geocache/GC3W8GY_find-the-nazi-gold?guid=9f517883-3cc8-43a6-b655-fbafe9c4fef1

German submarines continued to be active in the Indian Ocean in late 1943 and early 1944 though no details of any further operations offshore of the UAE's East Coast have yet been traced.

Picture: Gunther Schmidt, the survivor from U-533, photographed by Sergeant William Henry Chapman of 244 Squadron. Picture provided to Robert Quirk, editor of the '244 Newsletter', by Chapman's daughter. Published by kind permission of Robert Quirk. The picture has the notation on the back: "Hermann Fritz, Only survivor from sub sunk by 244 Squadron 16th Oct 1943, picked up 18th Oct 1943. Sunk by Chapman" [**5**]

Both names represent nicknames commonly used by British servicemen for Germans, rather than Schmidt's name.

Italian submarine 'Luigi Galvani'

The U-533, however, was not the first submarine known to have been active in waters off the UAE. An earlier encounter, also involving a sinking, occurred in the summer of 1940 and involved an Italian submarine, the 'Luigi Galvani', captained by Lieutenant Commander Renato Spano and part of a flotilla operating out of the port of Massawa, in Eritrea, then an Italian colony.

One of five Brin-class submarines and built in 1938, it departed Massawa on 10th June 1940, with orders to reach the Gulf of Oman by 23rd June, where it was to operate within an eight mile radius at the head of the Gulf of Oman, close to the Straits of Hormuz. Unfortunately – for the Luigi Galvani – before it arrived, the British were already aware of its destination.

On 18th June, another Italian submarine, the Galileo Galilei, part of the same flotilla, operating off Aden, was seen by a (British) Royal Air Force fighter-plane. Although it dived when Royal Navy ships appeared on the scene, it was re-located the next morning, 19th June, by an armed British trawler, the HMS Moonstone. In the encounter that followed, involving depth charges and, later, gunfire when the submarine surfaced, the Galileo Galilei surrendered, being taken into Aden Harbour under her own power, flying the British 'White Ensign'.

An inspection of her sailing orders provided details of the mission assigned to the 'Luigi Galvani', allowing the British to search for her.

A November 2015 article on the website http://ww2talk.com presents the encounter from a British point of view [**10**] .

As it was suspected that this (the 'Luigi Galvani') might be a mine-laying vessel, British and Norwegian shipping was diverted, and H.M.S. " Falmouth " and H.M.S. " Kimberley " (on passage from Bombay) were ordered to proceed to the U-Boat's operational area. At 2257 on 23rd June, when in position 25° 55' N, 56° 55' E, just inside the operational area, H.M.S. " Falmouth "sighted a darkened object fine on the port bow, at a range of miles. She altered course to close the position and confirmed that a U-Boat on the surface was steaming slowly from port to starboard at an inclination of 110° right. The Commanding Officer of "Falmouth " decided to hold fire and approach as close as possible unseen : when the range was about 600 yards, as the ship could not remain unseen any longer, "Falmouth " made the challenge and opened fire with the foremost 4-in. gun at 2308. The U-Boat was seen to be hit aft at the third round, but it was not possible to estimate the damage caused at this stage, or see other hits, owing to the blinding gun flash. She then submerged, moving rapidly across "Falmouth's " bow, with only the conning tower visible. "Falmouth " steered to ram and struck her abaft the conning tower, but the impact was light and it was considered that the pressure hull was not touched. On passing over the vessel "Falmouth " fired three depth charges, two set at 100 ft. and one at 150 ft., which forced the U-Boat to the surface. First the bow appeared at a vertical angle, then she gradually righted herself and assumed a comparatively even trim with her conning tower and casing above the water. During this period two further 4-in. hits and a number of hits from the 3-pdr. guns were made. Members of the crew quickly emerged from the conning tower waving white clothing, and "Falmouth " ceased fire. The U-Boat then lost trim and sank by the stern. "Falmouth's" boats picked up the Commanding Officer, three officers and 27 ratings. Twenty-six of the total complement including three officers were lost, of these some sank before the lifeboats reached them and the remainder went down in their ship. "Kimberley " also had closed and lowered a boat to search for survivors.

It was subsequently established that the first round fired by "Falmouth" fell short, and the ricochet passed through the conning tower, killing the coxswain. The third round pierced the pressure hull and burst in the motor room. Survivors stated that the effect of the depth charges was to blow the U-Boat to the surface and that without this help it might not have been possible to regain the surface as the after part of the boat was filling rapidly. An Italian Officer stated that "Falmouth" was not sighted until the challenge was made. Although the sloop approached up moon, it is considered that a very poor look-out must have been kept in the U-Boat .

http://ww2talk.com/index.php?threads/h-m-trawler-moonstone-and-the-capture-of-an-italian-submarine-june-1940.56890/

An article by Italian author Cristiano D'Adamo on a website" Regia Marina" covering the activities of the Italian Navy during the Second World War http://www.regiamarina.net/detail_text_with_list.asp?nid=84&lid=1&cid=22 provides further information and also reproduces a report written by the Luigi Galvani's captain, Lt.-Commander Spanio, after the war [**11**].

The corvette H.M.S. Falmouth and the destroyer H.M.S. Kimberley were immediately dispatched to the area. The evening of June 23rd, unaware of the situation, the Galvani entered the gulf and the usual tanker traffic was completely absent; thereafter, the vessel was sighted by the corvette Falmouth. The official British report states that the crew of the Falmouth sighted a shadow at about two and one half miles and moved closer to identify it, discovering it was a submarine proceeding on the surface. The report continues:

"At 23:08 at about 600 yards, the Falmouth signaled "who's there", and then open fire with the 4" gun".

Lieutenant Commander (capitano di corvetta) Renato Spano, the captain of the Galvani, immediately ordered a crash dive, but while the boat was slow in submerging, and the stern section was still visibly out of the water and was hit by one of the shells. At this point, with the resistant hull badly compromised, chief 2nd class torpedoman Pietro Venuti (from the town of Codroipo, Udine) evacuated the aft torpedo room, locked himself in, and sealed the water-tight hatch. Immediately after, the Falmouth brought itself closer to the wounded submarine discharging a well-placed series of depth charges, which caused enormous damage.

With the realization that the boat was lost, but some of the crew could still be saved, the captain order the boat to the surface, but this was achieved only with great difficulties, probably due to the several tons of water aboard and the damage to the control equipment. Of the original crew of fifty-seven, 31 are saved by the British vessels, while the remaining 26, including three officers, disappear with the Galvani.

At the end of the conflict, Captain Spano wrote a report narrating the events that brought about the loss of the Galvani:

(English as per original)

"At 2:09 of June 24th, according to our estimations, we were at about 50 miles for 130° from Little Qoin, when midshipman Car, subordinate to the navigating officer, sighted a shadow starboard of the bow. I recognized the silhouette of a ship with Beta 10° to starboard with polar bearing 45° at a distance of 7-800 meters. We crash dove with a concurrent turn to port, while the enemy opened fire with all guns and a projectile exploded aft of the bridge. While diving, I heard another projectile explode on bridge; I shut the water-thigh hatch. While the submarine was submerging with a strong inclination forward and with the diving plains down, I experienced a sudden heeling over which corrected itself. I believe that the enemy's hull almost touched our aft stays which, at that point, were about 2 to 3 meters below surface. A few second later, with the boat down by the bow at a depth of about 30 meters, a lifted some of the aft planes and at the same time the submarine was violently shaken by a nearby explosion of a cluster of depth charges. While the stern kept going down, I ascertained the following damage: No lights – rudder and plans were frozen - manometers were broken – removal of the main control panel in the control room and projection of this into the middle of the room – starboard electric motor went down to 600 rpm, while the port one stopped – I could not communicate with the other compartments. Since we were down 40° aft, I had the strong feeling that the boat was lost. I decided to emerge blowing all tanks. The submarine responded with great difficulty emerging only in part. I ordered the hatch open while the gunners came up to the cunning tower. I follow them and I reminded the midshipman to destroy all codebooks. As soon as I was out, I made the following observations: Aft, to port, a destroyer – the submarine had the "T" of the post of aft antenna truncated – a great gash on deck – the water was up to the aft hatch, while the boat started sinking again. Realizing that I did not have the time to arm the gun and open fire due to the heavy listing, I ordered the crew on deck and those who were already there were told to abandon ship. Lieutenant Mondaini, walking through the gash in the plating, went forward to open the hatch from which the personnel of the aft compartments escaped. The water was almost at the hatch of the cunning tower. No one came up to the deck, nor anyone replied to my calls inside the submarine. I assumed that no one was left behind, and I ordered the personnel grouped aft to jump into the water while the ocean starts pouring into the cunning tower's hatch. It was 02:17. I had just left the boat when it came upright with about 8 meters of the bow sticking out of the water, and then it rapidly sunk. Since come to surface, the boat had not remained afloat for more than two minutes. Meantime, the British gunboat had lowered two lifeboats which picked up the shipwrecked. I made sure that no one was still in the water, and then I also got aboard the lifeboat. Aboard the gunboat Falmouth, I made a roll call and I realized that 26 men were missing, including Captain (EN) Torzuoli, Lieutenant (EN) Bassetti, and midshipman Gemignani. The survivors were 31, including 4 officers."

The wreck of the Luigi Galvani has been located

http://www.wrecksite.eu/wreck.aspx?103623

According to the website, the submarine lies in the Gulf of Oman and to date, there is no evidence that the wreck has been reached by divers, although it is reported to have been used for sonar practice some years ago [**14**]. In recent years the Italian navy has named one of its submarines after Venuti [**15**].

Picture: Pietro Venuti [**13**]

Japanese submarine I-27

The third submarine known to have been engaged in waters off the UAE was Japanese which, during its patrol in the immediate area, caused the only damage to Allied shipping so far identified. It subsequently escaped.

http://www.defensemedianetwork.com/stories/nagumos-indian-ocean-raid/

Japan entered the Second World War on 7th December 1941, with its surprise attack on the US fleet at Pearl Harbour. Encouraged by their new Nazi allies, Japanese submarines entered the Indian Ocean in early 1942, taking part in a raid on Ceylon (Sir Lanka) in March, and then engaged in activities around Madagascar, which remained under the control of the Vichy French until November 1942.

After ceasing operations off south-eastern Africa and Madagascar, Japanese submarines, operating singly, continued to be active until early 1944 in other parts of the Indian Ocean. One, at least, operated in waters off the United Arab Emirates, the Type B-1 class I-27. Between its commissioning in February 1942 and its sinking in February 1944, I-27 was credited with sinking 12 ships and damaging a further 3, making it one of the most successful Japanese submarines during the war. It was nearly 109 metres long with a surface displacement of 2,631 tonnes. Like many of the large Japanese submarines, it carried a float plane.

It commenced activity in the Pacific Ocean, being engaged in the raid on Sydney, Australia, at the end of May 1942 and obtaining its first 'kill' on 4th June, off Australia [**16**].

Later in the year, it was assigned to the Indian Ocean, sinking a British steamer, Ocean Vintage, 80 miles east of Masirah, Oman, on 22nd October. Later that year, a new captain, Commander Fukumura, who was to become one of Japan's top-scoring submarine commanders, took command. On 20th March 1943, it sank the Fort Mumford a little over 500 km, west of Kerala, in southern India, followed by the Berokit, 400 miles south-west of Ceylon, on 7th May and a tanker, British Venture, 300 miles south of Reunion, on 24th June.

Four days later, it had arrived once again off Arabia, sinking the Norwegian vessel Dah Pu, off Muscat. By 3rd July, it had moved south-west, sinking the civilian transport Montanan around 150 km, south of the island of Masirah.

Moving northeast, it then encountered the PA44 convoy around 200 km. east of Kalba in the Gulf of Oman, on 5th July and torpedoed the US-flagged freighter Alcoa Inspector, coming from Abadan, Iran, at the head of the Arabian Gulf and en route for Montevideo.

The ship's crew, none of whom were injured or killed, were taken on board by the Royal Indian Navy minesweeper RINS Bengal, and the Alcoa Inspector was re-boarded the next day. The ship was eventually towed into Bandar Abbas by tugs from the Anglo-Iranian Oil Company, later BP, on 10th July. Its engines were later salvaged and used to propel the freighter Kinsman Independent on the Great Lakes of North America. The I-27 then returned to Penang, for maintenance and refuelling [**17**].

It returned to the region later in the year, sinking the Sambo in the Gulf of Aden on 10th November, the Sambridge, in the Arabian Sea, on 18th November, and, back in the Gulf of Aden, the Athina Livanos, on 29th November, and the Nitsa on 2nd December. On 3rd December, also in the Gulf of Aden, it damaged the Fort Comosum. It then returned to Penang at the end of December [**16**].

Returning to sea in January 1944, its last encounter was in the Maldives on 12th February 1944, where it encountered convoy KR-8 and torpedoed and sank the troopship Khedive Ismail [**18**]. Of the 1,511 people aboard, including 996 officers and men of the East African Artillery's 301st Field Regiment, as well as 54 nurses and 19 members of the many WRENS (Women's Royal Naval Service), only 214, including six women, survived. The sinking was the third largest loss of life from Allied shipping in World War II and the largest loss of servicewomen in the history of Britain and the rest of the Commonwealth [**18**].

Despite sheltering beneath survivors from the Khedive Ismail who were struggling in the water, the submarine was eventually forced to the surface by depth charges dropped by two destroyers escorting the convoy, HMS Paladin and HMS Petard, and was rammed and sunk. Only one of its crew of 100 survived

It is hoped that this paper and others in this volume of Tribulus will help to prompt further studies of the interesting, although peripheral, role played by the UAE in the Second World War.

Above and below: Pictures of the wreck of U-533. (Jeffery Catanjal)

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Crash of an American Flying Fortress at Shuweihat, 1944

by Laurence Garey

Abstract

On 22nd May 1944 a Boeing F-9B (the photographic reconnaissance version of the B-17 Flying Fortress bomber) was on a survey mission between Bahrain and Masirah, Oman. When close to Sir Yas Bani island, an engine fire developed and the pilot ordered the crew to bail out by parachute. Four of the six jumped successfully and were rescued the next day. As the pilot and photographer were about to jump, they saw that the fire was dying out so they returned to the cockpit and made a forced landing on the mainland beach near Shuweihat. They were uninjured and were rescued by launch, but the aircraft was flooded at high tide and written off.

Introduction

In 2004, Peter Hellyer and I described a number of accidents involving civil and military aircraft in the Trucial States during the Second World War [**1**]. Among these, we referred to an accident involving a Flying Fortress (B-17) that made a forced landing on the mainland opposite Sir Bani Yas (called 'Yas Island' in the available records) in May 1944. Recently a number of relevant records have been released by the British Library from the India Office archives in London which provide more details of this incident. [**2**]

Fig. 1. 26129 after its forced landing. It is relatively little damaged, except that the number 4 propeller (on the left in the picture) is missing and the others are bent back by the impact. Number 4 engine appears blackened by the fire.

New evidence

British Library/India Office archives

Of interest to us was File No. 7/11 "Flights of unidentified aircraft" containing 108 pages of notes, letters and telegrams. [**3**]

Document 27/108 is an unsigned, hand written note to the Sheikh of Abu Dhabi dated 22nd May 1944:

"This is to inform you that an aeroplane has force landed on the mainland near Yas Island. Before it landed four of the crew descended by parachute about half way between Abu Dhabi & Yas Island on the mainland near the coast. They have no water. Please send your men out immediately & search for them." There is also another hand written note (29/108) on headed notepaper of The Political Agency, Bahrain, in English and Arabic, requesting all concerned to help the four airmen get to Abu Dhabi, and promising a reward.

Still dated 22nd May 1944 (document 33/108), the Political Agent at Bahrain wrote to the Residency Agent at Sharjah, with copies to Royal Air Force (RAF) Sharjah and the Bahrain Air Liaison Officer to confirm the accident "this afternoon" (which corrects the date we originally noted as 2nd May 1944). The aircraft was based in Bahrain, and according to Document 102/108, dated 25th May 1944, it had taken off "at 1000 hrs local time and crashed at 1200 hrs". After four of the crew parachuted, some 50 to 60 miles east of Sir Bani Yas Island, the remaining two made a forced landing opposite the island. The Political Agent asks the Residency Agent to organise a search for the four lost crew members, by land, sea or air (the RAF had been asked to provide air transport if needed, with the cooperation of Squadron Leader Crossley). Happily, on 24th May, he informed Sharjah that the four men had been rescued.

Much of file 7/11 is devoted to trying to identify various aircraft that had been observed overflying unauthorised territory, particularly Saudi Arabia, and document 45/108 is a report of aircraft movements compiled by 43 Staging Post at Bahrain for the Officer Commanding the RAF station there. It deals with 22nd May and records, among others, "Fortress 26129" on a "Photo Flight to Persian Gulf". This enables us to identify it as US Army Air Force (USAAF) serial 42-6129 (i.e. dating from 1942). This aircraft, built by Lockheed-Vega at Burbank, started life as a B-17F bomber delivered in 1943, but was later modified for photographic reconnaissance and re-designated F-9B, with its bombing equipment and most of its armament removed and replaced by cameras. [**4**] It was indeed involved in a photo reconnaissance mission from Bahrain, apparently part of the Min Map Asia project. [**5**]

That same day two sister ships, 26135 and 26185, are reported as "Search (for missing B.17)". Two Dakota transports (one from the RAF, serial KG510, the other USAAF 694) are also reported as in the "Search".

Document 53/108, dated 30th May 1944, is a letter from Wing Commander HC Parker, the Bahrain Air Liaison Officer, to the Political Agent there. It transpires that two of the crew who parachuted, Lieutenants Simmons and

Yarock, had handed over cash, watches and rings to someone on the ground when they landed. In addition we learn (because he also paid some local people who helped him) that Wing Commander Anderson crashed a "D.H.89" some three miles from the F-9B. Presumably he had flown this RAF Dominie to help in the rescue of the American aviators and been caught out himself. There is copious subsequent correspondence, including some from Sheikh Shakhbut, Ruler of Abu Dhabi, about the return of the money, watches and rings, and even pistols and a sub-machine gun.

Document 73/108 is a translation of a letter dated 28th August 1944 from Sheikh Said Al Maktoum, Ruler of Dubai, concerning a boatman who was anchoring at Shuweihat when he saw an aircraft coming down over him. He and his brother and servant followed it and found two people, whom they assisted. They then "found the plane" from which emerged two other people, who told them to bring the first two to the aircraft, for which they promised a payment. Then the aircraft took off. Later they found a gun and a watch. This account is difficult to understand, as the four crew members who had parachuted were many miles away from the site of the crash near Shuweihat and the aircraft was written off [**6**] and never flew again, as we shall see later.

USAAF accident report

Fortunately we were able to obtain copies of the official records of the accident with formal reports by the crew and photographs of the wreck which clarify what happened that day. [**7**]

F-9B 42-6129 was attached to Deversoir Air Base near Ismailia in Egypt. It was in service with the 19th Photo Squadron of the 11th Photo Group, operating from Bahrain. The accident date is recorded as 22nd May 1944 in some of the documents, and as the 23rd in others, but the date of the 22nd emerges clearly from the British documents, cited above, and this seems to be the correct one.

The crew of six consisted of:

1st Lt Bruce L Miller, pilot
1st Lt John G Simmons, co-pilot
2nd Lt Edward Yarock, navigator
S/Sgt Paul M Beaulieu, radio operator
T/Sgt John L Paulsen, crew chief
T/Sgt Kenneth G Penney, photographer

At about 1040 local time, the aircraft was heading east from Bahrain to Masirah at some 20,000 feet, close to Sir Bani Yas Island, and the photographer was taking pictures. The pilot noticed fluctuations in number 4 engine (the outer engine on the starboard wing). He tried to feather the propeller (ie to rotate the blades to a position aligned with the flight path to reduce drag and stop rotation). However, this failed, even after several attempts. The crew saw oil spilling from the engine, developing into smoke and then fire, and efforts to extinguish it failed. The pilot asked the navigator for a heading to Sharjah, about 165 miles away, which he took up. They were losing height and feared that the aircraft might explode. He ordered the crew to bail out:

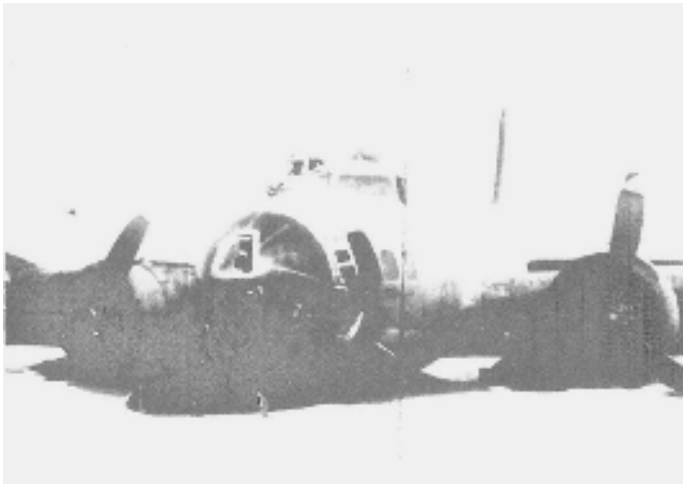

Fig. 2: Closer view of cockpit area showing the bent propellers and open hatch and pilot's window.

