SANDGROUSE

1996 Volume 17

SOUTHERN YEMEN AND SOCOTRA

...this world is a green and sweet thing. Allah has left you in charge in it and is looking at how you will behave. So be careful of the things of this world...

Hadith
(the collected traditions about the Prophet Muhammad)

OSME

OSME

OSME was founded in 1978 as the successor to the Ornithological Society of Turkey. Its primary aims are:

- To collect, collate, and publish data on all aspects of the birds of the Middle East.
- To promote an interest in ornithology and bird conservation throughout the Middle East.
- To develop productive working relationships with other governmental and non-govern mental organisations with an interest in conservation and/or natural history in the region.

Publications OSME publishes a scientific journal, *Sandgrouse*, containing papers on all aspects of Middle Eastern ornithology. The *OSME Bulletin* contains more popular articles, letters, Society news, and other news and information from around the region. Both are published twice a year and are issued free to members.

Meetings An Annual General Meeting is held in London at which guest speakers provide new perspectives on ornithology in the region. OSME usually joins forces with other societies for a second meeting each winter and organises occasional special meetings of its own; some meetings take place outside the UK.

Projects OSME organises field expeditions to collect data on birds in little-known parts of the region and in areas where OSME can assist by teaming up with local societies. In addition, the Sites Register Scheme collects records from all interested ornithologists of important bird areas in the Middle East.

Grants The Conservation & Research Committee disburses funds to valuable field projects and desk studies that further the conservation of birds in the region. Grants have been awarded to over 25 such projects since the Conservation & Research Fund was set up in 1982.

Membership OSME is open to all, and its membership spans over 40 countries.

Annual membership

Individual	£10	(£13 air mail outside Europe)
Family	£15	(£18 air mail) for two members, plus £3 for each additional family member

Life membership

Individual	£200	(£100 if 60 or over)
Family	£275	

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ORNITHOLOGICAL SOCIETY OF THE MIDDLE EAST

c/o THE LODGE, SANDY, BEDFORDSHIRE SG19 2DL, UK

SANDGROUSE
NUMBER 17

SOUTHERN YEMEN AND SOCOTRA

the report of the OSME survey in spring 1993

Edited by
R. F. Porter and R. P. Martins

with editorial assistance from
Francine Stone, Ben Hoare, J. W. Spencer and Mark Boyd

Designed by
H. I. Scott

Supported by

BirdLife
INTERNATIONAL

Published by
THE ORNITHOLOGICAL SOCIETY OF THE MIDDLE EAST
1996

Citation: Porter, R. F. and Martins, R. P. (1996) Southern Yemen and Socotra: the report of the OSME survey in spring 1993. *Sandgrouse* 17.

Further copies, price £10.00, from
OSME, c/o The Lodge, Sandy, Bedfordshire SG19 2DL, UK.

ISSN 0260-4736

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FOREWORD

As a member of the 1993 OSME team that surveyed southern Yemen and Socotra, I am very pleased to introduce this special issue of *Sandgrouse*. It is a most important contribution to the knowledge and understanding of the wildlife of my country.

Yemen is undergoing a period of rapid change. Its population growth is among the highest in the world. There is much pressure on the remaining areas of forest for fuel and food for livestock. Water is becoming an increasingly precious resource, as it is for all countries in Arabia.

As an agriculturalist, I know only too well how people and wildlife both need trees and water. But it is Allah alone who knows how important natural places are for our spiritual life.

Recently I was appointed the Yemen Representative for BirdLife International. This has enabled me to ensure that the OSME findings are used for the benefit of wildlife conservation. Let me give a few examples: planners involved in the development of Aden Harbour as a Free Zone have been made aware of the most important sites for wildlife; the unique bird biodiversity of Socotra was highlighted at an international scientific symposium – part of a process of seeking international conservation status for this remarkable island; and the Children's Bird Book that OSME sponsored will be distributed to all schools in Yemen this autumn by the Environmental Protection Council.

The Republic of Yemen has now ratified the Convention on Biodiversity and the government, like many throughout the world, is starting work on its Action Plan. I will ensure that the information collected by the two OSME surveys is fed into the process. The expedition's ornithologists have made a vital contribution to wildlife conservation in our country.

Dr Omar Al-Saghier,
Agricultural Research and Extensions Authority, Dhamar, Republic of Yemen,
June 1996

Sandgrouse (1996) 17: 5-14

The Ornithological Society of the Middle East's survey of southern Yemen and Socotra, March-May 1993: an introduction

R. F. PORTER, R. P. MARTINS AND FRANCINE STONE

Situated in the mountainous south-west corner of Arabia, the Republic of Yemen supports a unique and diverse assemblage of habitats and species. Many are endemic, occurring only within this region and are ecologically isolated by surrounding deserts and seas.

Until the mid-1970s, little systematic research in the environmental sciences had been conducted in Yemen owing to difficulty of access, both politically and geographically. The revolutions of the 1960s which overthrew the monarchy in northern Yemen and colonialism in southern Yemen paved the way for the creation of two modern states which united in May 1990, forming the Republic of Yemen.