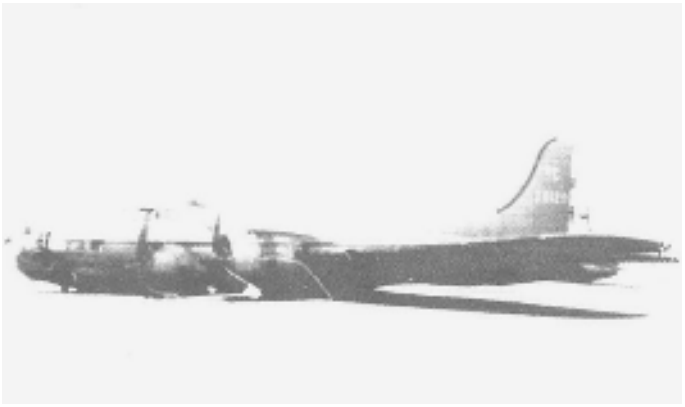

Fig. 3: Side view.

the co-pilot opened the exit hatch and jumped from about 12,000 feet, followed by the navigator.

The radio operator contacted another F-9B, 42-6135 flown by 1st Lt William F Moncrieff, that had taken off from Bahrain to assist its sister ship, to report that they were heading for Sharjah, and sent a mayday (distress) message. He then jumped from the tail exit, together with the crew chief. All four who used their parachutes were saved by a rescue party the next day, and saw the wrecked aircraft from the air as they flew over.

The pilot, after ordering the crew to jump, went to the hatch himself, believing he was alone aboard. But the photographer, Sgt Penney, was still in the nose and was due to jump next. He saw Lt Miller at the hatch, and they both noticed that the fire was less obvious, perhaps due to the high speed Miller had set up to try to control it. Miller took the controls again and told Penney to stay in the nose and direct them toward Sir Bani Yas Island where there was an emergency landing strip. They turned back west and Penney went to the waist hatch to throw out heavy equipment, after which he took the co-pilot's seat. He lowered the flaps, but not the undercarriage. They could only see rough terrain on the island, so they headed for the mainland and landed smoothly on the beach. Number 4 propeller flew off, but apart from the other propellers bending there was little damage (Figs. 1-3). They left through the pilots' windows, checked for fire, and then

radioed their situation. They destroyed the sensitive IFF (Identification Friend or Foe) equipment and various papers, keeping their small arms and ammunition with them. They were rescued by Royal Navy launch on the afternoon of 24th May together with some salvaged equipment.

In the end, the only serious injury was that Lt. Simmons broke his ankle. Although the aircraft was not badly damaged, the remoteness of the site and lack of facilities precluded its salvage, and arrangements were made for personnel to destroy the wreck. Lt Miller noted that at high tide the aircraft was in four feet of water.

Looking at the photograph of the tail (Fig. 4), we are struck by the damage to the fabric covering the control surfaces, the rudder and elevators. Assuming that the pictures were taken within a short time of the landing, it is difficult to understand why they are shredded. However, in some of the photographs it is clear that other personnel than the photographer are present near the wreck, and we may surmise that they had begun the destruction of the aircraft with the easily removed fabric covering the control surfaces.

It would be interesting to know if anything of the plane remains.

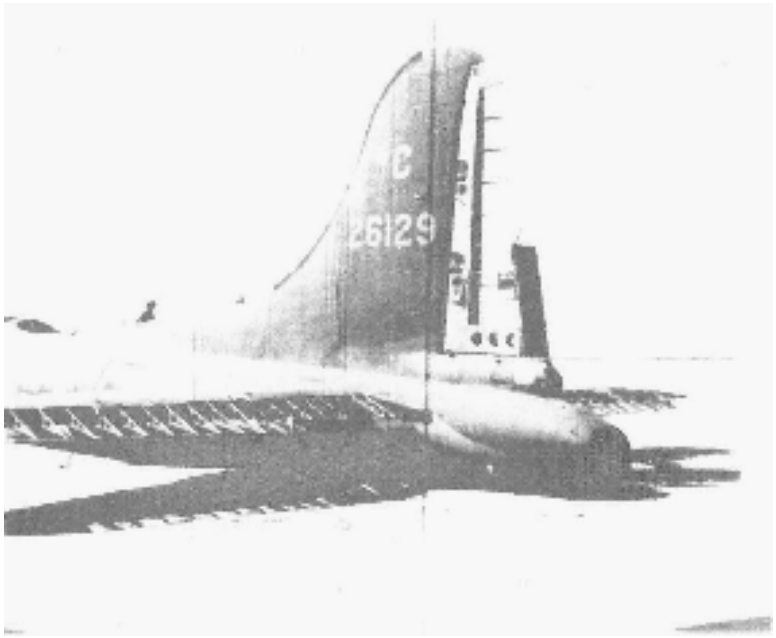

Fig. 4: The tail area with aircraft serial. It is not clear why the fabric of the rudder and elevators is damaged.

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‘Touring of the tougher variety‘ – a 1941 voyage from Dubai to Bahrain and back

by Peter Hellyer

Introduction

It has long been recognised that one of the most important sources for the history of the Gulf, at least over the last couple of hundred years, is the records of the former British Government’s India Office, now held at The British Library in London.

Though open to researchers, the records have been poorly catalogued and difficult to investigate. As a result, much information of value to historians has yet to be retrieved.

Over the last few years, however, many thousands of pages related to the Gulf have been digitised and catalogued, being made available for free download.

One document that has become available is a report by a former British Political Officer in Sharjah, C.J. (Cornelius James) Pelly of a trip by sea from Dubai to Bahrain and back in December 1941. This is reproduced below along with a report of a visit to Abu Dhabi and a note on a journey from Abu Dhabi to Sharjah by camel.

Born in Cork, Ireland in 1908, Pelly joined the Indian Civil Service in 1930, transferring to the Indian Political Service in 1937, and being posted to Sharjah as Political Officer – Trucial Coast, from 1941 to early 1942. He later served as Political Agent in Muscat, Kuwait and then Bahrain, from 1947-1952, transferring to the British diplomatic service in 1947, after the independence of India. He returned to Kuwait as Political Agent, from 1952-1955, and then became financial adviser to the Emir, Sheikh Abdullah bin Salim for a year, before abruptly being asked to leave following the Suez invasion of 1956. His last work in the region was as Secretary, Financial Affairs for the Sultan of Muscat and Oman from 1968 to 1970. Awarded the OBE (Officer of the Most Excellent Order of the British Empire) in 1944 and the CMG (Companion of the Order of St. Michael and St. George) in 1952, he died in 1985.

Pelly’s reports provide an interesting insight into life and travel in the Emirates in the early years of the Second World War.

Explanatory notes are in italics; spellings and grammar as in the original.

Tours of P.O.T.C in the months of December 1941 and January 1942

(by C.J. Pelly)

When P.A. (*the Political Agent in Bahrain*) was on tour in the Trucial Coast last December, he thought it would be worth trying to tour overland from here to Bahrein, and also mentioned that a good tour would be one to have a look at the islands in the Gulf, between here and Bahrein which are rarely visited by Political Officers. The first did not, as will appear from these notes, prove feasible; the second I carried out.The following is a diary of the attempt at the first and of the second.

11th December 1941. Sharjah to Abu Dhabi. On reaching Abu Dhabi, I was put up in the Sheikhs battered guesthouse. When he came to see me I broached my project of travelling overland by camel from Abu Dhabi to Sila’, a distance of about 200 miles, and asked the Sheikh’s help in the matter of providing camels. If it came off, I was to be met by a launch at Sila‘ which would take me to Bahrein. Sheikh Shakhbut seemed quite willing to help, but mystified as to why I should want to go by camel rather than by aeroplane. However he promised that the camels would be ready in a day or two day’s time.

12th December. In the morning the Sheikh confirmed his promise about the camels. Shortly after he left, his maternal uncle, Sheikh Hamid bin Buti, was announced, with the rider that he had come to see me about the camels. (*Sheikh Hamid was chief of the Qubaisat sub-section of the Bani Yas tribe; his sister, Sheikha Salama was the wife of Sheikh Sultan bin Zayed Al Nahyan, ruler from 1922 to1926, and mother of Sheikh Shakhbut and his three brothers, Hazza, Khalid and the youngest, Sheikh Zayed, ruler from 1966 to 2004 and 1st President of the UAE*).

After a lot of talk with him and some coming and going on his part, we agreed that I wanted eight animals as the march would be one of not less than eight days through country short of water and fodder. Bedou were to supply the camels and to come with them, with two of the Sheikh’s men as an escort. All seemed well until we started to discuss costs. Hamid bin Buti wanted me to pay Rs 40 for each camel and Rs 100 to each of the Sheikh’s men - i.e. the journey was to cost Rs. 520. in the first place. (In view of subsequent experiences I am sure that the cost would ultimately have been greater had I agreed to Sheikh Hamid’s initial terms). [*The main currency in use in the Trucial States at the time was the Indian rupee*].

Ultimately I stated to Sheikh Hamid that I could not undertake the journey at the cost he asked for transport, and I sent a message to Sheikh Shakhbut that I was returning to Sharjah that afternoon. I was taken at my word and allowed to go after the usual courtesies. Of course the Sheikh (*Shakhbut*) knew why I was leaving but he seemed unwilling to discuss, or rather, avoided the subject and I did not press it. I gathered that Sheikh Hamid has some influence over him, and that the same Sheikh Hamid is a man always anxious to drive a very hard bargain... This, and not any desire on the part of Sheikh Shakhbut to prevent me crossing his territory apparently explained the price demanded from me. Also it appears that wherever, as in Abu Dhabi the representatives of Oil Companie’s have travelled, the impression has been created among the Arabs that foreigners can afford prices beyond the

dreams of avarice. I arrived back in Sharjah late in the evening.

(*Sheikh Shakhbut had signed an onshore oil concession with Petroleum Concessions Limited, PCL, on 11th January 1939 and oil company survey parties had travelled widely throughout the emirate on several occasions during the mid-to-late 1930s. Guides had been hired, along with boats to transport motor vehicles to offshore islands).*

15th December. The only motor launch available in Dibai for the journey to Bahrein was one / 30 ft. long and a beam of 9 ft. with a "jolboat" hull (also known as *jalboot* or *jalbut*). It was used for carryng passengers to and from the steamers calling here, but I was told they regarded it as dangerous on account of it's smallness. It proved a very good sea boat but will never be used as a tender again. We motored in it, coasting along the shore, to Khor Ghanadah (Abu Dhabi territory) on the first day out. We arrived there too late to get into the Khor through the shoals but I had a look at it on

16th December. It seemed shallow, with two entrances, apparently around an island. We left there at 9 .a.m. on a course N.N.W – more or less. The only instruments of navigation with our "naukhada" were an old compass, though it seemed to be by a good English maker, a half circle cut out of cardboard by himself, and a pair of very old French binoculars which he apparently only used at night. Fortunately I had a land map with me and an Admiralty chart for the first part of our route. We made good going for Sir bu Nu'air island, doing the 40 miles to there in 5 hours, with the lateen sail helping the engine for the last three. I landed on the island in the afternoon. It seemed about three miles long and was uninhabited. I was told that pearlers visited it in the summer to take on fairly fresh water and I saw on the ground there the red iron oxide which used, I was told, to be taken to England.

(*The Golden Valley Ochre and Oxide Company, of Bristol, UK, had signed an agreement with the Ruler of Sharjah to mine and export red oxide from Sir Bu Nu'air. Operations ceased during the war, but were resumed after the end of the conflict*).

17th December. Started for the island of Zirko (*Zirku*) at 7 a.m. Very good going with engine and sail to within sight of Zirko at 12.30, when the engine failed and wind fell. As a result we did not anchor off the island until after dark. The "Persian Gulf Pilot" reports that "some swells roll around the island." They caused us to shift to what did not prove a much easier lying anchorage at 2 a.m. I saw the island by landing on it on

18th December. It is about 2 ½ miles long, like Sir bu Nu'air, composed on volcanic hills , but with a high peak in it's centre. It is uninhabited, the property of Abu Dhabi. Pearlers visit it in the summer and cormorants make it their base. (*Socotra cormorants had a large breeding colony on the island until late 1970s, when construction of facilities for the offshore oil industry began*). This day we made for Dalmah island but our course was faulty, and we fetched up in the evening, anchored in the very fine Khor (Meriton Bay shown on the Admiralty chart) of Sir Bani Yas island (Abu Dhabi). A sheltered deep anchorage was a pleasant change. I saw the aerodrome on Sir Bani Yas on

19th December. It's surface seemed adequate but the area small. The one lonely "nautor" employed to guard it was present. He told me of habitation and palm trees at the north end of the island but I did not see them. [*The 'habitation' and palm-grove of the seasonally-occupied village of al-Dhahir. The palm-grove survives, while the remains of the 'habitation', including a stone mosque and a well, are being conserved by the Department of Culture and Tourism, DCT.*

The airstrip, established in the mid-1930s as an emergency landing ground for the Royal Air Force and civilian aircraft, was abandoned after the end of the Second World War].

The engine of the launch was totally out of order on this day and we made a course for Sila' - on the mainland of Abu Dhabi at 10 a.m. We were going well enough on a S.W. tack when a "shimal'" came on and caused instant terror to the "naukhada" and his crew of five. In fact the launch, under it's big sail was showing an alarming tendency to gybe. The naukhada wanted to run in and anchor to the east of Jebel Dhanna but I got him to take a westerly course and we beat along the shore of the mainland until the evening. We anchored offshore, I estimated, about 20 miles east of Sila' in a heavy sea for our craft. During the night, the "shimal" freshened.

20th December. It looked as though we were going to have to spend an indefinite amount of time at our uneasy station for the "naukhada" swore his tackle would give away, the launch founder, and all of us be drowned if we ventured to sail in the "shimal." He and the crew took the engine down and extracted pounds of filth from it. I got them to move off under sail about noon as the wind had lessened and we tacked to the N.E. for an hour or so and then they got the engine going. We anchored offshore N of Sila' after nightfall.

21st December. Made north with a lame engine, but I think the "Naukhada's" shore-hugging propensities caused him to motor too far W. of N. and we found ourselves amongst the myriad of small islands and shoals in the mouth of Khor adh Dhuwaihin. The engine then gave up and we did not see the island of Kafai, which was directly on our course until 2.30 p.m. It is long, narrow and said to have anchorages, at any rate for small craft. We kept going under sail and engine (when it worked!) until near midnight.

22nd December. Sailed and motored feebly past Wakrah to Dohah. There Sheikh Hamid, the son of the ruler, Sheikh Saleh al Mane, and Abdullah bin Darwish befriended me and sent me to the oil company's camp in the Sheikh Hamid's car. After a night at Dukhan I arrived in Bahrein in the Oil Co's launch. In Bahrein the representative of

Sheikh Mustafa bin Abdul Latif, the owner of the launch in which I had travelled from Dubai told me it's engine was being thoroughly repaired.

[*The discovery well for Qatar's first oilfield, Dukhan, was drilled in 1939/1940 by a subsidiary of Petroleum Concessions Limited, which also held the onshore concession for Abu Dhabi and other emirates. Exports began in 1949*].

Pelly spent Christmas and New Year in Bahrein, before commencing the return journey).

2nd January 1942. Left Bahrein In the "repaired" launch which some master of irony named the "Ghazal." (*i.e.* '*gazelle*'). The engine gave up for a while but was soon re-started. Night fell with the Qatar coast dimly visible. We moved on taking soundings and then, fearing shoals and rocks, the "naukhada" anchored about a mile from the coast too far away to be sheltered from the swell on which we rolled all night.

3rd January. Decide to make for the island of Halul but course-plotting was not easy as we had to guess where we were starting from. Up to evening there was no sight of any land. We motored on during the night, it being too deep to anchor. The wind freshened and changed to N.W. About 2 a.m. the engine irretrievably surrendered, blowing a piston to bits and a connecting rod through the crankcase. We ran before the wind with a small, very much "ad hoc" stay sail. I estimated we made about 120 miles until the dawn of

4th January. The wind blowing strongly and very high seas. The lauch ran before them remarkably well, only taking green water aboard twice, until we anchored off Ras Kahaf, having done about 250 miles in 48 hours, most of it under sail. [*Ra's Kahf is at the tip of the Dabb'iya peninsula, west of Abu Dhabi*]. We anchored in the small hours of

5th January. When the tide fell we were aground and did not get away under a reefed mainsail until about noon. We were reaching along well on a N.E. course when the sail tore and we hoisted storm canvas. This carried us towards the shore as it was impossible to tack with it, and when the mainsail was up again it was clear that our only possible course, parallel to the shore, with the wind as it was, was blocked ahead by shoals. To my disgust the "naukhada" took his usual action in this and all subsequent difficulties. He downed anchor to wait for a favourable wind. Most unfortunately as it subsequently turned out, I insisted on getting the launch poled closer to the shore so that I might land and look around. I did so and found myself on one of the many islands west of Abu Dhabi; this was Jazirat al Bahrani, (*immediately west of Abu Dhabi island*), desert and swamp and uninhabited. When I returned to the launch it was fast aground and by 10 p.m. was high and dry. The incoming tide started to knock it about during the early hours of the morning and efforts to warp the boat out against tide and wind were not very effective; but such as they were they probably saved it from being broken up. By 6 a.m. on

6th January. we were aground again. I walked over quite a stretch of the island and met a couple of wood collectors from Abu Dhabi who had their boat moored on the inland side. They tried to persuade me to make for Abu Dhabi by Running before the Wind between the island and the mainland. I viewed the shallow waters of the way indicated with considerable suspicion in view of the 3 ½ foot draught of our boat; this suspicion I learned later was justified. We could not move in those waters without a very competent pilot. The Admiralty chart shows them as covering shoals of very large area. In the afternoon we managed to move away from the shore to a slightly deeper anchorage alongside a small "Sama' " (small boat) manned by three men from Abu Dhabi who had been collecting camel fodder at Dalmah island and also had a hard time in the shimal.

7th January. There was a long sand spit running parallel to the shore practically enclosing the shallow water in which we lay. Beyond it were more shallows on which the waves broke white and beyond them the deep water of the Gulf. The problem was to find the way out through the shallows by which we had come in. The Abu Dhabi men left at noon as their food was running short and they said they preferred the "shimal" to their "dying of hunger". The same consideration moved my "naukhada" to try to get out, though our draught prevented us from taking the path of the "sama". We spent a weary day warping and poling and going aground. By evening we were over the worst of the shoals and sailing on a S.W. tack in an effort to reach deep water; but as night fell it was clear that we were over a shoal and we anchored. At midnight, the Abu Dhabi "Sama" returned and anchored beside us with food sent by the Sheikh and some of his men to help us out.

8th January. Under the guidance of the Abu Dhabi men we got away and said farewell to them off Abu Dhabi town. We sailed uneventfully till late at night and then anchored off Masqeem village 20 miles from Sharjah.

9th January. Reached Sharjah at midday with a light wind.

[*Having safely reached Sharjah, Pelly then set out after a few days, by car, for Abu Dhabi. He makes no mention of how he crossed to Abu Dhabi island. The causeway that preceded the Maqta Bridge was not built until the early 1950s, so he presumably left his car at Maqta*].

Abu Dhabi to Sharjah (131 miles) by camel

On the 12th January. I visited Abu Dhabi by car to ask the Sheikh to look out for the barge reported drifting towards his shores. While waiting for him at his guesthouse, I met Sheikh Ibrahim bin Othman, the representative of the Sheikh of Abu Dhabi in his village of 'Ain in the interior. Sheikh Ibrahim and his men were originally Biluchis but are now, I should imagine, fairly typical Bedouins of these

parts. Sheikh Ibrahim told me that he was making for Dubai on the morrow. He agreed to take me with him when I promised, in return for the loan of two of his camels, to send two of his men to Abu Dhabi in the car I had come in. This I did and after buying the usual desert travel stores for the journey for the eight of our party we set off on the 13th. We bid farewell of the Sheikh of Abu Dhabi who, this time, said he was pleased about my arrangements for travel; he was indeed most pleasant about them.

Our stores were rice, flour, dates, ghee and a goat whose throat was slit a mile from Abu Dhabi town. I shot a few hare and a goggle-eyed plover (*an English dialect name for the stone curlew or 'kairawan*') on the journey. It took five days and followed, in it's small way, the pattern of all these Odysseys of desert travel we have all read about – except that the weather was pleasant throughout. The Bedou were pleasant companions, pious Moslems, inquisitive and acquisitive. We watered the camels and ourselves every day with water that grew sweeter as we neared Sharjah; in Abu Dhabi it is positively medicinal.

We travelled on the higher ground overlooking the motor track on rolling sand dunes, because on them grows the scrub on which the camels feed and the wells are in amongst them – there are merely wells, no villages in that country. (*The 'motor track' between Abu Dhabi and Dubai ran along the inner edge of the sabkha. It was still drivable, in parts, in the mid-1970s, after completion of the first tarmac road*). The wells I saw and our halting places were Gharayah, Boomeraygah, Doweybi, Samaih', Howth and Noveybi. (*'Boomeraygah', or Bu Mireikha, is today surrounded by a large plantation inland of the main road, opposite Al Rahba, Samaih' being roughly half way between Abu Dhabi and Dubai. Locations of the other wells have not been checked*). On the journey I had my meals with Sheikh Ibrahim at one fire and his men, separate from us, at another. I gave them all a days hospitality when we arrived here and a "Kiramah" of Rs. 100 to the Sheikh. He and his men went away, pleased. They all then spent a day with the Sheikh of Dubai and then departed for their home inland. A camel saddle would be worth having on expeditions like this; a goat skin only is not wholly comfortable.

Following completion of his journeys, Pelly submitted his report to the British Political Agent in Bahrain, E.B. Wakefield, on 23rd January 1942, requesting repayment of the 'Kiramah' of 100 rupees and noting:

This is the first occasion of which P.O.T.C. has toured alone with Bedouins and you will agree that it is desirable to make a good impression if only to make the way easier in future.

Wakefield approved a repayment of the money and transmitted a copy of the report to the Political Resident in the Gulf, Lt.-Colonel Rupert Hay. It was then forwarded to the Government in India.

On 28th February 1942, H. Weightman, Joint Secretary of the External Affairs Department of the Government of India in New Delhi, wrote to the Political Resident to say:

"I am desired to say that the Government of India note with considerable pleasure that they still have in the more junior ranks of the Indian Political Service some officers who are prepared to undertake touring of the tougher variety and are able to make good use of their powers of observation while engaged on their tours."

Pelly's report can be found in the India Office archives at The British Library, file number IOR/R/15/2/180, accessible at the following website:

https://www.qdl.qa/en/archive/81055/vdc_100023550731.0x000062

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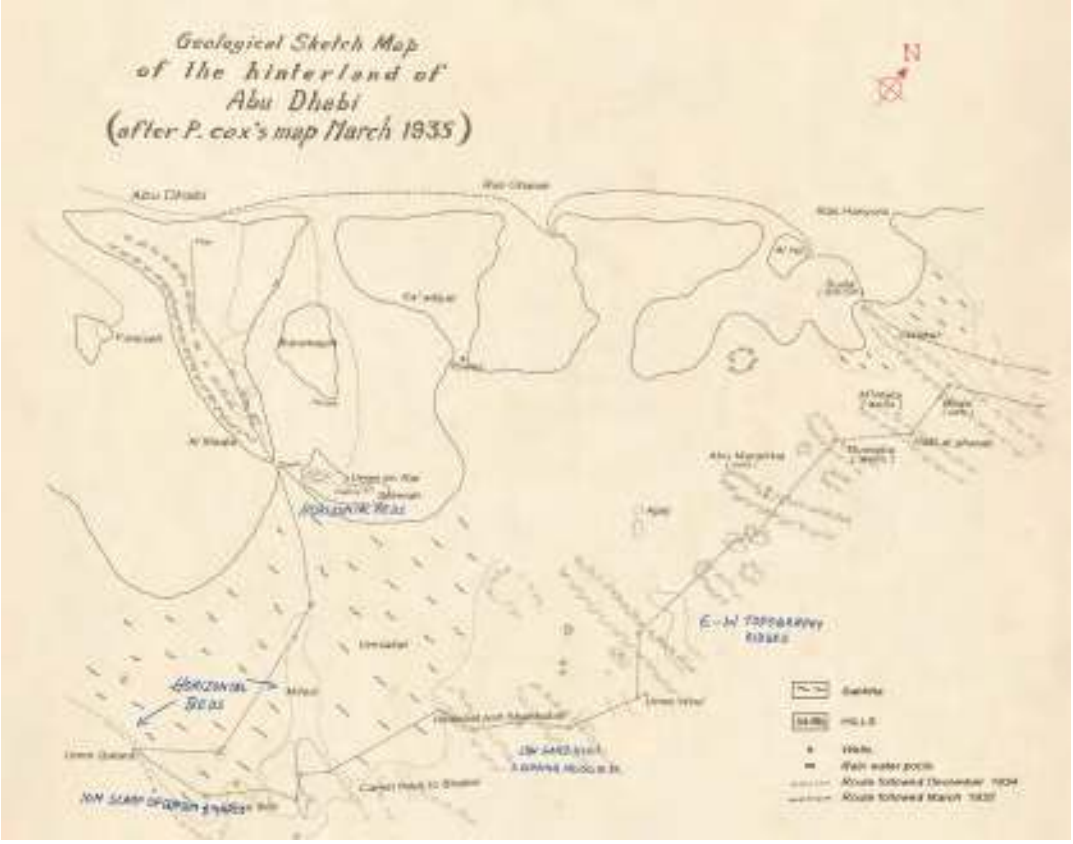
The first report of the burials at Umm an-Nar

by Peter Hellyer



One of the delights of poring through old archives for data on the Emirates is the way in which one can find scraps of information, often little more than a very brief reference, that shed new light on a wide range of topics. In some cases, there is sufficient to embark on a search for more data, out of which a fascinating tale can be developed. It was such a small reference in the archives of the British Political Residency in the Gulf that led to the discovery that a British Royal Air Force Wellington bomber had crashed on the UAE's East Coast in 1943, with one casualty, and to the subsequent identification of the crash site (Hellyer & Garey, 2004; 2005 and Garey 2012).

On rare occasions, however, the significance of data that has been published can be overlooked. Such is the case with a geological sketch map based on data collected in 1934 and 1935 which was re-drawn and published several years ago as an end-paper in the book '*From Pearls to Oil – how the oil industry came to the United Arab Emirates*', by David Heard, a 55-year veteran of Abu Dhabi's oil industry and expatriate community (Heard 2011).

The map is based on two original sketches in the archive of the Iraq Petroleum Company, IPC. This archive also held the original reports on which the book was based. The IPC consortium, through its subsidiary, Petroleum Concessions Limited, was awarded the 75-year onshore oil exploration concession for the Emirate of Abu Dhabi in January 1939 that expired on 10th January 2014.

Entitled '*Geological Sketch Map of the hinterland of Abu Dhabi (after P. cox's map March 1935)*', it is a simplified sketch of two maps drawn by Cox of the coastal areas from Ra's Hanjura, in the north-east, to Abu Dhabi and Futaisi in the west, stretching inland to roughly the area of the present-day township of Bani Yas. It shows the routes followed by a geologist, P.T. Cox, working for the Anglo-Persian Oil Company, APOC, the forerunner of today's BP, and a major shareholder in IPC, during preliminary surveys undertaken as part of an evaluation of whether IPC should seek concessions in the Trucial States, of which Abu Dhabi was one. As published, it is a "redrawn amalgamation of Cox's 1934 and 1935 maps" (D. Heard, *in litt*. 7th October 2017)

Cox, who had been instructed both to assess the potential viability of drilling new water wells and to evaluate prospects for oil being present, was concerned primarily with marking water wells and elevated areas. On the map, the shape of the inshore islands, apart from Abu Dhabi, is rather inaccurate. There are, however, scraps of information of some value. One represents the first record, from 1934, of the identification of the important group of Bronze Age burial mounds on the island of Umm an-Nar, adjacent to Abu Dhabi, where, in 1959, the first archaeological excavations in the Emirates took place.

The map shows the routes of two surveys undertaken by Cox, one in December 1934 along the coast, and another route in March 1935, along the coast, stopping

at Ra's Ghurab, to the island of Al-Hil, landing at Ra's Sadr and then proceeding inland, returning via the Maqta crossing to Abu Dhabi island and terminating at the 'Fort', i.e. Qasr al-Hosn.

The December 1934 survey included a visit to 'Futaiseh', to the west of Abu Dhabi island, and a more extensive examination of the lagoon east of Abu Dhabi. This involved a stop at the outer end of 'Burumayid', which appears to be the complex of small islands and mangroves between Abu Dhabi and Sa'adiyat, now with Reem island at its outer end. A 'House' was noted at the inner end of 'Burumayid' and a 'Tower' on Sa'adiyat.

Cox also visited the island of 'Umm en Nar', Heard noting (page 111) that "Cox found no oil or gas indications wherever he went in 1934. However, the island of Umm an Nar (mother of fire) interested him because the name suggests a possible oil seepage, but he was disappointed."

The sketch map, as redrawn, notes the presence of 'Cairns' on Umm an-Nar, recorded by Cox in his original sketch, clearly the collective burial cairns dating to the Third Millennium BC that were first excavated by archaeologists in 1959. Information previously published on these cairns has suggested that they were first noted by Temple (Tim) Hillyard, then local director for Abu Dhabi Marine Areas, ADMA, in early 1958, over thirty years after the date of the sketch map. Hillyard had been informed of the presence of the cairns by the ruler, Sheikh Shakhbut bin Sultan Al Nahyan, who had encouraged the visit. They were drawn to the attention of Professor P.V. Glob and Geoffrey Bibby, of the Danish Archaeological Expedition in Bahrain, who visited them in the company of Hillyard. The excavations the next year then followed (Hojlund 2012), these being visited both by Sheikh Shakhbut and his younger brother, and successor, Sheikh Zayed bin Suiltan Al Nahyan.

Cox's report on his survey may contain a first description of the cairns. Had his discovery not been hidden away in the IPC archives until David Heard obtained access to write his book, but had been drawn to the attention of interested people, he might well have received recognition as the discoverer of one of the UAE's most important archaeological sites. Perhaps that can now be remedied.

One wonders what other scraps of information about the UAE's past are still waiting to be discovered in dusty archives.

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An introduction to the birds and other aspects of the natural history of Balghelam Island, Abu Dhabi

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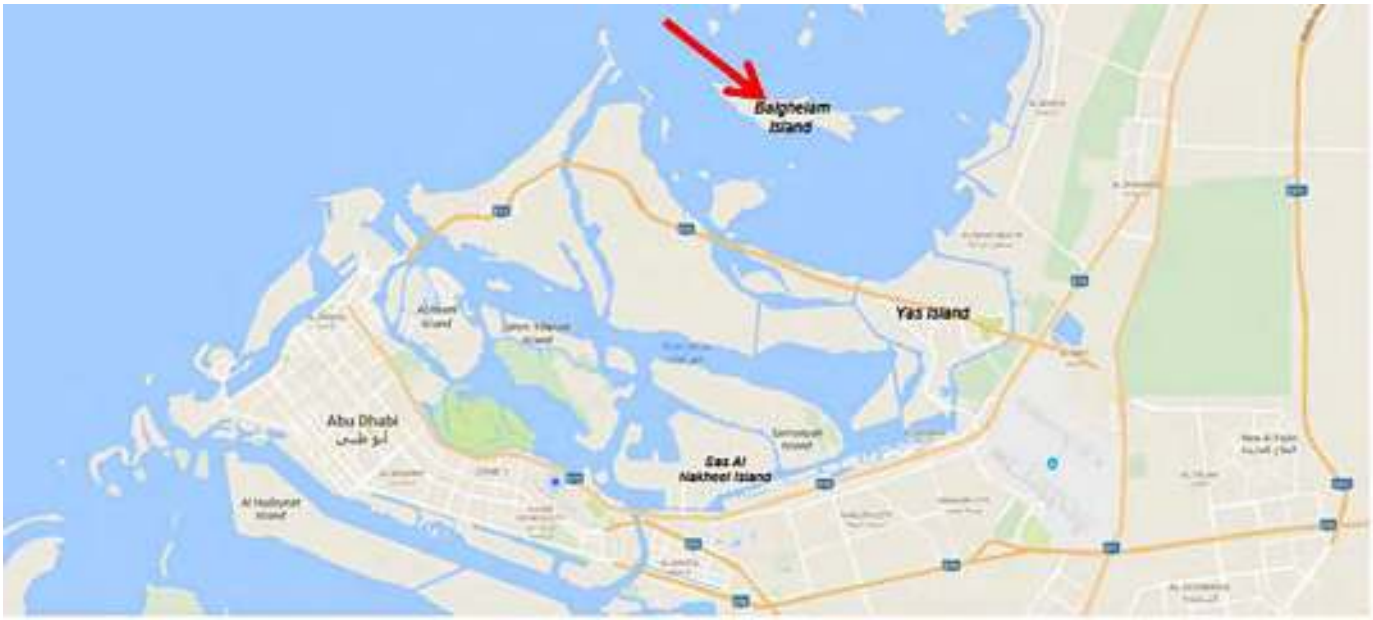

Figure 1 Location map of Balghelam Island (marked with an arrow) in relation to Abu Dhabi Island.

Introduction

Balghelam Island (N 24.56, E 54.54) lies on the south-eastern fringe of the Arabian Gulf and is 20km north east of downtown Abu Dhabi (Figure 1). The sandy, low-lying island originally comprised a very small eastern island and a rather larger, western island but these are now joined by a raised roadway. The island (Figure 2) stretches 7.6 km west to east and 1.8 km at its widest point, and is in the lee of the outer barrier islands of Ra's Ghurab and Jazirat Sa'adiyat. Its north coast is exposed to wave action, particularly that generated by the *shamal* (north-westerly winds that affect the southern Gulf at certain times of year) and has limited inter-tidal areas. The *shamal* is a significant influence (albeit lasting only a matter of days at a time) but an almost daily onshore breeze generates sufficient wave action, as does the flood-tide, to ensure that the windward shore is predominantly sandy and mobile. In the island's own lee, the sheltered southern shores are a low-energy environment, with the exception of the extreme western and eastern ends where the flow of water is accelerated, being squeezed on the ebb and flood tides as it rounds the island. These sheltered shores have muddy intertidal flats and extensive, naturally occurring, dense mangroves *Avicennia marina* fringing the shore.

Away from the shore, the island is, on the whole, extremely arid, and almost devoid of perennial plants, due to a combination of very limited rainfall and the impact of released gazelles *Gazella* sp. which have almost entirely denuded the natural vegetation. (see Plate 1). A natural seedbank should, however, ensure the flora (both perennials and annuals) recovers, given sufficient rains, while a programme of reducing gazelle numbers and confining the majority within the plantations, now mainly fenced, should assist further recovery.

This paper provides an introduction to the geology and natural history of Balghelam Island. However, it should be noted that certain taxa, Arthropods in particular, have received little or no study to date and so comments are restricted to the better studied flora, reptiles, mammals and, especially, birds. The island's avifauna is by far the best-studied aspect of its natural history and a checklist of 118 naturally occurring species is presented. With the encouragement of Sheikh Surour bin Mohammed Al Nahyan, the island's owner, and, more recently, his son, Sheikh Mohammed bin Surour Al Nahyan, the island has been visited by UAE-based naturalists (mainly birdwatchers) on an erratic basis since 1990 with more regular visits (total 12) being resumed from March 2013 onwards. The months of visits undertaken 2013–2017 is presented (Table 1).

Table 1. Months of visits each year, 2013–2017

2013	March, April, October
2014	January, October
2015	January, February, March
2016	January, October
2017	January, March

Figure 2 Satellite image of Balghelam Island.

Some of the original visits in the 1990s were organised to coincide with surveys and excavations being undertaken by the Abu Dhabi Islands Archaeological Survey, ADIAS, directed by PH - see Garfi (1996) and Carter (*in prep*). A first review of the birds of the island was published by Hellyer & Aspinall (1996).

GEOLOGY

An introduction to the geology of Balghelam Island was provided by Evans & Kirkham (2009) and is briefly summarised here.

The oldest rocks visible are Pleistocene carbonate aeolianites (wind-blown carbonate sands) which form a series of low ridges orientated parallel to the main trend of the island (see Plate 2). The highest occur along the western and northern flanks of the island and form the substrate on which the main residence is built. Along the north-eastern shoreline, there is a wave-cut platform, generally about 20m wide, which is thought to have developed about 4000-5000 years ago when sea level was 1-2 m higher than currently. It seems likely that the entire island represents the north-westernmost erosional relict of a *seif* dune that formed a peninsula on the immediately adjacent mainland shoreline; this same pattern of *seifs* can be traced for about 100kms on a south-west trend towards the Hajar Mountains across the UAE.

Lithified mangrove trunks and rhizoliths (fossilised roots) are abundantly exposed along the outer reaches of the wave-cut platform all along the northern and north-western coast. Any sediment that once covered the rhizoliths has been largely removed by wind and wave erosion, except for one or two remnants.

Surrounding the aeolianite ridges to the southwest and forming a long tail to the south is a platform with an elevation of about 2m above mean sea level. The underlying bedrock is in places either deflated aeolianites or, along the southwest shoreline, Quaternary marine carbonates sitting upon the truncated aeolianite. Whereas most of the shoreline is rocky in the northwest and the northeast, the eroded edges of the platform along the southwest coast and parts of the northeast are flanked by a belt of low dunes (1-2m high) and a narrow beach of skeletal sands.

HABITATS AND VEGETATION COMMUNITIES

Mature mangroves *Avicennia marina* are considered a habitat of considerable ecological importance throughout the region. On Balghelam, these occur in intertidal areas on the south-western shores and in a sheltered lagoon opening to the south-east of the island. The latter area is flooded relatively passively on each tide, although more extensive low-lying areas of the island are flooded during spring tides or during strong onshore winds. The mangroves, although mature and reaching to 3m in height, are slim-trunked and presumably of relatively recent (though natural) origin.

The low woody shrub *Athrocnemum macrostachyum* is found at the upper tidal limit, where a tidal influence is occasionally felt and where the substrate is kept sufficiently moist for these salt-tolerant shrubs to prosper. Monospecific stands are typical.

Plate 2. Wind-eroded aeolianite on the north western edge of Balghelam Island, October 2014. *Mark Smiles*

Extensive seagrass beds are found sub-tidally around the island, principally of *Halodule uninervis*, while algal mats are present in a limited area in the south and south–east where seawater incursion only intermittently wets the substrate.

Inland from any marine inundation, the island is intensely arid, although irrigated plantations thrive. Most land surface is sparsely vegetated (some areas may be too saline for plants to survive) and droughts lasting up to several years invariably result in a die-off of those Chenopods, such as *Salsola imbricata*, ordinarily but patchily present. Subsequent grazing, as well as years of poor rainfall, prevents recovery and no live plants occur at all in many areas. Up to 2001, a relatively luxurious growth, particularly of Chenopods, was present in the centre of the island but, as of 2017, there has been little evidence of extensive re-establishment.

Anabasis setifera may survive when other perennials have perished during droughts, although generally as solitary plants and thus not providing much cover. *Halopeplis perfoliata* dominates locally in lower-lying areas where a high water-table keeps the substrate moist, though this, of course, is invariably of high salinity.

The island's plantations (and gardens around the few residential dwellings) feature both native and alien species of tree. Mesquite *Prosopis juliflora,* a pernicious invasive alien of limited ecological value, has spread naturally outside plantations. The acacias *Acacia arabica* and *A. tortilis,* along with Ghaf *P. cineraria*, attract most migrant birds (see below), whereas, at least for feeding, exotics appear to be generally avoided.

FAUNA

Reptiles

Only three species of terrestrial reptile have been recorded thus far on Balghelam, but this aspect of the island's natural history has not been studied thoroughly and more species might be found through further study.

Species known to occur are the Baluch Rock Gecko (also called Arabian Desert Gecko) *Bunopus tuberculatus*, an almost ubiquitous species and certainly that most frequently found on UAE islands. During the day, this diminutive gecko is usually to be found under fallen tree trunks, logs and planks or other debris. In and around buildings, the Yellow-bellied House Gecko *Hemidactylus flaviviridis* is present. They are most active late in the day and at night, feeding on insects attracted to artificial lights.

The third species is the Short-nosed Lizard *Mesalina brevirostris*. This invariably occurs close to the coast, down to the upper tidal limit. A juvenile specimen was noted during a survey in the 1990s of the Islamic graveyard in the eastern section of the island.