This event prompted OSME to extend the work commenced in 1985 in north Yemen (the then Yemen Arab Republic) to southern Yemen (previously the People's Democratic Republic of Yemen) and to Socotra. Thus OSME's second expedition was launched in spring 1993.

Southern Yemen and Socotra are poorly known ornithologically and this influenced the choice of these regions for attention during the eight week period 16 March to 9 May. This volume of *Sandgrouse* presents the results of the 1993 survey, complementing the results of the 1985 expedition to (the then) North Yemen detailed in *Sandgrouse* 9. Copies of all published and unpublished records and material collected by survey participants are held by the leaders and lodged in the OSME archives.

AIMS OF THE SURVEY

The principal aims of the survey were:

To establish:

- the status, distribution and ecology of birds, especially species endemic to south-west Arabia. The avifaunas of the Afrotropical zone in the extreme east (contiguous with the Dhofar region of Oman) and Socotra naturally commanded special attention.

- the importance of southern Yemen as a migratory flyway for birds, especially diurnal raptors.

- priorities for bird conservation (for inclusion in the BirdLife publication *Important Bird Areas in the Middle East*).

- an active dialogue between OSME, the Environmental Protection Council and the Ministry of Agriculture of the Republic of Yemen and to train Yemeni

scientists and technicians in both fieldcraft and the development of strategies to advance conservation.

To collect:

- information for the forthcoming *Atlas of the Breeding Birds of Arabia* (ABBA).
- incidental records of other vertebrates and plants.
- information to enable the publication of an illustrated bird book for distribution to schools treating a selection of 96 of the most familiar or significant species (in the context of conservation) in Yemen.
- footage for a film or video to promote the work of the survey.

To document the results of the survey in appropriate journals.

SURVEY COVERAGE

Survey activities were arranged so as to maximise coverage of as many areas as possible in the available time, given available resources, in order to define key areas for conservation attention with a view to future intensive studies. Two consecutive teams of survey participants were in the field from 16 March to 10 May. This period coincides with the breeding season and spring migration through the region.

For the purpose of this survey we have defined southern Yemen as the area of the former People's Democratic Republic of Yemen (South Yemen) and, in addition, the areas south of al-Mukha on the Red Sea coast, south of al-Turbah including the Jabal Iraf massif in Ta'izz province and the environs of al-Mardam near al-Bayda'. Maps showing the sites surveyed and other localities where ornithological observations were undertaken in southern Yemen and on Socotra are presented in Figures 1 and 2. The itinerary was as follows:

March		**April**	
15	arrive Sana'a	1–6	Socotra
16–20	northern Yemen	7–9	al-Mukalla
21–23	Jabal Iraf		Wadi Himarah
23–26	Aden and adjacent interior plain		al-Mardam (north-west of al-Bayda')
26–29	Wadi al-Jahr		
	Wadi Yashbum	9–17	northern Yemen
	Wadi Hajr	17–21	al-Jadid
30–31	Socotra		Dhubab
			Bab al-Mandab