The Turkish Gecko *Hemidactylus turcicus* would be expected to occur in woodlands, but has yet to be recorded. No land snakes are currently known.

Marine reptiles known to occur are Hawksbill *Eretmochelys imbricata* and Green Turtles *Chelonia mydas*, but some species of seasnake are also likely to occur, at least on occasion. As with terrestrial reptiles, these warrant further study.

Mammals

Very few native land mammals occur. However, Arabian Hare *Lepus capensis* has been recorded and presumably Sand Gazelle *Gazella subgutturosa* formerly occurred. Introduced mammals include House Mouse *Mus musculus*, rats, (either Brown *Rattus norvegica* or Black Rat *R. rattus*) and Arabian Gazelle *Gazella gazella*. Some 33 Sand Gazelles and 300 Arabian Gazelles were reportedly released in 1993 and their descendants survive, with the assistance of supplementary feeding. East African Thompson's Gazelles *G. thomsoni* have also been released and have reportedly bred, including, regrettably, with Arabian Gazelle. Several Fallow Deer *Cervus dama* have been released and these too have bred.

Bats are likely to occur but no records have been obtained to date. Kuhl's Pipistrelle *Pipistrellus kuhlii* has been noted on the nearby mainland peninsula and may well reach the island.

Two marine mammals recorded in the waters around Balghelam are the Indo-Pacific Humpback Dolphin *Sousa chinensis* and the Indo-Pacific Bottle-nosed Dolphin *Tursiops aduncus*. The former is the more common and also comes closer inshore, even reaching the point where it must sometimes ground its belly to cross sandbars on the falling tide. Bottle-nosed Dolphins invariably remain in deeper water and channels to the north of the island. The vertebrae of a whale, picked up on the south shore of the island in 1993, are on display at the resthouse on neighbouring Qassar al Jile'ah island. The species is unknown, but both Bryde's Whale, *Balaeonoptera edeni*, and Minke Whale, *B. acutorostrata* , are known to occur inside the Gulf.

Dugong *Dugong dugon* are known to have been present around Balghelam since at least the Iron Age, bones having been excavated at hearths dated to around 500 BC (ADIAS, undated). A small number may conceivably still live in the shallow lagoons north-east of Abu Dhabi in which Balghelam is situated; a corpse was found on the beach at Ra's Yah, the westerly most point of Balghelam Island, in January 2015. The reason for its death was not ascertained.

Plate 3. Watching shorebirds at a roosting site on the north western edge of Balghelam Island, March 2015. *Mark Smiles*

Plate 4. Roosting shorebirds, Slender-billed Gulls *Chroicocephalus genei* and Caspian Tern *Hydroprogne caspia* at high tide on the southern shore of Balghelam Island, October 2014. *Oscar Campbell*

Plates 5 and 6. Crab Plovers Dromas ardeola, Balghelam Island.

Plate 5. Birds leaving roost on a falling tide, October 2015. *Oscar Campbell.*

Plate 6. Note the tracking device on the right leg, put on by Environment Agency – Abu Dhabi at Abu al-Abyadh Island, the presumed breeding site of this individual, October 2014. *Mark Smiles*

Plate 7. Short-eared Owl *Asio flammeus* in mangroves, Balghelam Island, March 2015. *Oscar Campbell*

Plate 8. Eurasian Oystercatchers *Haematopus ostralegus* roosting with other shorebirds, north western end of Balghelam Island, March 2015. *Oscar Campbell*

Birds

A checklist of 118 species of bird has been amassed from Balghelam Island despite relatively irregular visits; further coverage will doubtlessly enhance this. Of these, nine species are designated of conservation concern by BirdLife International (2017). Whilst the island is well-placed to receive migrants crossing the Gulf, habitat limitations mean that it supports only 20 species of regular breeders, and the majority of species recorded are winter visitors and passage migrants, the latter defined as those visiting in primarily in spring and/or in autumn but rare or unrecorded in mid-winter (December to February). A small number of species recorded are rare visitors anywhere in the UAE. In the account that follows, scientific names for all species mentioned are given in the systematic checklist presented at the end.

Breeding species and other residents

Like much of the UAE, introduced species are prominent members of the terrestrial avifauna, although many introductions did not last (see Appendix 1). However, Grey Francolin is now established in plantations and gardens. This species was successfully introduced across the UAE and has rapidly become almost ubiquitous concomitant with widespread greening. Egyptian Goose, another introduced species, successfully breeds.

A number of other species are also established exotics, having been deliberately introduced elsewhere in the UAE and expanding their ranges naturally. Some of these have now colonised Balghelam, most being species commensal with mankind. These include Feral Pigeons, White-eared and Red-vented Bulbuls and Common Myna. Species indigenous to the UAE such as Laughing and Eurasian Collared Doves, Crested Lark and House Sparrow undoubtedly reached Balghelam unassisted, as did Graceful Prinia. The latter was established by 1993 at least. More recent natural colonists are Green Bee-eater, Red-wattled Lapwing and House Crow, all unrecorded in the 1990s (the former first appearing in 2004) but well-established residents by 2013. Purple Sunbird, present erratically during the 1990s, is also now fully established.

Other native nesting species, present regardless of human occurrence or intervention, are rather few. However, Kentish Plover nests on the saltflats and beaches and Striated Heron, Western Reef Heron and Clamorous Reed Warbler do likewise in the mangroves. Saunders' Tern may also attempt to nest, in the general absence of ground predators such as Red Fox *Vulpes vulpes* or introduced feral cats. A recent success story has been the successful breeding of Western Osprey; a chick was seen on an artificial platform provided for the purpose in January 2016. However, at least one native species has seemingly been lost as a breeding resident. Greater Hoopoe-Lark, regularly present in the 1990s and showing evidence of breeding in 2004 has apparently declined greatly (just two records of singles since 2013). Two species that might be expected to occur and even breed, Black-crowned Sparrow-Lark and Chestnut-bellied Sandgrouse are unconfirmed to occur (see checklist) and a rare visitor respectively.

Wintering and passage waterfowl

Coordinated mid-winter (January) counts of waterfowl (herons and allies, ducks, waders, gulls & terns) have been made throughout the UAE over a number of years and Balghelam has been included in sites covered where manpower permits (see Plates 3 and 4). Data collated is presented in Table 2. Such counts indicate up to 3000 waterfowl to be present at this time of year. Dominant by far are shorebirds with 25 different species recorded, often totalling in excess of 2000 individuals. Lesser Sand Plover, Dunlin and Bar-tailed Godwit predominate, with maxima for these three species during such surveys being 950, 960 and 528 respectively. A recent important discovery was the confirmation of small numbers of over-wintering Great Knot first noted in 2013 (Campbell & Hellyer 2015) and annually since. The maximum recorded has been 36 and some light on the origins of the small Arabian Gulf population of this endangered shorebird was recently obtained with a ringing recovery at Khor al-Beida, Umm al-Qaiwain Emirate (150 km north east of Balghelam), from Kamchatka, Russia (Dorofeev & Campbell, 2017).

Comparable shorebird numbers occur during the main passage periods from March to April and August through October at least. The composition is substantially similar, although species such as Crab Plover (see Plates 5 and 6), Common Ringed Plover, Greater Sand Plover, Sanderling and Ruddy Turnstone occur in higher numbers than mid-winter and clearly move on to more southerly wintering localities.

Although relatively unimportant in terms of total numbers for other species of waterfowl, mention must be made, given the diversity, of some of the other species occurring on Balghelam. Non-breeding Greater Flamingo are generally to be found on the island's mudflats and numbers appear to have increased since the 1990s; counts having exceeded 200 in both 2015 and 2016. Small numbers of Western Reef Heron and Striated Heron are invariably present and Socotra Cormorants often roost in small numbers on tiny rocky islets.

Wintering and passage songbirds

As for breeding, relatively few small songbirds reside during the winter. However, the plantations are particularly attractive for migrating passerines, which make use of feeding opportunities and make refueling stopovers of some days, either prior to, or after, crossing the Gulf depending on the season involved. Chiffchaff, Lesser Whitethroat and Black Redstart are three of the commoner migrant species which often remain all winter, at least in small numbers. In winter, Desert Wheatear is a typical species found in vegetated parts of the island although numbers of its frequent companion, Asian Desert Warbler, seem to have declined in recent years.

Regular migrants include numerous other songbirds, particularly species of warblers, wheatears and shrikes. Rare or scarce migrants recorded include Short-eared Owl (see Plate 7), Great Reed Warbler, White-throated Robin, Black-throated Thrush, Red-breasted Flycatcher and Spanish Sparrow. Further coverage will doubtlessly expand this list further.

Provisional Checklist

This checklist presents the results of all bird records made on the island. In all, 118 species are listed, plus two further species noted using **) not yet confirmed as occurring. In addition, data collated during six systematic counts, in 1994, 1998 and annually 2014–2017, made as part of the Asian Waterbird Census, are tabulated (see Table 2). Taxonomy and nomenclature utilised follows the IOC World Bird List (Gill & Donsker 2017) which is the authority followed in the UAE Bird Database and UAE Annotated Checklist (Pedersen *et al*, 2017). Data on conservation status has been taken from BirdLife (2017). Species with no conservation status noted are designated Least Concern. A brief comment on the status of each species on Balghelam Island is provided. For a small selection of species, brief additional analysis or context is provided. The status of many species, especially migrant passerines which are highly temporal and, even when present, hard to locate, will undoubtedly have been underestimated by the limited number of visits and status comments for these must be interpreted with this in mind. In addition, it is also worth noting that many species noted as rare or uncommon below will be limited by habitat on Balghelam and may be common elsewhere in the UAE.

ANSERIFORMES: Ducks, Geese and Swans (Anatidae)

Egyptian Goose (*Alopochen aegyptiaca*) Uncommon breeding resident; established since at least 1993. Maximum count 9.

GALLIFORMES: Pheasants and allies (Phasianidae)

Grey Francolin (*Francolinus pondicerianus*) Common breeding resident; established since at least 1993. Maximum count 80.

Common Quail (*Coturnix coturnix*) Rare migrant (autumn).

PHOENICOPTERIFORMES: Flamingos (Phoenicopteridae)

Greater Flamingo (*Phoenicopterus roseus*) Common non-breeding resident, usually in small numbers; maximum count 210.

PELECANIFORMES: Herons, Bitterns (Ardeidae)

Striated Heron (*Butorides striata*) Uncommon breeding resident. Maximum count 5.
Western Cattle Egret (*Bubulcus ibis*) Rare migrant (spring).
Grey Heron (*Ardea cinerea*) Uncommon non-breeding visitor; may over-summer. Maximum count 30 (but all other counts less than 10).
Purple Heron (*Ardea purpurea*) Rare migrant (spring).
Great Egret (*Ardea alba*) Uncommon migrant (spring).
Little Egret (*Egretta garzetta*) Uncommon migrant (January; September).
Western Reef Heron (*Egretta gularis*) Common breeding resident. Maximum count 15.

SULIFORMES: Cormorants, Shags (Phalacrocoracidae)

Great Cormorant (*Phalacrocorax carbo*) Uncommon winter visitor. Maximum count 9.
Socotra Cormorant (*Phalacrocorax nigrogularis*) **Vulnerable.** Uncommon non-breeding resident. Maximum count 35.

ACCIPITRIFORMES

Ospreys (Pandionidae)

Western Osprey (*Pandion haliaetus*) Uncommon breeding resident. Breeding confirmed in January 2016, on an artificially provided platform.

Kites, Hawks and Eagles (Accipitridae)

Greater Spotted Eagle (*Clanga clanga*) **Vulnerable.** Rare winter visitor.
Western Marsh Harrier (*Circus aeruginosus*) Uncommon winter visitor. Maximum count two.
Pallid Harrier (*Circus macrourus*) **Near-threatened.** Uncommon migrant (January, October).
Montagu's Harrier (*Circus pygargus*) Rare visitor (January).
Long-legged Buzzard (*Buteo rufinus*) Rare visitor. Four records (September, January, February) 1994–1997 but none since.

CHARADRIIFORMES

Oystercatchers (Haematopodidae)

Eurasian Oystercatcher (*Haematopus ostralegus*) **Near-threatened.** Common winter visitor, September to January. Maximum count 75 (1996) but since 2013 maximum count 42. See Plate 8.

Crab-Plover (Dromadidae)

Crab-Plover (*Dromas ardeola)* No records prior to 2013. Since then, recorded almost annually, mainly in October. Maximum 167, October 2014, including one ringed bird bearing a tracking device put on by Environment Agency – Abu Dhabi at the breeding colony at Abu al-Abyadh island, 80km to the west-southwest (S. Javed *in litt*). Rare in mid-winter but 52 recorded, April 2013.

Stilts, Avocets (Recurvirostridae)

Black-winged Stilt (*Himantopus himantopus*). Uncommon migrant (October, January). Maximum count 13.

Plovers (Charadriidae)

Red-wattled Lapwing (*Vanellus indicus*) First recorded 2013; now common breeding resident. Maximum count 29.

Grey Plover (*Pluvialis squatarola*). Common winter visitor and migrant. Maximum count 240 but most counts less than 100.

Common Ringed Plover (*Charadrius hiaticula*) Fairly common migrant with small numbers over-wintering. Maximum count 20.

Kentish Plover (*Charadrius alexandrinus*) Common migrant with smaller numbers over-wintering; also breeder in small numbers. Maximum count 650.

Lesser Sand Plover (*Charadrius mongolus*) Common winter visitor and migrant. Maximum count 1800.

Greater Sand Plover (*Charadrius leschenaultii*) Common migrant (mainly autumn) with smaller numbers over-wintering. Maximum count 866 but this exceptional; no other counts exceeding 150. Separating this species from Lesser Sand Plover is very difficult in dense, roosting flocks and it is possible that some are overlooked.

Sandpipers, Snipes (Scolopacidae)

Black-tailed Godwit (*Limosa limosa*) **Near-threatened.** Rare winter visitor.

Bar-tailed Godwit (*Limosa lapponica*) **Near-threatened.** Common winter visitor and migrant. Maximum count 528.

Whimbrel (*Numenius phaeopus*) Fairly common winter visitor and migrant. Maximum count 42.

Eurasian Curlew (*Numenius arquata*) **Near-threatened.** Fairly common winter visitor and, in smaller numbers, as a migrant. Maximum count 45.

Common Redshank (*Tringa totanus*) Common winter visitor and migrant. Maximum count 280.

Marsh Sandpiper (*Tringa stagnatilis*). Uncommon migrant (March, October).

Common Greenshank (*Tringa nebularia*) Common winter visitor and migrant. Maximum count 75.

Terek Sandpiper (*Xenus cinereus*) Common winter visitor and migrant. Maximum count 65.

Common Sandpiper (*Actitis hypoleucos*) Regular migrant and winter visitor in small numbers.

Ruddy Turnstone (*Arenaria interpres*) Fairly common migrant, and, in smaller numbers, winter visitor. Maximum count 70.

Great Knot (*Calidris tenuirostris*) **Endangered.** First recorded 2013; regular winter visitor and spring migrant. Maximum count 36; all records to date January to March but may be expected with more regular November / December visits.

Sanderling (*Calidris alba*) Fairly common passage migrant, mainly autumn. Uncommon mid-winter and spring. Maximum count 30. Phenology of this species is in marked contrast to that at Al Wathba Wetland Reserve where small numbers of migrants recorded exclusively in late spring (OC *pers obs*).

Little Stint (*Calidris minuta*) Fairly common migrant with small numbers over-wintering. Maximum count 113 exceptional; all other counts less than 30.

Curlew Sandpiper (*Calidris ferruginea*) **Near-threatened.** Fairly common migrant and, in smaller numbers, winter visitor. Maximum count 200. Separating this species from Dunlin is very difficult in dense, roosting flocks and it is possible that some are overlooked, especially in mid-winter.

Dunlin (*Calidris alpina*).Common migrant and winter visitor. Maximum count 1131.

Broad-billed Sandpiper (*Limicola falcinellus*). Rare winter visitor. Given the observation of a flock of 97 at nearby Yas Island in November 2015 (OC *pers obs*), it is possible that this elusive species is more regular on Balghelam than the sole record to date suggests. Autumn migration is mainly early to mid-September at Al Wathba Wetland Reserve (OC *pers. obs.)* and it is possible that more September visits to Balghelam would produce more records of migrants of this species.

Gulls and Terns (Laridae)

Slender-billed Gull (*Chroicocephalus genei*) Common migrant and winter visitor. Maximum count 508.
Black-headed Gull (*Chroicocephalus ridibundus*). Erratic winter visitor. Maximum count 120 exceptional; all other counts less than 6 and often absent.
Pallas's Gull (*Ichthyaetus ichthyaetus*). Fairly regular winter visitor, in very low numbers.
Steppe / Heuglin's Gull (*Larus (fuscus) barabensis / heuglini*). Fairly common winter visitor in small numbers. Maximum count 20. Taxonomy of this group is controversial but most records seemingly referable to 'Steppe' Gull *Larus (fuscus) barabensis*, with Heuglin's Gull *Larus (fuscus) heuglini* also reported and probably regular (in small numbers). It is possible that Caspian Gull *Larus cachinnans* is also a rare vistor, but remains unconfirmed.
Gull-billed Tern (*Gelochelidon nilotica*) Fairly common winter visitor in small numbers. Maximum count 7.
Caspian Tern (*Hydroprogne caspia*) Fairly common winter visitor in small numbers. Maximum count 23.
Lesser Crested Tern (*Thalasseus bengalensis*). Uncommon visitor (January, March). Maximum count 6.
Sandwich Tern (*Thalasseus sandvicensis*) Uncommon visitor (January, March). Maximum count 12.
Little Tern (*Sternula albifrons*) Rare migrant (March) but see comments under the following species.
Saunders's Tern (*Sternula saundersi*) Fairly common October to May and may attempt to breed; more common as a migrant than in mid-winter. Maximum count 80. Note that it is generally not possible to distinguish this species from Little Tern in non-breeding plumages and that the latter might be more regular than currently believed.
White-cheeked Tern (*Sterna repressa*) Uncommon visitor (April) but it is likely that this species is regular, at least in small numbers, during the poorly studied summer months.

PTEROCLIFORMES: Sandgrouse (Pteroclidae)

Chestnut-bellied Sandgrouse (*Pterocles exustus*) Rare visitor (March).

COLUMBIFORMES: Pigeons, Doves (Columbidae)

Rock Dove (*Columba livia*) Common resident. Maximum count 50.
Eurasian Collared Dove (*Streptopelia decaocto*) Common resident. Maximum count 200.
Laughing Dove (*Spilopelia senegalensis*) Common resident. Maximum count 100.

STRIGIFORMES: Owls (Strigidae)

Short-eared Owl (*Asio flammeus*) Uncommon visitor (January, March).

CAPRIMULGIFORMES: Nightjars (Caprimulgidae)

European Nightjar (*Caprimulgus europaeus*) Uncommon migrant (April, October).

CORACIIFORMES: Bee-eaters (Meropidae)

Green Bee-eater (*Merops orientalis*) First recorded 2004. Now fairly common resident. Maximum count 16.
European Bee-eater (*Merops apiaster*) Uncommon migrant (October).

BUCEROTIFORMES: Hoopoes (Upupidae)

Eurasian Hoopoe (*Upupa epops*) Fairly common migrant; very small numbers present in winter. Maximum 5.

FALCONIFORMES: Caracaras, Falcons (Falconidae)

Common Kestrel (*Falco tinnunculus*) Rare migrant (October). Not recorded since 1993. Given that this species is a regular and fairly common breeder on Abu Dhabi Island, the lack of recent records from Balghelam is surprising.
Eurasian Hobby (*Falco subbuteo*) Rare migrant (October).
Peregrine Falcon (*Falco peregrinus*) One escaped bird recorded (March) but no records of undoubtedly wild individuals.

PSITTACIFORMES: Old World Parrots (Psittaculidae)

Rose-ringed Parakeet (*Psittacula krameri*) Formerly rare visitor (or resident?) but not recorded since 1996.

PASSERIFORMES

Shrikes (Laniidae)

Red-backed Shrike (*Lanius collurio*) Rare migrant (April). Maximum count 7.
Isabelline Shrike (*Lanius isabellinus*) Uncommon winter visitor and (presumed) migrant.
Red-tailed Shrike (*Lanius phoenicuroides*) Uncommon migrant (March, April, October).
Lesser Grey Shrike (*Lanius minor*) Rare migrant (April).
Southern Grey Shrike (*Lanius meridionalis*) Uncommon resident, or possibly erratic visitor. Potential breeder, but no recent evidence.
Steppe Grey Shrike (*Lanius pallidirostris*) Uncommon winter visitor and migrant.
Woodchat Shrike (*Lanius senator*) Rare migrant (March).
Masked Shrike (*Lanius nubicus*) Rare migrant (April).