Acacia savannah east of Bab al-Mandab and coast to Aden

21–23 Aden
al-Mukalla
Wadi al-Masilah
Sayhut

23 Pelagic transect by boat from Sayhut

23–26 Sayhut to the Mahrah

26–30 Wadi Mararah in the Mahrah
Shahrut hills in the Mahrah

30 al-Ghaydah

May

1–3 al-Ghaydah to Tarim

4–5 Tarim to Shabwah, through Ramlat al-Sab'atayn on fringe of Rub' al-Khali

7–10 northern Yemen

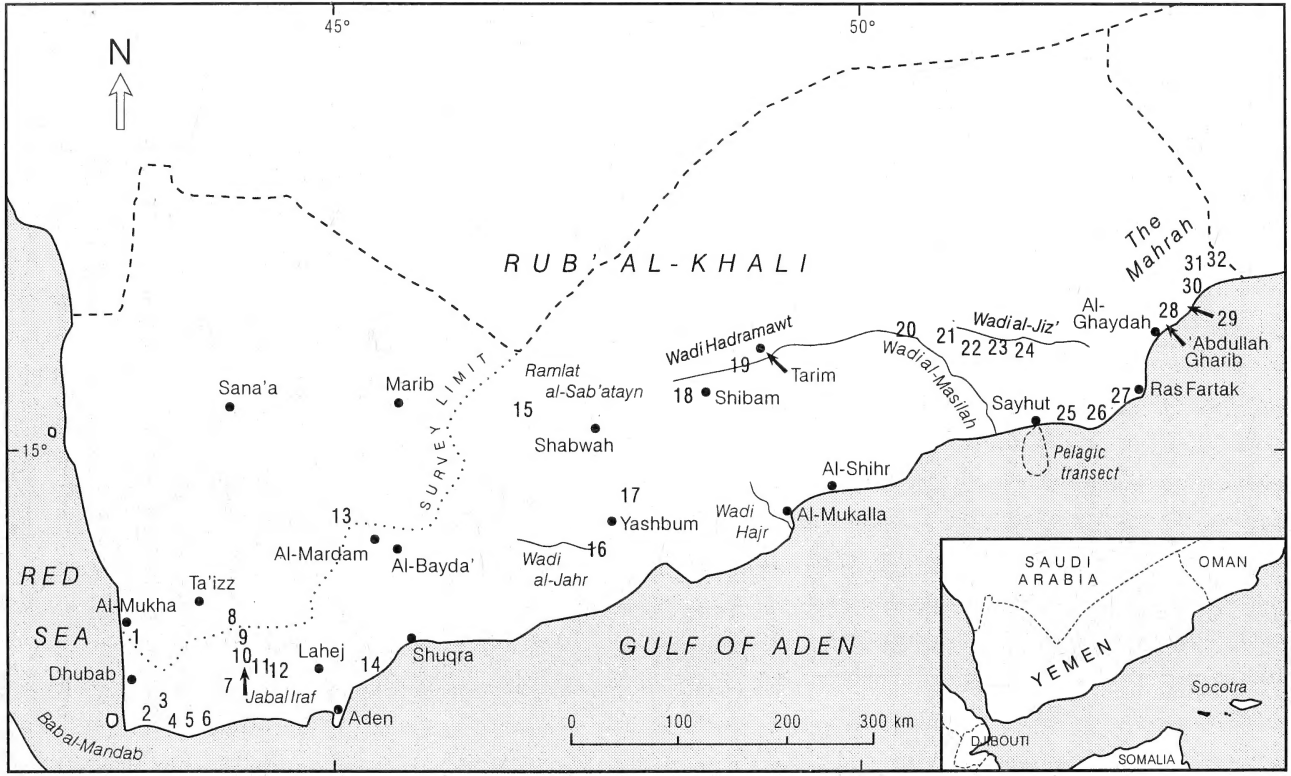
10 depart Sana'a

NOTES ON LOGISTICS

Transportation was by three long-wheelbase Toyota Land Cruisers with Yemeni drivers, except on Socotra where two flat-bedded trucks (with drivers) were used. In addition, on mainland Yemen we engaged guides to assist us in navigating problematical dune systems east of Sayhut and through the sands of Ramlat al-Sab'atayn between Shabwah and Marib. On Socotra we were supported by guides, porters and cooks. Fishing vessels were used to undertake a pelagic transect off the coasts of both southern Yemen and Socotra. Camping allowed extended periods in the field, maximising opportunities early and late in the day. Tents were not essential but mosquito nets were considered indispensable. Care in protection against malaria is crucial in the region as resistant forms of the disease are now endemic. An extensive range of medical equipment proved useful in combating such ailments as a twisted ankle, a scorpion bite, severe diarrhoea and a two-day high fever.

Participants in the survey were selected from the OSME membership. Selection reflected the need for a broad range of expertise beyond ornithology, notably in mammals, amphibians, reptiles and botany. Sound ecological and conservation qualifications and experience were also considered important, as well as practical photography skills, video recording and bird trapping techniques. Six survey members participated for its full eight week duration and were joined by two additional teams of six during the first and second months. Throughout the entire period, the survey benefited substantially from the opportunity to work with Yemeni counterpart Dr Omar al-Saghier of Yemen's Agricultural Research and Extension Authority (AREA) in Dhamar, who undertook training in ornithological research techniques and facilitated work in innumerable practical ways.

Figure 1. Republic of Yemen: the area of southern Yemen treated by this report and the sites covered there by the OSME survey in spring 1993. Numbers refer to locations listed in the gazetteer opposite. This map does not show all the sites by previous observers which are referenced in this issue of *Sandgrouse*.



Gazetteer

To be read in conjunction with Figure 1. **The positions of localities marked * are shown by name on the map**

'Abdullah Gharib
Aden*
Al-Bayda'*
30 Al-Fatk
28 Al-Faydami
Al-Ghaydah*
4 Al-Hajaf
1 Al-Jadid
13 Al-Khaw'ah
Al-Mardam*
9 Al-Mihal
Al-Mukalla*
Al-Mukha*
18 Al-Qatn
20 Al-Sawm
Al-Shihr*
2 Al-Suqayyah
8 Al-Turbah
Bab al-Mandab*
7 Biram
Muhammadiyah
11 Dar al-Qudaymi
Dhubab*
5 Hiswat al-Hujaymah
Jabal Iraf*
29 Jabal Rub'ut
Lahej*
24 Mar'ayt springs
Marib*
26 Qishn
15 Ramlat al-Sab'atayn
6 Ras al-'Arah
Ras Fartak*
Rub' al-Khali*
Sana'a*
27 Saqr
Sayhut*
19 Sayun
Shabwah*
31 Shahrut hills
Shuqra
Tarim*
The Mahrah*
Wadi al-Jahr*
Wadi al-Jiz'*
12 Wadi al-Khabt
Wadi al-Masilah*
21 Wadi Fughmah
17 Wadi Habban
Wadi Hadramawt*
Wadi Hajr*
3 Wadi Harim
16 Wadi Himarah
25 Wadi Irkhawt
32 Wadi Mararah
23 Wadi Sh'hout
22 Wadi Wa'shah
Wadi Yashbum*
10 Wadi Zirayqah
14 Zinjibar