Crows, Jays (Corvidae)

House Crow (*Corvus splendens*) First recorded 2013. Now resident, in seemingly increasing but variable numbers. Maximum count 83 exceptional; most counts less than 15. This is species is a well-known invasive pest to many parts of the world and control of numbers, whilst still relatively small, may be advisable.

Larks (Alaudidae)

Greater Hoopoe-Lark (*Alaemon alaudipes*) Former resident, seemingly declining - only one record, possibly of the same individual, 2013-2017. Maximum count 10 (1993) and evidence of potential breeding noted in 2004.
Crested Lark (*Galerida cristata*) Fairly common resident. Maximum count 20.
****Black-crowned Sparrow-Lark** (*Eremopterix nigriceps*) Unconfirmed. Mentioned in passing by SJA (*in litt.* to PH) but not recorded in the UAE Bird Database.

Bulbuls (Pycnonotidae)

White-eared Bulbul (*Pycnonotus leucotis*) Common resident. Maximum count 100.
Red-vented Bulbul (*Pycnonotus cafer*) Fairly common resident. Maximum count 20.

Swallows, Martins (Hirundinidae)

Barn Swallow (*Hirundo rustica*) Uncommon migrant (March, October).

Leaf warblers and allies (Phylloscopidae)

Willow Warbler (*Phylloscopus trochilus*) Uncommon migrant. Maximum count 11.
Common Chiffchaff (*Phylloscopus collybita*) Fairly common winter visitor.
Plain Leaf Warbler (*Phylloscopus neglectus*) Uncommon migrant; may overwinter. Maximum count 7, an unusually high number for the Arabian Gulf coast.
Hume's Leaf Warbler (*Phylloscopus humei*) Rare winter visitor.

Reed warblers and allies (Acrocephalidae)

Great Reed Warbler (*Acrocephalus arundinaceus*) Rare migrant (April).
Clamorous Reed Warbler (*Acrocephalus stentoreus*) Presumed uncommon breeding resident, in inaccessible mangroves. Also potential migrant.
Marsh Warbler (*Acrocephalus palustris*). Rare migrant (April). Limited visits in May likely cloud the status of this species and it is presumably a more common late spring migrant than available records indicate.
Eastern Olivaceous Warbler (*Iduna pallida*) Uncommon migrant (autumn); also one winter record.

Cisticolas and Allies (Cisticolidae)

Graceful Prinia (*Prinia gracilis*) Uncommon resident. Maximum count 6.

Sylviid Babblers (Sylviidae)

Eurasian Blackcap (*Sylvia atricapilla*) Rare migrant (April).
Barred Warbler (*Sylvia nisoria*) Rare migrant (October)
Lesser Whitethroat (*Sylvia curruca*) Common migrant and winter visitor in small numbers. Most, if not all, records of this taxonomically controversial species presumably referable to *halimodendri*, the widespread over-wintering and migrant form across the UAE.
Asian Desert Warbler (*Sylvia nana*) Formerly uncommon migrant and winter visitor but no records since 1995.
Common Whitethroat (*Sylvia communis*) Uncommon migrant (April, September).
Menetries's Warbler (*Sylvia mystacea*) Rare migrant (March). Maximum count 8.

Starlings, Rhabdornis (Sturnidae)

Common Myna (*Acridotheres tristis*) First recorded 2013; now fairly common resident. Maximum count 17.

Thrushes (Turdidae)

Black-throated Thrush (*Turdus atrogularis*) Rare winter visitor, recorded in January 2017. This was a record-breaking winter for this eruptive species in the UAE (Pedersen *et al*, 2016).

Song Thrush (*Turdus philomelos*) Uncommon winter visitor.

Chats, Old World Flycatchers (Muscicapidae)

Spotted Flycatcher (*Muscicapa striata*) Uncommon migrant (April, September, October). Maximum count 8.

Common Nightingale (*Luscinia megarhynchos*) Uncommon migrant (April, May).

White-throated Robin (*Irania gutturalis*) Uncommon migrant (April, May) with one January record exceptional nationally (Pedersen *et al*, 2017).

Red-breasted Flycatcher (*Ficedula parva*). Uncommon migrant (April, May).

Black Redstart (*Phoenicurus ochruros*) Uncommon winter visitor.

Common Redstart (*Phoenicurus phoenicurus*) Uncommon migrant (spring). Both nominate and more south-easterly breeding subspecies *samamisicus* recorded.

Common Rock Thrush (*Monticola saxatilis*) Uncommon migrant, mainly spring.

Blue Rock Thrush (*Monticola solitarius*) Uncommon migrant (March).

Whinchat (*Saxicola rubetra*) Rare migrant (April)

Northern Wheatear (*Oenanthe oenanthe*) Uncommon migrant (April, October).

Isabelline Wheatear (*Oenanthe isabellina*) Uncommon migrant, mainly autumn. Maximum count 25.

Desert Wheatear (*Oenanthe deserti*) Uncommon migrant, with smaller numbers over-wintering.

Pied Wheatear (*Oenanthe pleschanka*) Uncommon migrant (March, October). Maximum count 6.

Red-tailed Wheatear (*Oenanthe chrysopygia*) Uncommon migrant (April, May, October).

Sunbirds (Nectariniidae)

Purple Sunbird (*Cinnyris asiaticus*) Fairly common resident. Maximum count 30.

Old World Sparrows, Snowfinches (Passeridae)

House Sparrow (*Passer domesticus*) Common resident. Maximum count 200.

Spanish Sparrow (*Passer hispaniolensis*) Rare visitor (January).

Wagtails, Pipits (Motacillidae)

Western Yellow Wagtail (*Motacilla flava*) Rare migrant (April).

White Wagtail (*Motacilla alba*) Uncommon visitor, October to March.

Table 2. Data from Asian Waterbird Censuses. All counts made on an afternoon high tide in January. Scientific names of species involved are given in the systematic list.

	1997 (partial count)	1998	2014	2015	2016	2017
Egyptian Goose		2	4	4	7	2
Greater Flamingo		34	53	80	200	13
Striated Heron			1	1		
Little Egret	1					
Western Reef Egret	3	9	10	3	12	2
Grey Heron	9	2	5	1	1	4
Great Cormorant	5	4	4	7	9	2
Socotra Cormorant		2	8		1	1
Eurasian Oystercatcher	75	41	33	20	42	21
Crab-Plover			3			
Red-wattled Lapwing			2	25	15	18
Grey Plover		55	240	65	85	50
Common Ringed Plover				1		3
Kentish Plover	30	275	100	80	95	102
Lesser Sand Plover	125	850	178	950	580	725
Greater Sand Plover		80	36	60	80	122
Black-tailed Godwit						1
Bar-tailed Godwit	65	385	528	320	200	310
Whimbrel	1	25	22	42	15	2
Eurasian Curlew	45	60	25	33	10	25
Common Redshank	40	120	280	125	225	160
Marsh Sandpiper					1	
Common Greenshank	2	20	65	75	20	42
Terek Sandpiper	1	10	30	65	25	14
Common Sandpiper		1		2	1	1
Ruddy Turnstone	2	33	15	25	22	27
Great Knot			13		20	7
Sanderling		17			2	
Little Stint	5	12	10	10	10	10
Curlew Sandpiper		4	1	15	60	10
Dunlin	250	550	300	960	560	585
Broad-billed Sandpiper						1
Slender-billed Gull	20	13	350	110	70	70
Pallas's Gull	4	2	2			1
Black-headed Gull	120					
Steppe / Caspian Gull	176	34	4	1	12	28
Gull-billed Tern	1				7	
Caspian Tern	11	2	5	9	5	23
Lesser Crested Tern						1

Note: Simon Aspinall

Much of this paper is based upon an unpublished draft prepared by the late Simon Aspinall, a former Chairman of the Emirates Bird Records Committee, before his untimely death in 2011. It is included with the kind permission of his parents, Jack & Sylvia Aspinall.

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Successful captive rearing of an Egyptian vulture at Kalba Bird of Prey Centre, UAE

by Gerard Whitehouse-Tedd and Katherine Whitehouse-Tedd

Abstract

Egyptian vultures (*Neophron percnopterus*) are endangered across their range, and *ex-situ* conservation efforts focus on establishing captive breeding programmes, with the ultimate goal of releasing captive-bred individuals into secure habitat. To date, this species has not been successfully bred in captivity in the Arabian peninsula. Moreover, efforts to reduce the risk of human imprinting by captive-reared birds of other species have typically included the use of hand puppets and excluding visual contact with humans. This report documents the first successful captive rearing of an Egyptian vulture in the United Arab Emirates, and describes the successful return of the chick to its parents without the use of hand puppets. By temporarily returning the chick to its parents during daylight from 11 days of age, it was possible to maintain normal parenting behaviours in the adult birds, this leading to the successful dual-imprinting of the chick. The chick is now included in a flight demonstration as part of a conservation education programme, and will be included in a regional captive breeding programme upon maturity.

Keywords: captive, hand-rearing, incubation, vulture, parent-rearing

The captive reared Egyptian vulture

Introduction

Egyptian Vultures (*Neophron percnopterus*), along with the majority of other species of African vultures, were recently uplisted to Endangered status by the International Union for the Conservation of Nature, IUCN, as a result of dramatic declines in their populations due to intentional and secondary poisoning, poaching, electrocution, bush meat trade, and use in traditional medicines or folklore (Amezian & El Khamlichi 2016; Ogada *et al*. 2016; Birdlife International 2017). Within the Arabian peninsula, Egyptian Vultures occur in Oman and the United Arab Emirates (Inigo *et al*. 2008; Aspinall 2010; Jennings 2010; Porter & Aspinall 2010; Aspinall & Porter 2011), although tracking of birds moving between the two countries indicates that they form one population (IUCN Species Survival Commission 2016). In the United Arab Emirates, Egyptian Vultures are classified as year-round residents to the west of the Hajar Mountains, primarily in the area of Jebel Hafit, just south of Al Ain, an isolated massif which is partly in the UAE and partly in Oman (Aspinall 2010, Porter & Aspinall 2010, Aspinall & Porter 2011). Populations in the UAE are considered to have declined significantly since 2006 (UAE Bird Database). Some migration occurs southwards into the UAE and Oman from southern Iran (Porter & Aspinall, 2010). There are also separate resident populations in Yemen and western and central Saudi Arabia (Aspinall & Porter 2011).

Although coordinated captive breeding programmes have been established for a number of vulture species,

including the Egyptian Vulture, these programmes have not yet extended to the Arabian peninsula (Inigo *et al*. 2008). To the authors' knowledge (and according to the species' studbook) no Egyptian Vultures have previously been bred in captivity in the Arabian peninsula.

Given the endangered status of this species, it is imperative that any captive breeding is performed in a manner that promotes natural behavioural development of individuals in order that captive-bred birds are suitable for future breeding or even release projects. In the event that a chick requires hand-rearing, it is therefore vital that imprinting on humans is prevented (Mendelssohn & Marder 1984). Although many zoos and captive facilities utilise puppets to mimic parent birds when hand-feeding chicks, successful prevention of imprinting (including normal behavioural and breeding development) has previously been reported in hand-reared Lappet-faced Vultures *Torgos tracheliotus* without the use of these puppets (Mendelssohn & Marder 1984). Instead of utilising the somewhat cumbersome hand-puppets which lack the facial expressions of parent birds, these authors provided hand-reared chicks with the opportunity to see conspecifics (i.e. other chicks or its own reflection in a mirror) and early exposure to conspecific adult birds during the hand-rearing process (Mendelssohn & Marder 1984). This current paper documents the successful breeding and artificial rearing of an Egyptian Vulture, which was subsequently returned to its parents without the use of hand puppets, following a similar method of introduction as previously described in Lappet-faced Vultures (Mendelssohn & Marder 1984).

Breeding and rearing of Egyptian Vulture chicks at Kalba Bird of Prey Centre

The 2015 breeding season

The parent birds were part of a group of six adult wild-born birds (three male and three female) that were donated to the Sharjah Environment and Protected Areas Authority, EPAA, by colleagues in Oman. All of the birds were injured and therefore unsuitable for release. One pair were housed at Kalba Bird of Prey Centre (hereafter KBOPC) on public display, and two pairs were housed off-display at the Breeding Centre for Endangered Arabian Wildlife (hereafter BCEAW) both facilities being operated by the EPAA in Sharjah. The KBOPC pair arrived on 23rd March 2014 and settled quickly into their new environment, as evidenced by their calm behaviour and normal activity. Due to the poor flight ability of the pair, they constructed a nest on the ground of the aviary (a natural rock and soil substrate). The female laid an egg early in the morning on 3rd May 2014, but had broken it prior to staff discovery. No more eggs were laid that season.

The pair were seen to be mating again around 13th February 2015 and laid one egg on 3rd March 2015 and both birds displayed normal nesting and incubating behaviours; therefore, the decision was made to leave the egg with the parents. On 8th March a second egg was laid. Both eggs were temporarily removed from the parents during their feeding time and examined on a digital egg monitor ("Egg Buddy'', Avitronics; Biotech, UK) on 22nd March. No heartbeat was detectable in the first-laid egg although a heart-beat was detected in the second-laid egg. Both eggs were returned to the female within 5 minutes. On 14th April the first-laid egg hatched and the chick was seen to be healthy and being well cared for by the parents (they were sitting over it in the nest and displayed heightened protective behaviour when human caretakers were visible). The lack of detectable heartbeat during the incubation period of this egg may be explained by the thickness of the egg shell, which may have reduced the detection ability of the Egg-Buddy (see discussion in a later section).

The following morning, the chick was still being cared for by the parents, but at midday the chick could not be found; the parents were no longer sitting on the nest and were visibly disturbed, exhibiting excited and aggressive behaviours. A search of the aviary and surrounding areas revealed no evidence of the chick or its remains, and it is our belief that it was taken by a predator (either a rat or snake) as a rats' nest was subsequently located in an adjacent aviary. Rodent traps had already been placed around the centre, but additional traps were laid and intensive searches implemented to locate and destroy any rodent nests. The parents continued to incubate the remaining egg, which hatched on 20th April 2015, and was immediately removed from the parents and hand-reared. At this point, in order to maintain normal incubating behaviours in the pair, a painted wooden replica egg was placed in the nest, which the female continued to incubate. The pair were seen mating repeatedly over the next 2 weeks, after which time the female vacated the nest (10th May 2015).

The chick (egg #2) was housed in an incubator (Grumbach C84, Germany) set at 37.2°C, with humidity at 65%. The chick was offered food approximately 17 hours after hatching, once the chick began displaying an interest in food. Typically, the first feed is recommended to occur 6 – 12 hours after hatching since the yolk-sac is still actively supplying nutrients to the chick during this period (Duerr 2007). Food should only be offered once a feeding response is seen in the chick, and therefore the first feeding event may be delayed for some chicks, particularly those with a large yolk reserve (Duerr 2007). The chick appeared slightly weak but had a fair appetite and took food for the following 2 days. The chick was offered breast of quail 3–4 times per day as this was a readily available prey item for the centre, and wild Egyptian Vultures are known to include a range of bird species in their diet during the breeding season (Margalida *et al*. 2012. However, the chick was found dead on the morning of 23rd April 2015 and was sent to the BCEAW for post-mortem examination. Examination revealed marked deformities in the chick's orbital sockets, and a variety of abnormalities associated with its internal organs.

The 2016 breeding season

As part of an internal evaluation of the previous year's breeding season, the temperaments of the parent

birds were reviewed. Records of their behaviour during routine cleaning and maintenance activity in or around their enclosure were assessed, and in particular, their behavioural response to the presence of caretakers during the breeding season was considered. This also included events in which eggs (or nests) were removed (or inspected) whilst the parent birds were feeding. At no point were the birds observed to exhibit any fear or aggression responses; they maintained normal feeding, preening, and social behaviours and were not deemed to exhibit any change in activity budget or enclosure use in relation to the presence of humans. Observations of their behaviour were made surreptitiously from hidden locations outside of their enclosure, as well as during enclosure cleaning and maintenance, whereby we were confident that our level of interaction with them, their eggs or chicks, was not likely to interfere with their potential for parenting.

The following breeding season an egg (#3) was laid on 14th February 2016, and a subsequent one (#4) on 20th February 2016. Both eggs were removed immediately upon laying, and artificially incubated (Grumbach incubator, set at 37.2°C with humidity of 35%, turned 180° in one direction, and then back again in the opposite direction, every 5 hours). Upon removal of egg #4, a replica egg was placed in the nest and the parents proceeded to incubate this for the duration. Forty days after each laying, each respective egg was removed from the rollers.

It is worth noting here that methods used to determine the fertility of the eggs prior to hatching were unsuccessful. Over the two breeding seasons reported here, heartbeats were often not detectable by the Egg-Buddy in eggs that subsequently hatched. Likewise, candling was unable to confirm fertility, as the eggshells were consistently too thick and impenetrable to our candling lamp (OvaView High Intensity Candling Lamp, Brinsea, UK). The Egg-Buddy manual (Avitronics; Biotech, UK) states that a heartbeat should be detectable 5 – 10 days, and that users should check again 24 hours later before disposing of the egg. However, our decision to continue the incubation of eggs in spite of the absence of detectable heartbeat proved worthwhile. Moreover, in those eggs in which a heartbeat was detected, detection was not possible until at least 22 – 25 days since laying. We would therefore urge facilities to persevere with vulture eggs despite an inability to detect a heartbeat using the Egg-Buddy system, and to consider candling results with caution due to eggshell thickness.

Egg #3 began pipping (cracking the shell of the egg during hatching) on 26th March 2016, at which time it was transferred to a hatcher (Grumbach C84, set at 37.2°C and 85–90% humidity). This egg hatched, with assistance (due to delayed progress), on 27th March 2016 (42 days after laying, which is consistent with reported incubation periods in the wild (Jennings 2010)). Two hours later, the chick was then transferred to a brooder (Brinsea TLC50, UK, set at 37°C and 30-34% humidity) and first offered food approximately 18 hours after hatching. The chick had a good appetite, appearing to be stronger than the previous season's chick. Despite feeding as expected, the chick consistently lost weight, dropping from 58.5g on day 2 to 54.0g on day 4, and died on 1st April 2016 (day 5). Post mortem results determined the cause of death to be a retained yolk sac, which may have been associated with bacterial contamination during incubation, the assisted hatching process or a pre-existing underlying disease condition, as has been found in other bird species (Dzoma & Dorrestein 2001).

Egg #4 hatched unaided on 3rd April 2016 (43 days after laying; Figure 1a and 1b) and the same process as detailed for egg #3 was followed in terms of housing and husbandry. Due to the lack of similarly aged conspecifics present in the facility at the time of initial intervention, it was not possible to co-house or expose the chick to other Egyptian Vultures, as had been performed for Lappet-faced Vultures described by Mendelssohn & Marder (1984).

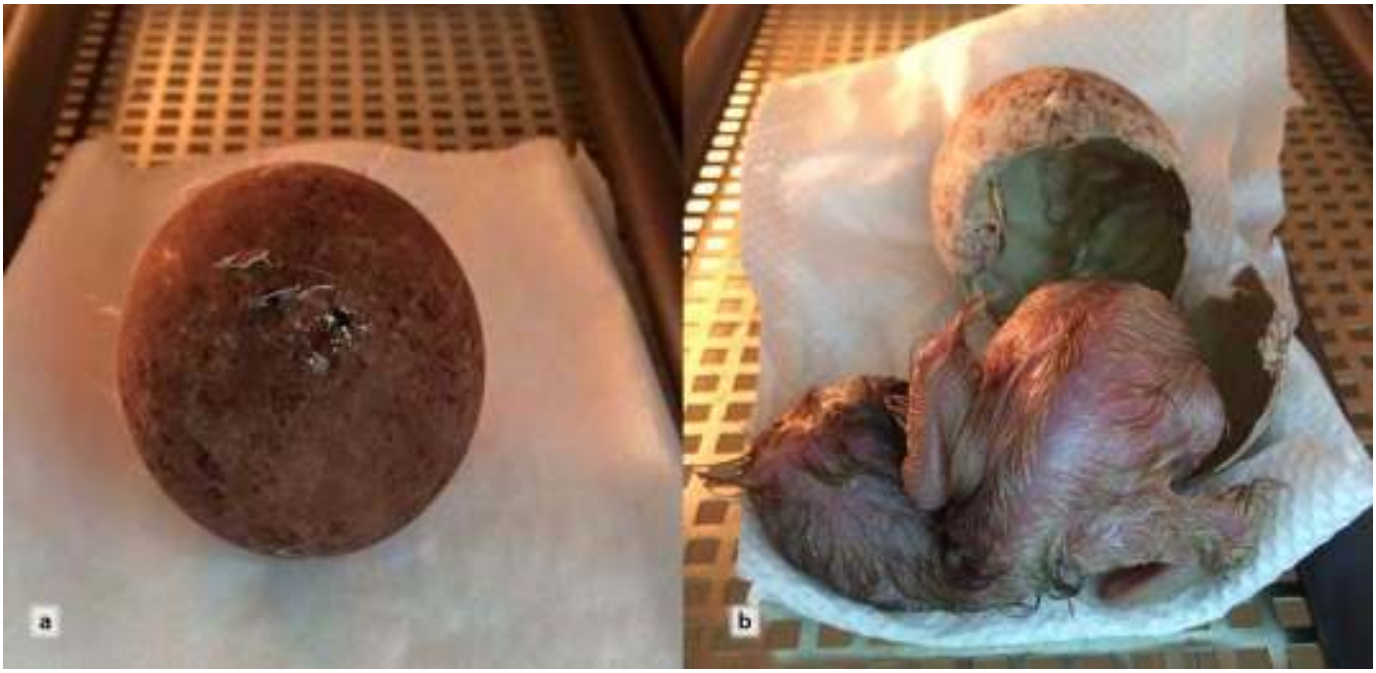

Figure 1. (a) Egyptian Vulture egg in the incubator set up as a hatcher, 80% humidity, 37°C (pipping), (b) Egyptian Vulture just hatched in incubator (set up as a hatcher)

Figure 2. (a) chick returned to parents at 11 days of age (removed overnight), (b) chick at 22 days of age with a parent bird, (c) chick at 46 days old.