Jabal - mountain
Wadi - watercourse

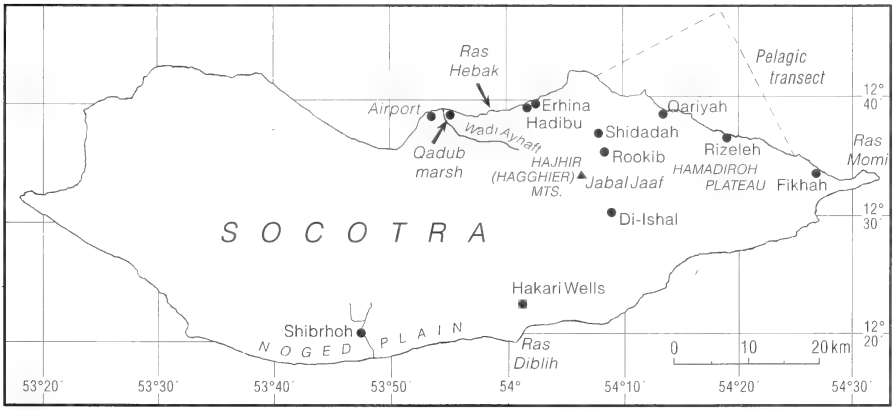


Figure 2. Socotra: the sites covered during the OSME survey in spring 1993. Note: this map does not show the islands of 'Abd al-Kuri, The Brothers and Sabuniya or all of the sites visited by previous observers referenced in this issue of *Sandgrouse*.

Survey personnel

Gier Anderson	13 April–10 May
Pieter Bison	15 March–10 May
Chris Bradshaw	13 April–10 May
Alan Brown	13 April–10 May
Peter Davidson	15 March–10 May
Nick Dymond	15 March–12 April
David Farrow	15 March–12 April
Chris Heard	13 April–10 May
Guy Kirwan	15 March–12 April
Fiona Lowry	15 March–12 April
Rod Martins, co-leader	15 March–10 May
Keith Morton	15 March–12 April
Richard Porter, leader	15 March–10 May
Dr Omar al-Saghier	15 March–10 May
Ken Shaw	15 March–12 April
David Showler	15 March–10 May
Uffe Sørensen	13 April–10 May
Jonathan Spencer	13 April–10 May
Francine Stone, co-leader	8 March–10 May

Richard Porter took overall responsibility for ensuring the success of the survey including directing the field work and liaising with sponsors. He was assisted by Rod Martins and by Francine Stone who was also responsible for managing the finances in the field and for liaison with Yemeni authorities and support personnel. This required her travel to Sana'a for one week in advance of the arrival of the first team.

SPONSORS

The survey was facilitated through generous sponsorship from the following organisations:

The American Institute of Yemeni Studies (in Sana'a)
The British Council
The British Ornithologists' Union
Cable and Wireless plc
Canadian Oxy
Lasmo Oil (Aden) Ltd
The Ornithological Society of the Middle East
The Royal Society for the Protection of Birds, the UK partner of BirdLife International
Shell International Petroleum Company Ltd
Sun International Exploration and Production Company Ltd
TeleYemen
Yemen Airways

ENDORSEMENTS

In addition to sponsorship, endorsement was received from:

The Atlas of the Breeding Birds of Arabia (ABBA)
BirdLife International
Fauna and Flora International
The Harrison Zoological Museum
The Society for Arabian Studies
The World Conservation Union (IUCN)

ACKNOWLEDGEMENTS

We thank the government of the Republic of Yemen for welcoming us to their remarkable country through, in particular, the Ministry of Agriculture, the Environmental Protection Council and the Yemen Embassy in London. Dr Derek Harvey of the Joint Oil Companies' Medical Clinic was paramount in ensuring the success of the survey through hospitality in Sana'a and tireless support through the life of the project and beyond.

In addition OSME is very grateful to Faisal Abd al-Aziz, Muhammad al-Basahi, Yahya al-Haifi and the staff of Al Mamoon Travel, Dr Omar al-Saghier and his family, Abdullah Salim Ali, HE Sa'id Salim Ba Haqiba, Grahame Binns, Renaud Detalle, Yasin Dutton, MacGuire Gibson, HE Douglas Gordon, Martin Herzog, Gordon Kirby, Irena Knehtl, Daniel L'Emaillet (CGG), HE Mark Marshall, HE Col Al-Iryani, Shaykh Muhammad Ali Mazariya, Dr McKenzie (Canadian Oxy), Taoufik Oaunes (UNHCR), Nabil Obadi, Katie Read (Nabors Drilling), Nicki Rush, (Canadian Oxy), Jamaledine Saadallah, the late Haj Salih, Dr David Warburton, and Carlos Zaccagnini (UNHCR).