Likewise, the design of the adult parent birds' aviary was not amenable to providing visual access between parents and chick.

This chick weighed 60.5g on day 1 and fed for the first time 12 hours after hatching, by which stage it had lost weight (59.0g). The chick was markedly more interested in food and more active than the first chick of this season; the chick maintained a relatively stable body weight for the first 2 days, after which time it steadily gained an average of 16g per day for its first week (weighing 166g on day 11). Human contact was minimised, and involved only the handling necessary to weigh the chick at each feed. However, no hand-puppets or other methods of reducing the risk of imprinting were employed.

Following careful consideration by the experienced rearing team, the parent birds were assessed to be behaviourally receptive to human activity during their nesting activities, and the decision was taken to attempt to return the chick to the parent birds. On day 11, the surviving chick was not fed in the morning, but instead returned to the parents (Figure 2a). At this point, the replica egg was removed from the nest and the chick placed in the nest. The parents were fed at this time and a staff member was stationed inside the aviary to monitor their behaviour towards the newly-introduced chick. Both parent birds immediately investigated the chick and began passing food to it. No aggressive or undesirable behaviours were observed, and after a short period of feeding, the female bird began brooding the chick in the nest. The male also participated in the brooding during the morning. The chick was temporarily removed from the nest at midday for weighing, at which point it was 194g, providing evidence of successful feeding by the parent birds. The chick spent the remainder of the day with the parents, under supervision of a staff member and was then returned to the artificial brooder in the evening, as overnight monitoring for predators in the aviary was not feasible. No food was offered by keepers whilst the chick was removed from the parents. This pattern continued up until the chick was 27 days of age (with the exception of the midday weighing, which was excluded from day 12 onwards; Figure 2b).

From 28 days of age, when the chick weighed 859g and was fledging, the chick was left with the parents full-time. No problems were experienced (Figure 2c); at 89 days of age the chick was removed from the parent's aviary and housed with an unrelated juvenile Egyptian Vulture in order to encourage normal flight behaviour and muscle development since the parents' injuries prevented them from flying normally.

Conclusion

At the time of writing, the chick is now 518 days of age, weighing 1582g, and has been successfully trained for flight displays as part of the KBOPC's education programme. The bird displays characteristics of a good dual-imprint (i.e. having established an attachment to both the parent birds, and human caretakers). To this end, the bird is relatively shy of human approach, but still tolerant of necessary handling without apparent signs of distress. Upon maturity, the bird will be included in our captive breeding programme.

Given the endangered status of the Egyptian Vulture, successful captive breeding programmes are an important conservation measure, undertaken by a number of facilities around the world, with varying methods and outcomes. The vulture group at KBOPC are integral to our education programme, and future breeding efforts are planned, whereby the maintenance of bonded-pairs is critical for future breed-to-release programmes. The artificial rearing of chicks during their vulnerable early days was deemed necessary in order to eliminate the risk of predation. Unlike traditional methods of hand-rearing, no puppet or mock parent bird was utilised whilst the chick was being handled by humans. We followed the method described by Mendelssohn & Marder (1984) for Lappet-faced Vultures, and successfully implemented a modified version of this method with Egyptian Vultures in order to avoid the use of unwieldy puppets. To our knowledge, this

is the first report of this rearing method for this species. Due to the lack of similarly aged conspecifics during the initial rearing period of this Egyptian Vulture, a degree of human imprinting occurred.

Although apparently successful (i.e. the bird is healthy and not solely imprinted on humans), by interfering with parent birds to this extent during the incubation and rearing process, the method reported here poses a risk of detrimentally influencing parenting behaviours (e.g. potentially resulting in aggression towards the chick or egg). However, these birds were carefully evaluated for their response to human activity around the nest prior to egg-laying, and throughout the reintroduction, and no aggressive or otherwise unwanted behaviours were observed.

By providing a replica egg, and then later re-introducing the chick to the parents, we were able to successfully maintain normal parenting behaviours in the adult birds. Likewise, despite initial human-assisted rearing, the offspring has maintained a natural shyness of humans, although it must be acknowledged that imprinting was not completely prevented, and therefore this objective was not met. Nonetheless, as a primarily parent-reared chick, it is hoped that the bird will be better suited to future breeding and reintroduction programmes.

Other facilities considering this method should ensure parent birds are behaviourally suited to this type of intervention. Although initial breeding seasons were unsuccessful, we consider this method of dual-imprinting to have been effective, and will continue to evaluate this strategy in future breeding seasons with this (and potentially other) breeding pairs.

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New record of the Egyptian Tomb Bat *Taphozous perforatus* (Chiroptera: Emballonuridae) from Dhofar, Oman

by Saeed Al-Shanfari, Hanne Eriksen, Jens Eriksen and Andrew S. Gardner

Plate 1. Egyptian Tomb Bat in the cave at Rakhyut. This individual has a lighter coat. Note the hair extending over the rump to the tail membrane.

Plate 2. A darker Egyptian Tomb Bat in the cave at Rakhyut

Two species of sheath-tailed bats (*Taphozous* Geoffroy, 1818) have been recorded in Arabia (Harrison and Bates, 1991). These are the larger Naked-rumped Tomb Bat (*Taphozous nudiventris* Cretzschmar, 1830) and the smaller Egyptian Tomb Bat (*Taphozous perforatus* Geoffroy 1818). The former is well-known in northern Oman (Harrison and Bates, 1991), and has also been recorded at Ain in Dhofar (Harrison and Bates, 1991) and from Suhur cave in Wadi Nahiz (Gardner and Howarth, 2007). In the UAE, records of the nominate subspecies of Naked-rumped Tomb Bats include Al Ain, Jebel Faiyah (Harrison and Bates, 1991) and Qarn Nazwa while the larger *Taphozous nudiventris magnus* has been recorded from Das Island (Harrison and Bates, 1991). Harrison (1955) described a further subspecies as *Taphozous nudiventris zayidi*, based on a specimen collected by the late Sheikh Zayed bin Sultan Al Nahyan, then Ruler's Representative in Abu Dhabi's Eastern Region, in Al Ain, as reported by Hellyer and Aspinall (2004). However this form is now known to be intermediate with specimens from southern Arabia and its validity is considered doubtful (Harrison and Bates, 1991).

The Egyptian Tomb Bat *Taphozous perforatus* is a medium-sized sheath-tailed bat, widely distributed throughout sub-Saharan and northern Africa and as far eastwards as Pakistan. Within the Arabian Peninsula, it has been recorded from the Levant and western Saudi Arabia, western areas of Yemen, and also from northern Oman. The first records from Oman were reported by Harrison (1968) from a tower in Sohar fort, flying at dusk among palm groves at Suwera and Wadi Arad and from a deep cavern in the hillside above gardens near Siya (Harrison and Bates, 1991). As far as we have been able to ascertain, there have been no records of this species from central or southern Oman. This note reports the first record of the Egyptian Tomb Bat from Dhofar, from a cave near Rakhyut, Jebel Qamr.

In early November 2015, three of us, SAS, HE and JE, were birdwatching in the Rakhyut area about 80 km west of Salalah in Dhofar, southern Oman. We visited a cave at the foot of the cliffs in a wadi west of the village of Rakhyut in the evening of 7th November. The cave was large, approximately 20m wide, 30m deep and from 1m to 8m high. The entrance was blocked with sticks and blankets and showed evidence for being used at times to keep animals, though none were present during our visits. Soon after entering the cave, we saw a few bats clinging to the roof. Anticipating that more bats would be present during daylight hours, we returned in the early morning of 8th November. At least 100 bats were now present, with bats constantly arriving and leaving. Several photographs were obtained for identification purposes. These were identified by ASG as Egyptian Tomb Bats on the basis of the fur on the belly and rump clearly extending posteriorly as far as the tail membrane. This represents an extension of the known range of this species into southern Oman. All Arabian specimens of the Egyptian Tomb Bat have been referred to the East African subspecies *Taphozous perforatus haedinus* (Harrison and Bates, 1991).

Egyptian Tomb Bats have not yet been recorded from the UAE, although it is likely that the species will be found in the Hajar Mountains. Mahmood-ul-Hassan *et al.* have recently described a range extension for this species in Pakistan (Mahmood-ul-Hassan *et al*., 2012). In their paper, the authors describe the ultrasound call and compare it to other recordings from Egypt, Israel and the UAE. However the UAE record is in error as they are using the description in Davis (2007) which states that the species has not yet been recorded from the UAE, but describes the calls as 'quasi-CF calls, two prominent harmonics, lower harmonic end frequency 27-29kHz', without giving the source of this information.

Plate 3. Common Genet outside the Rakhyut cave

Plate 4. Dhofar tailless whip scorpion *Phrynichus dhofarensis* in the Rakhyut cave.

The wadi at Rakhyut is typical for Dhofar, and similar wadis can be found over a 200 km stretch from the Yemen border to Jebel Samhan. It is well vegetated with large trees on the wadi floor and smaller trees and bushes on the steep slopes. It is possible that the Egyptian Tomb Bat is quite widespread where caves are present in the Dhofar wadis, but time did not allow for further exploration.

The bat shared the cave with other interesting creatures including a tailless whip scorpion *Phrynichus dhofarensis* and Ali Kiyumi's Leaf-toed Gecko *Hemidactylus alkiyumii*. In the wadi outside the cave, we encountered two Common Genets *Genetta genetta*, one of which allowed close approach for a photo. Arabian Wolves *Canis lupus arabica* were heard in the wadi at sunset.

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Saving the UAE's Halfa Grass

by Mohammad Shahid and N.K. Rao

Abstract

Halfa grass (*Desmostachya bipinnata*) has previously been recorded from Kalba and Ra's al-Khaimah in the United Arab Emirates (UAE). Recent studies at both of these locations have shown that the species is no longer present. The disappearance of *D. bipinnata* in the UAE is believed to be the result of encroachment on its natural habitat. The species has both fodder and medicinal values and is also important in stabilising soils. During one visit to the Ra's al-Khaimah site, prior to its disappearance, one plant of the grass was collected and planted at the research facilities of International Centre for Biosaline Agriculture (ICBA), Dubai for propagation. The grass has established well at the ICBA and can be used for reintroduction to the wild. This planting of the species at the Centre may have helped to save the species from extinction in the UAE.

Photo 1. *Desmostachya bipinnata* growing close to the coastal area of Ra's al Khaimah in 2007

Introduction

Halfa [*Desmostachya bipinnata* (L.) Stapfis] is a rhizomatous perennial grass, which grows mostly in desert and semi-desert environments. It is a C4 plant with long and sturdy rhizomes that help in stabilising sand. A salinity- and drought-tolerant grass, it can be grown in marginal lands with high salinity and a shortage of fresh water as a fodder for livestock.

Halfa is used in many traditional medicines in India to cure leucorrhea, urinary tract infections, dysentery, menorrhagia and several other diseases. The plant can also be used for making ropes, brooms and thatch. In the Indian subcontinent, it has been used for millennia in sacred ceremonies (Griffith, 1896). According to legend, Lord Buddha was sitting on a mat made of *D. bipinnata* when he attained the enlightenment (Williams, 2006).

D. bipinnata is native to parts of Northeast Africa as well as West and South Asia, (Cope, 1982). In the Arabian Peninsula, the species has been reported in Oman (Ghazanfar, 1992) Saudi Arabia (Chaudhary, 1989), UAE (Jongbloed, 2003) and Yemen (Wood, 1997). In the UAE, the species was found at Kalba in the emirate of Sharjah (Jongbloed, 2003) and in the coastal zone of Ra's al-Khaimah (unpublished data).

Photo 2. *Desmostachya bipinnata* planting at the International Centre for Biosaline Agriculture (ICBA)

Materials and Methods

Between 2007-13, the authors undertook a number of expeditions throughout the UAE to document the local wild flora, with a focus on plant species considered to be rare. *Desmostachya bipinnata* (L.) Stapf was noted by A. R. Western once at Kalba, an East Coast town in the emirate of Sharjah (Jongbloed, 2003). The authors conducted many visits during 2007-09 to the Kalba area to search for the species, but without success. In 2007, however, they were able to locate about 50 plants of *D. bipinnata* growing at about 200 metres from the coast in Ra's al-Khaimah emirate (25°38 34 N, 55°44 03 E; Picture 1). The species was growing in association with other plants, including *Zygophyllum qatarense*, *Cornulaca monacantha* and *Heliotropium digynum*, in a sandy soil.

Seeds of five *D. bipinnata* plants were collected from the site and tested for germination at the seed laboratory of International Centre for Biosaline Agriculture (ICBA), Dubai, UAE. The results indicated that the seed of the species from Ra's al-Khaimah was not viable. Subsequently one plant with its roots was carefully removed from the site. All of its tillers with roots were separated meticulously and planted separately at the ICBA field research facilities in May 2008.

Results

In 2013, the research team from ICBA revisited the *D. bipinnata* site in Ra's al-Khaimah, but no plants of the species were found. The area had been cleared for construction. With the elimination of the flora from the site, the last-known *D. bipinnata* plant in the UAE had gone.

Planting of *D. bipinnata* at ICBA was, however, successful (Photo 2). The species has established well in the field and propagates through rhizomes. It began flowering two months after being transplanted at the Centre.

Conclusion

Development in different parts of the UAE is having a deleterious effect on the country's native flora. Due to the extent of new construction, especially in areas close to cities and towns, many wild plant species are rapidly being lost, the loss of *Desmostachya bipinnata* in its natural habitat in the country is one example. The UAE ecotype of the species is being protected at ICBA and can be reintroduced to the wild in the future, with the help of relevant agencies.

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Two populations of *Salicornia europaea* in the United Arab Emirates

by Mohammad Shahid

Abstract

The plant *Salicornia europaea* is cultivated for oilseed and as a fodder crop in various parts of the world. Two local populations of the species, in the emirates of Ra's al-Khaimah (RAK) and Umm al-Qaiwain (UAQ), both part of the United Arab Emirates (UAE), were studied. Both of the ecotypes, i.e., *RAK* and *UAQ,* grow in coastal areas on the shores of the Arabian Gulf. Studies reveal that they are different genotypes. The *UAQ* ecotype starts flowering and maturing one week earlier than the *RAK* ecotype. The spikes of *RAK* turn yellow before maturing, while those of the UAQ genotype turn pink during the same stage. Data on different characteristics including plant height, plant dry weight, number of branches per plant and number of spikes per plant of the two populations were also taken to identify differences. While the *S. europaea* population in Umm al-Qaiwain is thriving, an invasive halophytic species, *Sesuvium portulacastrum,* is present in some of the area inhabited by the population at Rams, in Ra's al-Khaimah.

Picture1. *Salicornia europaea* growing at the edge of a lagoon at Rams, Ra's al-Khaimah

Introduction

Salicornia europaea, commonly known as glasswort or samphire, is an annual halophyte in the family Chenopodiaceae. It grows in areas of intertidal and inland saltmarshes as well as on the edges of lagoons. The species is one of the most salt-tolerant terrestrial plants and can be cultivated as a vegetable, oilseed and fodder crop using brackish water for irrigation.

Salicornia europaea can be eaten either fresh or cooked. While it has long been used as food, especially in northern Europe, in recent years it has attained popularity as a gastronomic delight in fashionable restaurants. It is generally steamed or cooked in a microwave, followed by light frying in butter or olive oil.

The seed oil of *S. europaea* is very nutritive with high health benefits (Liu *et al.,* 2005) compared with other halophytes (Roshandel and Shamsi, 2015). The oil contains five main fatty acids including stearic acid (2.37%), linolenic acid (2.63%), palmitic acid (7.02%), oleic acid (13.04%) and linoleic acid (75.62%) (Liu *et al*. 2005). The majority of the fatty acids found in the oil are unsaturated, e.g. linoleic acid and oleic acid, considered beneficial for human health.

Other species of the genus *Salicornia* have successfully been used as fodder in the USA (Glen *et al.,* 1998) and Kuwait (Abdal, 2009). *Salicornia* seed meal can also be used as a protein supplement in feeds of different livestock animals (Glen *et al*., 1998).

Studies on various halophytes have shown that they contain many compounds which have medicinal properties, including anti-inflammatory, anti-tumour, antimicrobial and antioxidant (Rhee *et al.,* 2009). These compounds help to fight acute inflammation, cancers, cardiovascular disorders and some infectious diseases, as well as help in slowing the ageing process (Ksouri *et al.* 2011). A study of *Salicornia herbacea* (a synonym of *S. europaea*) showed that it contains tungtungmadic acid, quercetin 3-0-glucoside, and isorhamnetin 3-0-glucoside, which are anti-inflammatory, immunomodulatory and antioxidative in nature (Rhee *et al.,* 2009).

The species is native to North America, Europe and South-west and East Asia (Bojian *et al.,* 2003). In the Arabian Peninsula, it has been reported from Kuwait (Oman, 2001), Qatar (Norton *et al.,* 2009), Saudi Arabia (Chaudhary, 1999) and the UAE (Brown and Sakkir, 2004).

Map 1. The red arrows indicate the sites where UAE *Salicornia europaea* populations were studied

Map 2. At Rams, Ra's al-Khaimah, the *S. europaea* population site in green

Map 3. The green area shows the location of the *S. europaea* population in the Khor al-Beida, Umm al-Qaiwain.

Table 1. Seven different characteristics of two ecotypes of *Salicornia europaea* of the United Arab Emirates studied during 2015-2016

	Populations	
	RAK	**UAQ**
Characteristics	**Mean ± SD**	**Mean ± SD**
Plant height (cm)	39.9 ± 2.1	44.8 ± 2.4
Plant dry weight (g)	38.6 ± 2.6	48.3 ± 4.5
Number of branches/plant	28.8 ± 1.4	36.4 ± 1.7
Number of spikes/plant	321.1 ± 37.3	446.1 ± 43.4
Spike color	Yellow	Pink
Start of Flowering	Second week of November	First week of November
Start of Maturity	Third week of December	Second week of December

Materials and Methods

Two populations of *Salicornia europaea* in the United Arab Emirates (UAE), from Rams [N 25°53.062, E 056°00.760, (Picture 1)], in Ra's al-Khaimah, and in Umm al-Qaiwain [N 25°31.805, E 055° 35.335, (Photo 2)] were studied to identify differences between them. Both populations are located on the edge of coastal lagoons, around 60 km. apart (Map 1). At Rams, the *S. europaea* population was growing on the shores of a narrow lagoon with an average width of around 130 m (Map 2). At high tide, the *Salicornia* plants are submerged in water (Picture 3). No other plant species were found to be growing in direct association with them. The second *Salicornia* population was found on the edge of the large Khor al-Beida lagoon in Umm al-Qaiwain (Map 3). A mangrove species, *Avicennia marina,* was also present.

The study of the two *S. europaea* populations was carried out during 2015-16. Various plant traits including days to flowering, days to maturity, plant height, plant dry weight, the number of branches per plant, spike colour and the number of spikes per plant were studied to identify difference between the two *S. europaea* ecotypes. Data on twenty-five plants selected at random from each population were measured for the agronomic characteristics. A Garmin GPS 72H was used to record the geographical co-ordinates of the *Salicornia* populations, while data on the habitats were also recorded.

The data were analysed using standard statistical methods to ascertain significant differences between the *Salicornia* ecotypes for the four different morphological characteristics.