In the UK and Europe, we are most grateful for active assistance from Samar Damluji, Michael Jennings (especially for the loan of his Magellan 2000), Dawn Lakin, Antione Lonnet, Anthony Miller and Dr Miranda Morris, Julian Paxton (Shell), Dr Mike Rands (BirdLife), Khalid Rashad (Yemen Airways), HE Dr M. Shaya, Marie-Claude Simeone-Senelle, Mrs F. E. Warr and Paul Woodman and staff of PCGN.

Finally, we would like to express our grateful thanks to Duncan Brooks for advice on presentation and for preparing the maps in Figures 1 and 2, also to Pat Hall and particularly Kirsty Cheshire for coping with the onerous task of typing this report.

SUMMARY OF ACHIEVEMENTS

In the field, the survey:

1. Undertook systematic surveys of 77 locations in southern Yemen, recording 266 bird species and completing 350 kilometres of standardised habitat transects, with an additional 17 hours of spot-count observations.
2. Undertook systematic surveys of 18 locations on Socotra, recording 79 bird species and completing 66 kilometres of habitat transects and 4 hours of spot-count observations.

3. Undertook two 10-hour pelagic transects, from Sayhut on the Gulf of Aden coast of Yemen and along part of the north coast of Socotra, to investigate the status of pelagic seabirds (and whales and dolphins).
4. Discovered 4 and 10 previously unrecorded species in Yemen and Socotra respectively.
5. Collected data within 64 half-degree latitude/longitude squares for the forthcoming *Atlas of the Breeding Birds of Arabia*. Each square covers an area of 55 km x 55 km.
6. Identified 16 sites, based on habitat quality and species diversity, meriting international recognition as Important Bird Areas (IBAs) within the Middle East.
7. Observed spring migration through southern Yemen.
8. Undertook studies of Arabian Bustard *Ardeotis arabs*,13 south-west Arabian and 6 Socotran bird species of global conservation significance.
9. Photographed over 100 species, concentrating on endemics and species of global conservation significance within Yemen and Socotra.
10. Collected sound recordings of 55 species (these are listed in the Appendix).
11. Collected video recordings of selected bird species, of other wildlife encountered and of aspects of the survey's work.
12. Documented the occurrence of 5 species of amphibian, 55 species of reptile and 20 species of mammal.

CONSERVATION EDUCATION

The project:

13. Completed the planned book on Yemen's birds for children to be distributed to schools by the Environmental Protection Council of Yemen, and coordinated with this organisation to provide interpretive slide sets and text on Yemen's birds for future educational programmes within the country.
14. Participated with UNICEF in drafting a section concerning 'bird/wildlife awareness' for an environmental questionnaire for completion by 2,000 Yemeni youths during June and July 1993.
15. Lectured to the British Council and The American Institute of Yemeni Studies and consulted with the Yemen Ornithological Society to progress future conservation in Yemen.
16. Gave interviews to The Yemen Times and Yemeni radio.
17. Provided the opportunity to work closely with Yemeni counterpart Dr Omar al-Saghier of the Agricultural Research and Extension Authority (AREA), through training in bird survey and identification techniques and planning discussions for collaboration on future conservation work in Yemen.
18. Culminated with a presentation to the Deputy Minister of Agriculture, Dr Abdullah Zabarah, and representatives of the AREA and the Environmental Protection Council. At this the importance of Yemen's birds, their habitats, threats to their future survival and priority areas for follow-up action were

discussed. This meeting clearly demonstrated the interest and commitment to the conservation of nature currently emerging in Yemen.

RESULTS

The results of the survey appear in this issue of *Sandgrouse* (Volume 17). While a modified system of transliterated Arabic has been adopted for place names in the presentation of the survey results, no similar attempt has been made to standardise place names cited from historical records and references.

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R. P. Martins, 6 Connaught Road, Norwich, Norfolk NR2 3BP, UK.

Francine Stone, Grimsdyke Cottage, Nuffield Lane, Crowmarsh Gifford, Wallingford, Oxon OX10 6QW, UK.

APPENDIX

Bird vocalisations recorded during the OSME surveys of Yemen in 1985 and Yemen and Socotra in 1993

Species	Yemen	Socotra	Recorded by
Hamerkop *Scopus umbretta*	■		PH
Philby's Rock Partridge *Alectoris philbyi*	■		PD
Arabian Red-legged Partridge *Alectoris melanocephala*	■		PD
Sand Partridge *Ammoperdix heyi*	■		PD
Arabian Bustard *Ardeotis arabs*	■		PH
Lichtenstein's Sandgrouse *Pterocles lichtensteinii*	■	■	PD
Chestnut-bellied Sandgrouse *Pterocles exustus*	■		PD & PH
African Collared Dove *Streptopelia roseogrisea*	■		PD
Turtle Dove *Streptopelia turtur*	■		PD
Namaqua Dove *Oena capensis*	■		PD
Bruce's Green Pigeon *Treron waalia*	■		PD
Didric Cuckoo *Chrysococcyx caprius*	■		PD
African Scops Owl *Otus senegalensis*	■	■	PD
Little Owl *Athene noctua*	■		PD
Plain Nightjar *Caprimulgus inornatus*	■		PD
Nubian Nightjar *Caprimulgus nubicus*	■		PD
Forbes-Watson's Swift *Apus berliozi*	■		PD
White-throated Bee-eater *Merops albicollis*	■		PD
Little Green Bee-eater *Merops orientalis*	■		PH
Blue-cheeked Bee-eater *Merops superciliosus*	■		PD
Hoopoe *Upupa epops*	■		PD
African Grey Hornbill *Tockus nasutus*	■		PD & PH
Arabian Woodpecker *Dendrocopos dorae*	■		PD
Singing Bushlark *Mirafra cantillans*	■		PD

Black-crowned Finch Lark *Eremopterix nigriceps*	■	■	PD & PH
Dunn's Lark *Eremalauda dunni*	■		PD
Desert Lark *Ammomanes deserti*	■		PD & PH
Hoopoe Lark *Alaemon alaudipes*	■		PD
Red-capped Lark *Calandrella cinerea*	■		PD
Long-billed Pipit *Anthus similis*	■	■	PD & PH
Yellow-vented Bulbul *Pycnonotus xanthopygos*	■		PH
Arabian Accentor *Prunella fagani*	■		PH
Black Bush Robin *Cercotrichas podobe*	■		PD
Blackstart *Cercomela melanura*	■		PD
Red-breasted Wheatear *Oenanthe bottae*	■		PD
South Arabian Wheatear *Oenanthe lugentoides*	■		PD
Little Rock Thrush *Monticola rufocinerea*	■		PD
Yemen Thrush *Turdus menachensis*	■		PD
Yemen Warbler *Parisoma buryi*	■		PD
Socotra Warbler *Incana incana*	■		PD
Socotra Cisticola *Cisticola haesitata*		■	PD
Graceful Prinia *Prinia gracilis*	■		PD & PH
Scrub Warbler *Scotocerca inquieta*	■		PD & PH
Olivaceous Warbler *Hippolais pallida*	■		PD
Arabian Warbler *Sylvia leucomelaena*	■		PD
Barred Warbler *Sylvia nisoria*	■		PD
Desert Lesser Whitethroat *Sylvia curruca minula*	■		PH
Brown Woodland Warbler *Phylloscopus umbrovirens*	■		PD & PH
Gambaga Dusky Flycatcher *Muscicapa gambagae*	■		PD
African Paradise Flycatcher *Terpsiphone viridis*	■		PD
Arabian Babbler *Turdoides squamiceps*	■		PH
Nile Valley Sunbird *Anthreptes metallicus*	■		PD & PH
Shining Sunbird *Nectarinia habessinica*	■		PD & PH
Orange-tufted Sunbird *Nectarinia osea*	■		PD & PH
Socotra Sunbird *Nectarinia balfourii*	■		PD
White-breasted White-eye *Zosterops abyssinica*		■	PD
Black-crowned Tchagra *Tchagra senegala*	■		PD
Great Grey Shrike *Lanius excubitor*		■	PD
Fan-tailed Raven *Corvus rhipidurus*	■		PH
Tristram's Grackle *Onychognathus tristramii*	■		PD & PH
Socotra Starling *Onychognathus frater*	■		PD
Somali Starling *Onychognathus blythii*	■		PD
Socotra Sparrow *Passer insularis*	■		PD
Bush Petronia *Petronia brachydactyla*	■		PH
Rüppell's Weaver *Ploceus galbula*	■		PD & PH
Arabian Serin *Serinus rothschildi*	■		PD & PH
Yemen Serin *Serinus menachensis*	■		PD & PH
Golden-winged Grosbeak *Rhynchostruthus socotranus*	■	■	PD & PH
Yemen Linnet *Carduelis yemenensis*	■		PD & PH
House Bunting *Emberiza striolata*	■		PD
African Rock Bunting *Emberiza tahapisi*	■	■	PD

Recordists:
PH = P. A. D. Hollom (1985)
PD = P. Davidson (1993)

These recordings are housed in the OSME archives.

Sandgrouse (1996) 17: 15-21

Some aspects of southern Yemen: an introduction for field ornithologists and conservationists

R. P. MARTINS

The aim of this paper is to present a brief and necessarily very selective outline of some of the geographical and environmental aspects of the region relevant to the development of conservation priorities and field ornithology. Naturally, the issues discussed strongly reflect OSME survey experience. Limited time and resources imposed the adoption of an approach which favoured breadth of coverage over depth: the survey investigated the broadest possible range of habitats occurring in southern Yemen.

A central aim was the identification of significant sites for future conservation of wildlife habitats in southern Yemen: the Important Bird Areas. Twelve were identified and detailed accounts of these sites, based upon information collected, are presented in Evans (1994). Five of the more significant areas are briefly mentioned here. These are identified by an asterisk (*).

SOUTHERN YEMEN

Southern Yemen, with an area of about 336,800 km^2, approaches twice that of northern Yemen, (195,000 km^2). Northern Yemen was investigated by an OSME Expedition in 1985 (Rands *et al.* 1987) when it was a separate political state known as the Yemen Arab Republic (YAR). North and South Yemen (previously the People's Democratic Republic of Yemen, PDRY) merged to form a single state (the Republic of Yemen) in 1992.