Picture 2. *Salicornia europaea* population at Umm al-Qaiwain, UAE

Picture 3. At high tide, *Salicornia europaea* plants submerged in water at Rams, Ra's al-Khaimah

Picture 4. The spike colour of *Salicornia europaea* ecotype RAK growing at Rams.

Picture 5. The spike colour of the UAQ ecotype of *Salicornia europaea* found at Khor al-Beida.

Picture 6. *Sesuvium portulacastrum* invading the *Salicornia europaea* habitat at Rams.

Results

The study of various agronomic traits of the two *Salicornia europaea* populations in the UAE reveals that they are separate ecotypes with distinct characteristics (Table 1). The UAQ *Salicornia* population starts flowering in the first week of November and matures in the third week of December. The RAK population begins flowering in the third week of November, maturing in the last week of December. The spike colour of the RAK ecotype is yellow (Picture 4), whereas it is pink for the UAQ ecotype (Picture 5). As for plant height, the mean of the RAK ecotype is about 40 cm, while the UAQ ecotype stands around 45 cm, a difference of 11 per cent. Plant dry weight of the UAQ ecotype is 48 g, more than 20% greater than RAK (38.6 g). As for the number of branches per plant, the UAQ ecotype has more than 36, while the RAK ecotype has less than 29. The maximum variation between the two *S. europaea* ecotypes was observed for their number of spikes per plant. RAK has 320 and UAQ 446, a difference of more than 28% between the two populations for this characteristic.

The Umm al-Qaiwain population of *S. europaea* appear to be in a stable condition without any immediate threat from development or invasive plants. At Rams, an introduced halophytic species, *Sesuvium portulacastrum* was observed in the vicinity. This appears to have affected the growth of *S. europaea* there (Picture 6). Eradication of the invasive species from the site could be considered.

Conclusion

The two populations of *Salicornia europaea* at Rams, Ra's al-Khaimah (RAK) and Umm al-Qaiwain (UAQ) are different and can be classified as two ecotypes with distinct characteristics. The *RAK* ecotype may be threatened as a result of the invasion of a foreign halophyte, *Sesuvium portulacastrum*. Observation and possible eradication of this introduced invasive species may be necessary to prevent the disappearance of this unique UAE *Salicornia* population.

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Observations of rays and guitarfish (Batoidea) in shallow waters around Siniya Island, Umm al-Qaiwain, United Arab Emirates

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Abstract

Nearshore, shallow water habitats are believed to be highly important for various species of threatened sharks and rays (batoids) around the world. Yet, there is limited information on which batoid species use them. During fieldwork on Siniya Island in the Emirate of Umm al-Qaiwain, United Arab Emirates (UAE), rays and guitarfish were observed on twelve occasions in shallow waters or found stranded along the shoreline. At least three species were identified from at least 20 individuals (adults and juveniles) consisting of the Arabian banded whipray, *Maculabatis randalli*, the Halavi guitarfish, *Glaucostegus halavi*, and cowtail rays, *Pastinachus* sp. Our observations highlight the importance of shallow water habitats for at least these batoids. Many coastal habitats in the UAE and broader region are currently threatened by development projects and other anthropogenic activities, highlighting the urgent need to better understand their role in maintaining shallow subtidal biodiversity.

Keywords Batoids • Elasmobranch • Littoral zone • Arabian Gulf • Coastal development • Conservation

Introduction

Nearshore, shallow waters are highly productive habitats supporting a rich diversity of species and are considered extremely valuable ecosystems providing high quality goods and services to the environment and economy (Knip *et al*. 2010; Davy *et al*. 2015). Many species of sharks and rays use shallow habitats and their presence is a crucial component in shaping ecosystem dynamics (Frisk 2010; Knip *et al*. 2010).

Globally, sharks and rays face a variety of threats from fishing, habitat degradation, climate change and pollution (Simpfendorfer *et al*. 2011) with reports suggesting that rays, guitarfishes, and sawfishes have the highest number of species considered threatened with extinction on the IUCN Red List of Threatened Species (Dulvy *et al*. 2014). With K-selected life histories - long-lived, slow growing and producing few offspring, batoids are highly vulnerable to over-exploitation (Frisk 2010; Stevens *et al*. 2000). According to Dulvy *et al*. (2014), of the 539 species of skates and rays assessed by the IUCN, 3% are considered Endangered, 6% Vulnerable and Near Threatened respectively, and 25% are Data Deficient. The combined effect of fishing, habitat loss and degradation exposes many of these coastal species to decline (Dulvy *et al*. 2014), whilst overfishing has ecosystem-wide consequences (Stevens *et al*. 2000).

The Arabian Gulf is a unique shallow, semi-enclosed marine ecosystem, with extreme environmental conditions and extensive shallow areas of less than 20m (Sheppard *et al*. 1992; Naser 2014). This basin is surrounded by one of the most anthropogenically impacted regions in the world with continuous pressure due to oil exploitation, desalination plants, and rapid, large-scale coastal development as well as concomitant loss of important marine habitats (e.g. mangroves) (Halpern *et al*. 2008; Van Lavieren *et al*. 2011; Naser 2014). Population growth and urbanisation in close proximity to the coast compounded by limited environmental policies or management action have increased these threats to the marine environment (Van Lavieren *et al*. 2011). The United Arab Emirates (UAE) has experienced rapid coastal development, particularly with mega-projects and multi-use artificial islands changing the marine ecology and exposing biodiversity to unknown long-term, irreversible consequences (Hamza and Munawar 2009; Cressey 2011; Van Lavieren *et al*. 2011).

Fishing activities in the Arabian Gulf are largely artisanal but batoids are often incidentally caught while targeting other species and are mostly discarded (Sivasubramaniam and Ibrahim 1983; Jabado *et al*. 2014b). While there has been an increase in elasmobranch studies and observations in the region and particularly in the Arabian Gulf (Jabado *et al*. 2014a, b; Last *et al*. 2012; Moore and Pierce 2013; Robinson *et al*. 2013), there is still limited research on batoids. In fact, batoids have long been considered the most taxonomically problematic of all elasmobranch groups (Last *et al*. 2016). The limited information that is available on most species is confounded with misidentifications making any available data of limited use. Last *et al*. (2016) provided the first comprehensive identification guide to batoids of the world which includes a number of taxonomic and nomenclatural decisions to remove the current ambiguity in the existing classifications. Specific to species occurring in the Arabian Gulf and those covered in this paper, the genus *Rhinobatos* is no longer considered monophyletic and two rhinopristiform families were erected, namely Glaucostegidae and Trygonorrhinidae (Last *et al*. 2016). While nomenclatural issues still exist in the genus Himantura, it has been subdivided into seven genera, namely Brevitrygon, Fluvitrygon, Fontitrygon, Maculabatis, Pateobatis, Himantura, and Urogymnus (Last *et al*. 2016). Here we report the occurrence of ray species that are endemic to the Arabian region from around Siniya Island in order to record our observations and increase our knowledge of the spatial ecology of these species in the Arabian Gulf.

Materials and Methods

Study Area

Siniya Island (25°36'20.63"N 55°36'28.85"E) in Umm al-Qaiwain (UAE) is 13 km long, located 2 km offshore (Figure 1), and surrounded by a variety of habitats - very shallow waters, seagrass beds, mangroves, and lagoon inlets. Situated in one of the least developed Emirates, Siniya has restricted access and remains one of the last untouched wetland/ mangrove areas in the UAE. It has been classified by BirdLife International as an 'Important Bird Area' (Hellyer 2016), with thousands of migrating shorebirds visiting every year, and the largest breeding colony of regionally endemic Socotra cormorants (*Phalacrocorax nigrogularis*) in the Arabian Gulf (Muzaffar *et al*. 2017).

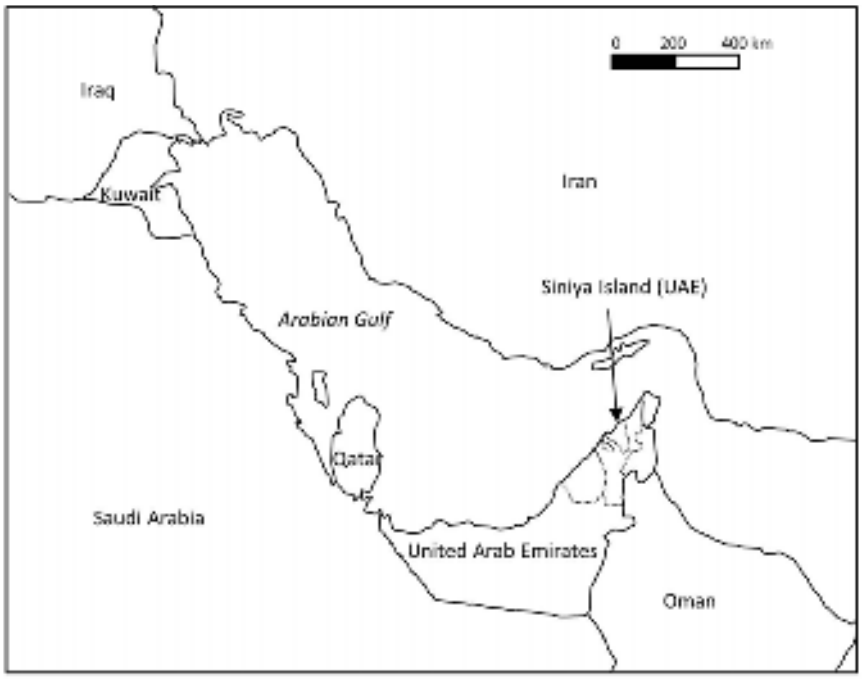

Figure 1 Map indicating location of Siniya Island, United Arab Emirates within the Arabian Gulf

Observations

Between March 2014 and November 2016, while monitoring the Socotra cormorant breeding colony on Siniya Island, batoid observations were recorded. Videos or photographs of specimens were taken when possible, and data including time, depth and approximate size (Disc Width (DW) or Total Length (TL)) were collected. Identification of specimens was based on Randall and Compagno 1995; Last et al. 2012; Last *et al*. 2016.

Figure 2 **(a)** *Maculabatis randalli* in shallow waters **(b)** *Maculabatis randalli*, bite marks on rear of pectoral disc (circled) **(c)** *Pastinachus* sp. **(d)** A juvenile *Glaucostegus halavi* in shallow waters **(e)** Relatively fresh specimen of *Glaucostegus halavi* found ashore.

Table 1 Records of batoids observed around Siniya Island by date, species, numbers of individuals and approximate sizes (DW: Disc Width; TL: Total length)

Date	Species name	Numbers	Approximate size (cm)	Comments
11.03.2014	*Maculabatis randalli*	4	~60cm DW	Alive, adult
31.03.2014	*Pastinachus sp.*	1	<30cm DW	Dead, shrivelled
28.04.2014	*Pastinachus sp.*	1	<30cm DW	Dead, shrivelled
15.09.2015	*Maculabatis randalli*	2-6	~60cm DW	Alive, adults
14.12.2015	*Maculabatis randalli*	1	~50cm DW	Alive, adult
17.01.2016	*Glaucostegus halavi*	1	90cm TL	Dead, relatively fresh, adult
12.04.2016	*Maculabatis randalli* *Glaucostegus halavi*	3 1	~20-30cm DW ~30cm TL	Alive, juvenile Alive, juvenile
30.05.2016	*Maculabatis randalli*	1	<30cm DW	Dead, shrivelled, juvenile
25.10.2016	*Glaucostegus halavi*	1	~30cm TL	Alive, juvenile
25.10.2016	*Glaucostegus halavi*	1	~30cm TL	Dead, relatively fresh, juvenile
25.10.2016	*Maculabatis randalli*	1	<50cm DW	Dead, shrivelled, juvenile
17.11.2016	*Glaucostegus halavi*	2-3	<30cm TL	Alive, juveniles

Results and Discussion

A total of twelve observations were recorded consisting of at least 20 animals from three species, the Arabian banded whipray (*Maculabatis randalli*), the Halavi guitarfish (*Glaucostegus halavi*) and at least one species of cowtail ray (*Pastinachus* sp.) (Table 1). It is believed that two species from the genus *Pastinachus* occur in the Arabian Gulf, the Feathertail stingray, *P. ater*, and the Cowtail stingray, *P. sephen* (Moore 2012; Henderson *et al*. 2016; Last *et al*. 2016). Until recently, this genus was thought to consist of a single widespread species but recent research has indicated that there are several species (Last *et al*. 2016). Although they have a characteristic ventral skin fold on the tail with a stinging spine making them easy to identify, the dishevelled state of the dead specimens documented in this study did not allow identification to species level (Figure 2c).

Six live observations were made between 06.30 – 10.00am in shallow waters up to 1m (e.g. Figure 2a) and included specimens of *M. randalli* (n=3 encounters) and *G. halavi* (n=3 encounters). The remaining six specimens were found on land and consisted of two fresh *G. halavi* near shore, most likely stranded on the sandbar when the tide receded (Figure 2e), two *M. randalli* and two *Pastinachus* sp. further inland (e.g. Figure 2d). Based on the sizes of the specimens observed (Table 1) and their reported size at maturity (Randall and Compagno 1995; Last *et al*. 2012; *Last et al*. 2016), it is likely these animals were juveniles. These species were not present in other surveyed localities nearby and it is therefore possible that this area is used due to its shallow, sheltered nature behind sandbars (observed at low tide). On one occasion, an aggregation of up to six *M. randalli* individuals within a 3x3m area was observed. Behaviour consisting of chasing, close-following, mounting, and two individuals 'ventral to ventral' was recorded. Bite markings were observed on the rear margin of the pectoral disc (Figure 2b). Chapman *et al*. (2003) documented similar behaviour in the southern stingray, *Dasyatis americana*, and suggested they were characteristic of mating events. While these observations do not necessarily infer the occurrence of a nursery or breeding area (Heupel *et al*. 2007), they warrant further investigations to determine the importance of the shallow waters around Siniya Island during the various life stages of these species.

Despite the relative abundance of these three species in coastal waters of the UAE, little information is available on their life histories and ecology. Last *et al*. (2012) report that *M. randalli* is probably endemic to the Arabian Gulf and, while it is not commercially valuable, it is often a by-catch in gillnet fisheries. *Glaucostegus halavi* is listed as Vulnerable on the IUCN Red List and is generally retained by fishermen due to the high value of its fins (Simpfendorfer *et al*. 2017). Finally, *P. ater* and *P. sephen* are listed as Least Concern and Near Threatened (Kyne *et al*. 2017; Morgan *et al*. 2016), respectively. Populations of these species are increasingly threatened in the region with little information available on their biology and ecology (Simpfendorfer *et al*. 2017; Kyne *et al*. 2017; Morgan *et al*. 2016). The observations reported here support the need to address these data gaps and highlight the importance of understanding the ecology and spatial structure of batoids in the Arabian Gulf.

The nature of shallow waters offers sheltered environments for batoids at all life stages, and such waters

are used for foraging, aggregating, and breeding. Coastal development and habitat degradation increases risk to batoids due to their biological traits, high susceptibility to disturbance and coastal habitat specificity (Knip *et al*. 2010; Dulvy *et al*. 2014). Nearshore habitats are identified as crucial for juveniles and therefore conservation of these areas may avoid negative ecosystem effects and help maintain ray populations (Davy *et al*. 2015). The decline or loss of batoids is likely to also have direct and indirect cascading ecological consequences on the marine ecosystem (Stevens *et al*. 2000; Simpfendorfer *et al*. 2011). It is essential that social, ecological, and economic research aspects underpin and inform effective conservation management initiatives (Simpfendorfer *et al*. 2011). The shallow waters around Siniya Island appear to be a small but important area for adults and juveniles of several species. Such areas need to be protected from development and disturbance to ensure the conservation of local and regional marine biodiversity.

Batoids are understudied within the Arabian Gulf region and those observed and recorded here add to our knowledge of their spatial ecology, and the importance of shallow waters. Siniya Island appears to provide good habitat and attracts individuals at all life stages, but mostly juveniles.

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A record of the Bladetail *Lindenia tetraphylla* (Vander Linden, 1825) (Odonata: Anisoptera: Gomphidae) from Abu Dhabi, United Arab Emirates

by Oscar Campbell

On 21st April 2017, whilst walking along the eastern edge of Lulu Island, an artificial, largely sandy island built just off the Corniche of the island of Abu Dhabi, capital of the United Arab Emirates, I found a distinctive dragonfly that I did not immediately recognise. The insect was sheltering from a strong westerly wind, perched on low vegetation on the leeward side of the island. I was able to examine it very closely through binoculars but, lacking a camera, was reduced to making a sketch and recording notes in my fieldbook.

On returning home, I compared my notes with illustrations in Dijkstra & Lewington (2006). Using this, I was able to identify the dragonfly as *Lindenia tetraphylla*, also known in English as the Bladetail. This species has been included in successive UAE dragonfly checklists (Giles 1998, Feulner *et al.* 2007) on the basis of records in Kuwait, Saudi Arabia and Northern Oman and the fact that it is mapped for the UAE by Walker & Pittaway (1987). However, at best the species seems to be a rare visitor to the UAE, with no specific sight records or specimens published.

The key features that supported identification as *L. tetraphylla* were:

- Along with the large size (see following point), the most striking feature was a definite, clear vertical (i.e. downward-pointing) 'blade' just before the tip of the abdomen. This was immediately evident although, as views were mainly from the side, the horizontal 'flaps' on segments 7 and 8 were not noted.
- Abdomen length was estimated to be 15-25% longer than *O. sabina* (several of which were inspected very closely one hour later).
- The forewing exhibited a long, solid-looking pale cream line running along the entire leading edge, with a long, thin yellow pterostigma surrounded by thin, black lines.
- Overall colours were pale and diluted, watery olive-yellow on the abdomen, thorax and legs, with narrow black stripes on the thorax side and abdomen.

The principal range of *L. tetraphylla* is in Iran and Central Asia, but records extend from the circum-Mediterranean region (where it is very rare and recently classified as critically endangered in North Africa) to Pakistan and Afghanistan (Boudot *et al*. 2009, 2013), with Middle East records from the Levant, Mesopotamia and Arabia (Boudot *et al.* 2009). In Arabia, it has been reported from Saudi Arabia, Oman (where it is present in Dhofar as well as Northern Oman) and Kuwait, where apparently migrating juveniles were observed in coastal desert (Feulner *et al.* 2007). Up until 2010 at least, it had not been reported from Qatar (Grunwell, 2010).

Reporting a rare dragonfly without a specimen or at least a photograph is not undertaken lightly, but *L. tetraphylla* is from a monotypic genus and distinct in size, colouration and, especially, shape. Although older individuals may become extensively pruinosed (blackened), a pale olive-yellow colouration is typical of immatures; the illustration in Feulner *et al.* (2007; Figure 7b) closely matches the individual observed on Lulu Island. The perching habit (versus hanging) rules out Aeshnids (the so-called "Emperor" dragonflies) – the only other local dragonflies of similarly large size – and the presence of the large 'blade' precludes any other species from a European or Middle Eastern perspective; finally, the other details mentioned above support the identification as *L. tetraphylla*.

The only other dragonfly species found in the UAE that are similar in form are the two gomphids *Paragomphus genei* and *P. sinaiticus*, but both are significantly smaller (similar in size to the locally common *Orthetrum sabina*) and both lack a blade, the males instead having an obvious curved hook at the very tip of the abdomen that is characteristic of most male gomphids and gives the family its common name, "hooktails". In the UAE, *P. sinaiticus* is common but restricted to wadis in the mountains. *P. genei* is much rarer and also reported mainly from mountain or peri-montane locations; it is believed to be a migrant, being absent during drought periods (Feulner *et al*, 2007).

Finally, and in contrast to both species of gomphids discussed in the previous paragraph, *L. tetraphylla* is a known nomad and strong migrant, sometimes swarming and capable of dispersing long distances. It can breed in slightly brackish water and readily colonises ephemeral wetlands in desert and semi-desert habitats (Boudot *et al.*, 2013); many records are therefore thought to represent temporary populations. Given this behaviour, the occurrence of *L. tetraphylla* at a largely desert island along the coastline during a sudden period of extreme weather (strong westerly winds that began locally on the morning of 20th April and precipitated a marked increase in the number and variety of migrating birds) is not wholly surprising.

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Short Note

40 years of the Emirates Natural History Group - An Appreciation

The Emirates Natural History Group, publisher of Tribulus, was formally established in Abu Dhabi in 1977 and celebrates its 40th anniversary in 2017. The Group is the oldest environmental non-governmental organisation in the United Arab Emirates. Besides Abu Dhabi, it has affiliated chapters in Dubai, Al Ain and Fujairah, with planning for a chapter in Ra's al-Khaimah under way.