In general, the topography of southern Yemen is lower in altitude, and it experiences substantially less precipitation than the highlands of the north. Consequently environments are more arid. Southern Yemen includes only a limited area of the south-eastern fringe of the montane plateaux of south-west Arabia. It is, however, difficult to develop such simple generalisations about the local climate as systematically collected climatological data are not available. Excluding the section of the 'south-eastern spur' of the Yemen highlands which extends into southern Yemen, most of the region receives an annual precipitation of between 100 and 249 mm (Blake *et al.* 1987) excepting the coastal fringe, where precipitation is apparently minimal. Local exceptions to the aridity which dominates the region do exist, typically supporting a more diverse assemblage of plant communities. Such sites are of crucial significance to the preservation of biodiversity in south-west Arabia, harbouring much of the botanical and zoological diversity. They are key areas for future study.

Population density throughout most of southern Yemen is low, in marked contrast to its northern counterpart. Consequently, the impact of habitat destruction has been much less. Recent population estimates for North and South Yemen are 7.0 and 2.5 million people respectively (Blake *et al.* 1987). The

first figure seems likely to be a significant underestimate: anecdotal estimates often fall within the range 12-13 million. As is commonplace in developing countries, recent decades have witnessed rapid population growth (this is particularly true of northern Yemen). The ports of Aden and al-Mukalla and the urban settlements of Wadi Hadramawt comprise core-areas of both population distribution and economic activity. Patterns of land-use have apparently not changed greatly in recent decades throughout rural southern Yemen.

The oil (and gas) industry, an emergent sector within the economy, is clearly of concern to conservationists. At present oil-related activities are, except at al-Mukalla and within its environs, largely restricted to exploration – a process beset by political and logistical difficulties. The economic significance of oil is, therefore, not comparable with the situation in many Arabian states.

ORNITHOLOGY IN SOUTHERN YEMEN

While no systematic survey of the status and distribution of the birds of southern Yemen has previously been undertaken, information has emerged in the literature through a small number of papers since the earliest contribution (Barnes 1893). These are comprehensively listed by Ash (1988). In addition, Meinertzhagen (1954) and Hollom *et al.* (1988) have treated geographical areas embracing the region and adjacent waters. Most observations during the last 50 years have been of a limited and opportunistic nature and have reflected the activities of expatriate ornithologists associated with the 'modern colonial' period, when extensive travel was often difficult. This has caused rather patchy coverage of limited areas within southern Yemen. The OSME survey of 1993 was fortunate in enjoying opportunities for travel and ornithological observation throughout southern Yemen which were unprecedented. Summaries, with appropriate details of the known status and distribution of all species recorded from the region are presented in Porter *et al.* (1996) and Martins *et al.* (1996). The areas visited are mapped in Figure 1 in Porter *et al.* (1996)

MAJOR SUBDIVISONS

Conclusions and miscellaneous comments arising from the survey's activities seem best presented in the context of a (very) general geographic description of southern Yemen according to major subdivisions and issues discussed below. Al-Hubaishi and Müller-Hohenstein (1984) and Varisco *et al.* (1992) provide much detailed information on some aspects treated here.

Tihamah

The coastal Tihamah region of northern Yemen is considered geographically to extend beyond Ras Bab al-Mandab along the Gulf of Aden coast of southern Yemen east to Shuqra. The lowland coast beyond here was not investigated during the survey and it is not clear whether this region is meaningfully viewed as a true extension of the Tihamah. The Tihamah is characterised by low altitude (typically between sea level and 100 m) and stony desert (hamada) comprising a mosaic of substrates including extensive areas of stony pediments and outwash

deposits. These vary from coarse material such as small rocks and gravel to alluvial silts, desiccated saline mud (or sabkha) and semi-fixed aeolian dunes. Intensive cultivation occurs locally but is nonetheless patchy and minimal in area throughout the region as a whole.

The broad range of substrate types supports correspondingly diverse vegetation. The most significant habitats or communities include almost pure stands of *Suaeda fruticosa* on saline sandy soils, xerophytic grasses admixed with small evergreen shrubs such as *Cadaba rotundifolia* and *C. glandulosa*, drought-deciduous woodland, *Euphorbia*-dominated communities and light *Acacia tortilis* woodland. This habitat extends over 100 km east from Hiswat al-Hujaymah near Ras al-'Arah and may support a population of the severely endangered sub-species of Arabian Bustard *Ardeotis arabs arabs*, endemic to South-west Arabia. This view is based on a single sighting during the survey and anecdotal evidence from discussions with local people. Other significant aspects of the Tihamah bird community include the presence of several primarily Afrotropical species and local abundance of certain others such as Black-crowned Finch Lark *Eremopterix nigriceps*, Hoopoe Lark *Alaemon alaudipes* and Black Bush Robin *Cercotrichas podobe*.