The Group's Patron, the UAE Minister of Tolerance, Sheikh Nahyan bin Mubarak Al Nahyan, issued the following statement to the local media to mark the anniversary.

It is with considerable pleasure that I offer my congratulations to the Emirates Natural History Group, ENHG, as it marks the 40th anniversary of its establishment back in 1977.

I have myself been Patron of the ENHG for over 30 years. During that time, I have seen the way in which its Abu Dhabi chapter, and younger ones in Al Ain, Dubai and Fujairah, have devoted time and attention, enthusiasm and expertise, to promoting a wider understanding of the natural history and heritage of the whole of the Emirates.

They have done this through their regular public meetings, through dedicated fieldwork and research and through their publications, while many of the ENHG's active members have made a substantial contribution over many years to our knowledge of our environment and all that it contains. In so doing, Group members have played an important part in promoting the philosophy of environmental conservation that now forms a key element of Government policies and practices.

Over the years, for example, ENHG members have played an instrumental role in drawing attention to the need to protect Abu Dhabi's Eastern Mangroves and the Al Wathba Wetland Reserve. It was during an ENHG visit to Sir Bani Yas, in 1991, that the first evidence was identified of the pre-Islamic Christian monastery that is one of our most important archaeological sites.

The late Sheikh Zayed once said that: "We cherish our environment because it is an integral part of our country, our history and our heritage."

He believed that in the process of protecting it, there was a role for individuals and non-governmental organisations, as well as for Government.

Over the years, with considerable success, the ENHG has followed the path that he laid down.

I wish the Group well and look forward to being associated with it for many years to come.

Book Reviews

Ahmed Khidr Bashir & Gamal E.B. Al Ghazali, *Comprehensive Guide to the Threatened Plants of the Gulf Council Countries*. Environment Agency – Abu Dhabi, EAD, 2015. ISBN: 978-9948-408-60-4.

It came as a surprise to learn that the Environment Agency – Abu Dhabi (EAD) had published a large tome with this title back in 2015. My first reaction was – what an ambitious and worthy project! The book had not come to my attention, and I wonder if botanists in the other member countries of the Gulf Co-operation Council, GCC, are aware of it. As far as we know, EAD has made no effort to publicise the book. Somewhat surprisingly, they have not even put their logo on the cover.

The book is primarily a brief description and account of the medicinal and pharmacological properties of about 770 plant species (with at least one photograph for each), within a thousand pages – not a small achievement! Indeed, it is the product of a huge amount of research and compilation. For the naturalist and field botanist, however, it is a frustrating piece of work.

Firstly the basis on which species have been selected is not explained. It appears that the main criterion for a species to be included, is that it must be "Threatened" in at least one GCC country - readers are expected to know which countries are in the GCC. (As an aside, one wonders how the authors and publishers selected the title for the book. Why choose the name 'Gulf Council Countries' instead of the immediately-recognisable, and accurate, 'Gulf Co-operation Council'?)

However, there is no definition of "Threatened". Have the authors referred to the work of other people, such as the Provisional Red List of Plants of UAE, compiled by Shahina Ghazanfar for the Ministry of Environment and Water (now the Ministry of Climate Change and Environment) ? It would seem not – the work is not mentioned, even in the list of "Botanical References" at the end of the book. Even more surprising is the omission from the reference list of the 2003 standard guide to plants in the UAE by Marijcke Jongbloed, especially as this was published by EAD's predecessor, ERWDA, and also used the phrase "Comprehensive Guide" in the title. This seems very strange, given the very strong links to the UAE, and to EAD/ERWDA, of one of the authors.

The description of each species includes a list of the countries, or regions, in which it is known to occur,

whether or not within the GCC. Distribution maps would have been very welcome, but this may have been ruled out on grounds of cost and time. Each species account then indicates the GCC country in which the species is threatened. This raises the question: "Using what criteria, or in whose opinion is it threatened?" For example *Chrozophora plicata* is listed as being "Threatened in UAE" but in Ghazanfar's provisional Red Data Book for UAE (2010), it is listed as Data Deficient, i.e. not necessarily threatened. Other species included have been classed by Ghazanfar as being of Least Concern. There seems to be no relationship between the two pieces of work.

Further questions about selection of species are raised by examples like *Acridocarpus orientalis* (only in one small area of Jebel Hafit) and *Acacia ehrenbergiana* not being included. The latter is declining rapidly in UAE, and this is a serious conservation issue. Likewise *Rhanterium epapposum*, which has declined enormously as a result of overgrazing, is omitted. The succulent *Caralluma arabica* is not included, yet Ghazanfar indicates that it is Vulnerable in UAE. *Limonium carnosum* is said to occur in Saudi Arabia, Kuwait and Iran, and to be Threatened in Kuwait. The UAE is not mentioned for this species, but it is arguably the country's most endangered species.

The book wrongly states *Nanorrhops ritchieana* does not occur in the UAE and other species such as *Polycarpaea spicata, Aloe vera* and *Mesembryanthemum nodiflorum,* are not regarded as threatened in the UAE. It would appear that neither Ghazanfar nor Jongbloed (2003) were used in the compilation of this book. Omission or lack of concern for species with a relict distribution is in stark contrast to the inclusion of *Stellaria media*, which most of us know as common chickweed. This is a cosmopolitan weed of gardens and farms, but it is listed as being Threatened in UAE, Saudi Arabia, Oman, Qatar and Kuwait. It may be very localised within each of these countries, but it should not be regarded as Threatened, as it can turn up anywhere there is a bit of water and shade, and its status is of no conservation concern whatever.

Perhaps not surprisingly for a book of this size, there are a number of spelling mistakes, and in one or two places the wrong photograph has been used (e.g. *Sonchus asper*).

Annex (1) at the back of the book lists all the "Threatened Plants of the Gulf Council Countries", arranged by family. Unfortunately it throws no further light on why the species were selected or the sources of information. The annex merely gives the local name and countries in which each species is regarded as being Threatened, both only in Arabic.

The authors have made little effort to keep up to date with changes in nomenclature and taxonomy, although there is a table of Updated Names of Some Plant Species. This does not include the change from *Zygophyllum qatarense* (with the exception of the UAE, apparently threatened throughout the southern Gulf) to *Tetraena qatarensis.* This change has been in effect since 2003.

It is very regrettable that preparation of this voluminous work should not have been accompanied by a more rigorous approach, with respect for consistency and transparency. One wonders also whether the text was ever subjected to a peer review by other botanists working in Arabia. Several are certainly well-known to EAD. It is not difficult to highlight what appear to be faults in the book, but because there is no explanation of its rationale, the authors cannot be accused of breaking their rules!

One wonders if the selection of species had more to do with how much knowledge was available on traditional uses, chemical constituents, pharmacological actions and toxicity. Overall, it seems highly probable that the book will be of more value to medical science than to ecology or conservation. The Environment Agency – Abu Dhabi have clearly missed an opportunity to make a real contribution to conservation of plants in the GCC.

Richard Hornby

Dr Munir Yousif Taha, The Discovery of the Iron Age in the United Arab Emirates. Abu Dhabi: Ministry of Culture, Youth and Community Development, 2009; 333 pp including 66 plates; hardback, ISBN 978-9948-15-017-6

This book is a lightly revised version of the author's PhD which was begun at Cambridge University in 1976 under the supervision of Joan Oates and submitted in 1981. The main part consists of the author's excavations at the important Iron Age site of al-Qusais (chapters 3-5) but includes an overview of the regional geography and routes (chapters 1-2) and comparative analyses with other Iron Age sites in the region (chapters 6-10). This is followed by an interpretative chapter on the identity of the inhabitants of al-Qusais (chapter 11), a conclusion and four appendices detailing the local soils, vegetation, material used for the chlorite vessels, and a metrical analysis of arrowheads found at al-Qusais. It is well illustrated with colour photographs integrated into the text and an extensive series of plates at the end which include plans, sections and key finds.

The chief value of this book lies in its long-awaited full publication of the excavations and finds from al-Qusais. Only a portion of these have been previously published, either in Arabic (*Al Athar*, Al Ain 1975) or as an article in the journals *al-Rafidan* (1982/83), which has contributed to various dates being suggested in the secondary literature and ranging from the Wadi Suq period (ca 2000-1300 BC) for two collective graves to a possible Iron III date (ca 600-300 BC) for some of the metalwork. Likewise there has been some confusion in

the literature over the context of some of the finds and the number of excavated graves.

Al-Qusais is situated near Dubai International Airport within what is now a northeastern suburb of the city but was originally probably close to the shore of a coastal lagoon. At the time of excavation (1974/75, 1979, 1979/80), it consisted of a dispersed series of low mounds rising to a height of up to three metres above plain level. The northern part of the site was formerly dominated by the mound of Nud Rashid which measured 100 x 80 metres across and rose to a height of some 12 metres but this had been bulldozed away by the time the author began work at the site as part of a wide-ranging programme carried out by Iraqi expeditions between 1972 and 1976. A smaller mound situated further north (so-called Settlement I) was partially excavated and revealed a sequence of horizontal compacted surfaces with occasional hearths and discarded pottery, shell and animal bones (reportedly identified as goat, sheep, camel, dog, bird and fish). No structural remains were found and the inhabitants presumably lived in *barasti ('arish)* dwellings although no post-holes were recognised.

Another series of mounds to the south are said to have covered an area measuring almost one kilometre by 600 metres (Settlement II) although a rather smaller area is indicated on the general plan of the site (Plate 1). Three soundings (Trenches A-C) were excavated but no significant finds made other than pottery and shell. A small mound at the centre of this area of the site was termed the "Mound of Serpents" by the excavator as he found a number of flat copper alloy snake *ex-votos* here, one of which was decorated along its back with a chevron design. A number of sherds belonging to large storage jars, spouted vessels and single-handled incense-burners decorated with appliquéd meandering snakes added to the suspicion that this part of the site represented a sanctuary dedicated to snake worship. 622 copper alloy tanged arrow-heads (sometimes with engraved midribs which Magee has suggested to have symbolic meaning), plain spouted pottery vessels, incense-burners on fenestrated stands, and copper alloy fish-hooks, awls, miniature *ex-voto* daggers, bracelets, applicators and other objects were also found here although only two stone vessels were recovered.

This was the only part of the site to yield evidence for solid structural remains, namely a small single-room building constructed of beach-rock which was later heavily burnt. A separate cemetery was located to the east and was discovered by chance during modern grave-digging: this was investigated in three separate areas which revealed a large collective grave and two individual graves in Area A, a second collective grave in Area B (located some 10 metres north of Area A) and 69 individual graves in Area C which was situated some 40 metres north-east of Area B (Note: the grave numbering was duplicated in the second season and those excavated in the third season by the Dubai Municipality were not systematically recorded). The full extent of the cemetery is unknown but all the graves excavated in the first two seasons are marked on plan (Note: Plate 6 illustrates graves excavated in 1979 rather than 1974 as captioned), most of those excavated in the first two seasons are individually described and schematic reconstructed sections of a selection are illustrated. Most of the graves had been previously looted and the skeletal remains were not studied although sufficient remained to show that the deceased were usually interred in a flexed position. The individual graves consisted of roughly oval pits with a shallow vertical shaft opening into a deeper undercut side-chamber in which the body and grave-goods appear to have been placed; the tops of the shafts had been covered with beach-rock, perhaps to minimise animal disturbance, but this feature probably attracted the later grave-robbers.

Despite looting, the cemetery yielded an important assemblage of chlorite bowls and lids with incised dotted circle, saw-tooth and linear decoration, bronze flanged daggers with crescentic pommels and perished wooden hilt inlays, a shaft-hole axe, bronze tanged arrowheads with low midribs and sheet-bronze bowls, some with long straight open spouts. These finds support an Iron II (ca 1100-600 BC) date for these graves. Some of these finds are described in greater detail and are illustrated, and the accompanying tables allow quantitative analysis. The strong contrast in frequency of chlorite vessels between the graves and settlement on the one hand and the sanctuary on the other is particularly striking but reflects conscious behaviour rather than a difference in date. It is significant that a number of the bronze and pottery bowls (and one of the lugged chlorite lidded containers) from Area C had been repaired in antiquity, implying the interment of heirloom items from everyday use. Additional strong patterning is also evident for instance in the occurrence of arrow-heads which were wholly absent from settlement contexts.

Calcite bowls, pottery, simple bronze bracelets and a large number of agate/carnelian beads (plus smaller numbers of pearl, shell, composition, marble, chlorite, quartz, rock-crystal and pottery) were also found. Many of the smaller "gypsum" (perhaps weathered composition) beads were reportedly painted blue whereas others were apparently coated in gold or silver. Unusual finds include a bone scaraboid, a tabular bone seal, a shell bead with dotted circle decoration, a metal pendant of a camel-rider (not illustrated), a potsherd with an incised drawing of a camel and oyster-shells containing black, dark brown or dark green pigment. A single sherd belonging to a skeuomorphic pottery bowl incised in imitation of a chlorite vessel was also found.

A unique find from one grave was a silver diadem with a dotted zigzag design and perforated at each end; this was found worn on the forehead of a presumed male individual who was also interred with a pair of daggers and a bundle of arrows.

The second half of the book outlines the state of research for the Iron Age in the Gulf and summarises the principal sites arranged according to modern country. This was innovative at the time the author submitted his thesis but although still useful has been superseded by more recent summaries and has not been updated to include new discoveries. The snake-decorated pottery and copper alloy snake *ex-votos* are no longer unique but are closely paralleled across south-east Arabia, for instance from Saruq al-Hadeed (H. Qandil, "Survey and Excavations at Saruq Al Hadeed, 20022003", pp. 121-39 in P. Hellyer & M. Ziolkowski (eds.), *Emirates Heritage Volume One* (2005), cf. pp. 132-33, fig. 10), Bithna-50 (A. Benoist, "Excavations at Bithna, Fujairah: First and Second Seasons", pp. 71-88 in P. Hellyer & M. Ziolkowski (eds.), *Emirates Heritage Volume One* (2005), cf. pp. 80-81, fig. 13) and Salut in northern Oman (http://arabiantica.humnet.unipi.it/).

The recent discovery by Dr Benoist of a large number of bronze snake *ex-votos*, snake-appliquéd pottery, weapons and a remarkable camel figurine decorated with appliquéd and painted snakes in a spring sanctuary at Masafi strengthens the ritual interpretation of these finds and their possible association with beliefs surrounding subterranean water as a source of fertility (paper presented at the Second International Conference on the Archaeology of the United Arab Emirates, 1-4 March 2009). The author draws attention to the earlier finds of snake skeletons buried within bowls in a building in Level IV of the Qala'at al-Bahrain but this appears to be a different manifestation. Nevertheless, there may be an Iranian connection for both as there is a long tradition of snakes associated with fresh water within Elamite (and earlier western Iranian) iconography as Miroschedji has observed (cf. "Le dieu Elamite aux Serpents et eaux jaillissantes", *Iranica Antiqua* 16/2 (1981), pp. 1-25).

The shaft-hole axe, arrow-heads and spouted metal bowls are paralleled from other sites of this period in south-east Arabia, including Saruq al-Hadeed (Qandil *op cit*.: p. 134, fig. 11:1-2), Hili 8, Qarn Bint Saud and Rumeilah (G. Weisgerber, "Oman: A Bronze-producing Centre during the 1st Half of the 1st Millennium BC", pp. 284-95, pls 158-70 in J. Curtis (ed.), *Bronze-working Centres of Western Asia c. 1000-539 BC*, London 1985). The pottery imitation of a chlorite bowl belongs to a type also found in small quantities in Period I at Rumeilah (R. Boucharlat & P. Lombard, "The Oasis of Al Ain in the Iron Age. Excavations at Rumeilah 1981-1983 [and] Survey at Hili 14", *Archaeology in the United Arab Emirates* IV (1985), p. 55, pl. 50:4-9). The discovery of cosmetic-shells is paralleled by a similar find from Tell Abraq where the green pigment was identified as atacamite (R. Thomas & D.T. Potts, "Atacamite pigment at Tell Abraq in the early Iron Age", *Arabian Archaeology & epigraphy* 7/1 (1996), pp. 13-16) and the silver diadem recalls examples found in western Iran (cf. B. Overlaet, *The Early Iron Age in the Pust-I Kuh, Luristan* (2003), p. 213), as does the shell bead with dotted circles (Overlaet, *op cit.*: p. 227).

These points underline how well al-Qusais now fits within the growing picture of south-east Arabia in the Iron Age. It is very good to see its final publication and thanks should go to the Ministry of Culture, Youth and Community Development for their generous support of this project with the first copies being distributed at the Second International Conference on the Archaeology of the United Arab Emirates which was held at the Intercontinental Hotel in Abu Dhabi from 1st-4th March 2009.

Editors' Note: Although prepared several years ago, this review is published now to draw attention to this publication, which remains of relevance in terms of understanding the UAE Iron Age)

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The Geology and Geophysics of the United Arab Emirates
12 Volumes by various authors and of various dates 2006 – 2012. Produced by the British Geological Survey for the Ministry of Energy, United Arab Emirates.
See website: www.bgs.ac.uk/research/international/UAE.html

Geology and Geophysics of the United Arab Emirates

There have been several general accounts on the geology of the United Arab Emirates, e.g. several chapters in *The Emirates: A Natural History* edited by Hellyer and Aspinall (2005), and numerous papers in scientific journals not easily available to the general reader. However, twelve new volumes and a series of accompanying maps have now been produced by the British Geological Survey for the UAE Ministry of Energy and these provide a comprehensive and up-to-date account of the geology, geophysics, resources and geological hazards of the UAE.

The series of 1:100,000 maps with their accompanying explanatory booklets will allow the interested public to locate, examine and understand the details of various parts of the UAE and their geological development.

Two volumes are likely to be of particular interest to the general reader. One (Volume 2) covers the geology and evolution of the western parts of the Hajar mountains.

The other (Volume 6) is a comprehensive account of the geology of the western UAE from the foot of the Hajar mountains to its eastern and southern borders. It contains a description of the sub-surface geology and the overlying Tertiary deposits that are so well exposed in the western parts of the UAE. Numerous maps and annotated photographs of the exposed section will be a most useful guide for anyone wishing to examine and understand these deposits.

There is a detailed description of the extensive inland cover of dune sands, their differing morphology, their sources and their complex history.

For many readers, the most interesting past will undoubtedly be the description of Abu Dhabi island and the other adjacent barrier islands and their associated lagoons and near-shore islands.

Finally, there is a detailed discussion of the most famous sabkha plain, the Sabkhat Matti, and of its evolution.

Another very interesting volume (Volume 7) is on the geology and evolution of the many salt plug islands of the offshore area.

The availability and future potential of various economic deposits, excluding oil, is discussed in Volumes 3, 9, 10 and 11. The limestone resources, particularly dimension stone (widely used but mainly imported) (Volume 11) building aggregate, armour stone for harbour and coastal defences, rock wool and rock for tile manufacture, as well as other construction materials are also considered (Volume 10). Surprisingly, there is a lack of high quality silica-sand in the desert area due to impurities in the abundant dune sand.

The occurrence of various economic mineral deposits (copper, chromite, platinum materials etc.) in the ophiolitic rocks of the Hajar mountains are described (Volumes 3, 8) although these are currently thought to be of economic importance.

There is a review of the hydro-geology (Volume 3) although this is relatively unimportant, except in the local areas of agriculture, as the major part of water consumed is produced by desalination of sea water.

The geohazards of the region are discussed (Volume 4) including the plate-tectonic setting of the surrounding area and its history of seismic tremors and tsunamis. It is concluded that the UAE is a low risk area. The other geohazards of the mountain front (rock falls, rock slides); alluvial fans; flashfloods; the desert (dust and blown sands) as well as those of the coastal plain (aggressive ground-water, liquefaction and variable strength of sediments) are also considered.

Surprisingly, there is no discussion of likely future problems posed by sea-level rise in a country whose major developments occur on a low coastal plain only a few metres above high water mark.

The authors seem to have accepted the interesting but contentious interpretation of the Quaternary evolution of the area which contradicts all earlier work and has very widespread repercussions, if correct. It claimed tectonic changes along the Arabian margin for which there seems little evidence.

At present, the available evidence indicates a much simpler explanation of the higher sea-level during the last interglacial (around 125,000 yrs BP) followed by an emergence of the areas and the final drowning by the Holocene rise in sea-level which peaked around (c 6,000 – 4,000 yrs BP). This appears to have been followed by a small general fall of sea level with the seaward building of the sabkha plain. There is at present, little published evidence of the effects of the recent rise in sea-level due to climatic warming (Stevens, T. Evans, G., Kirkham, A., 2011; Stevens T., Testico, M.J., Evans, G., & Kirkham, A., 2014).

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