Montane plateaux

The montane plateaux of former North Yemen extend beyond the old border into southern Yemen from west of al-Bayda' to its eastern limit near Jabal Sulayman, typically at an altitude of less than 2,000 m. The area is of minimal importance for the development of bird conservation strategies for montane south-west Arabian endemics as such priorities are more readily pursued within the former North Yemen. In southern Yemen, this region has received almost no attention from ornithologists and the status and distribution of species typical of the plateau are poorly understood. A small number of these, including Red-capped Lark *Calandrella cinerea*, Red-breasted Wheatear *Oenanthe bottae*, South Arabian Wheatear *O. lugentoides*, Arabian Serin *Serinus rothschildi* and Yemen Linnet *Carduelis yemenensis* were recorded during the survey. Future investigation of the eastern limits of this region are needed before the ranges of the montane plateaux species can be more comprehensively defined.

Residual uplands

Scattered upland areas, deeply dissected by large wadis, occur throughout southern Yemen. Ornithological investigation of such areas has been negligible. Such areas may be of significance for known or potentially breeding raptors, perhaps including Lammergeier *Gypaetus barbatus*, Lappet-faced Vulture *Torgos tracheliotus* and Verreaux's Eagle *Aquila verreauxii*. The extent to which most upland areas receive regular precipitation is not known but this is clearly significant in places. Jabal Iraf * , which was investigated during the survey, is a good example of such an isolated upland massif. This mountain supports *Juniperus* forest with arboreal lichens and substantial soil development (on limestone) in the area around the summit. Nearby peaks may be of equal conservation significance. The area around Jabal Iraf supports an apparently pristine altitudinal vegetation succession.

An interesting opportunity for botanical studies is presented by the coastal range which peaks at Jabal al-'Urays, east of Shuqra. It may be speculated that scarce plant communities are sustained here by maritime influence. The coastal slope of this range is spectacular, its altitude diminishing most spectacularly from 1,705 m to sea level in merely 12 km. There is a need for more environmental information from this massif.

The lowland east

The inland eastern part of southern Yemen is characterised by lower altitude, more weakly dissected and less variable topography and greater aridity. Low ridges are often interspersed by wide basins and the landscape reflects an advanced phase in the cycle of desert erosion. In such a large area of predominantly arid land, the often deeply-incised Wadi Hadramawt drainage system is an exceptional feature. It supports a substantial population in urban settlements dating from antiquity and including, from east to west, Tarim, Sayun, Shibam (a World Heritage site), al-Qatn and many smaller villages. The region is renowned for its traditional South Arabian culture and mudbrick and limewash architecture. Sophisticated irrigation systems support intensive cultivation, influencing the distribution of many bird species.

The northern part of the lowland east comprises the enormous hyper-arid 'empty quarter' of Arabia, the Rub' al Khali. This desert covers an area in excess of 500,000 km^2. Here extensive systems of mobile dunes (erg) are the predominant landform. Its southern periphery, including the Ramlat al-Sab'atayn throughout which bird distributions are virtually unknown, is characterised by a broader range of substrates and vegetation types. Part of this region was traversed during the survey.

The lowland east probably presents significant opportunities for discoveries concerning bird status and distribution in southern Yemen, as illustrated by the previously unknown populations of Lappet-faced Vulture and apparently breeding Dunn's Lark *Eremalauda dunni* encountered during the survey.

The wooded Mahrah*

An extremely small proportion (less than 0.5%) of the lowland east supports a distinctive drought-deciduous woodland with exceptionally high levels of endemism among many life-forms. Within Yemen, it falls within the administrative and cultural region known as the Mahrah and is perhaps best termed 'the wooded Mahrah'. This vegetation zone is contiguous with the coastal woodlands of Dhofar province, Oman. In Yemen it extends along the coastal limestone escarpment from the Oman border, east of al-Hawf, westward for about 50 km. The term 'fog oasis' has been coined (Davis *et al.* 1994) for this area because the vegetation is sustained by drip-precipitation induced by fog moisture. Along the coast, fog is associated with the seasonal upwelling of cold sub-surface water which rapidly cools moist south-west monsoon winds to dew point and the natural vegetation on the slopes permits the interception of water from such winds. The south-west monsoon occurs from mid-June to mid-

September and upwelling and associated climatic phenomena are most pronounced during this period although there is evidence that these may persist irregularly for longer periods. Measurements of drip-precipitation from the region (in the Dhofar) are among the highest recorded. Wadis with ephemeral surface flow, often originating from springs, dissect the seaward-facing escarpment slopes. Residual pools are not uncommon in such water courses. Features typical of limestone (karst) topography such as caves occur.

The vegetation is dominated by *Anogeissus dhofarica*, and *Commiphora habessinica* woodland with abundant *Adenium obesum* and scattered *Acacia senegal*. Plant diversity appears greatest in the riparian plant communities of major wadis. In places the woodland is influenced through active management by local tribal people. Such land-use practices are apparently regulated by established principles within the local community. Details of woodland management are in preparation (Spencer *in prep.*).

Within Yemen, the conservation of this vegetation zone is an extremely important priority. It is ancient, environmentally unique and its biodiversity is both poorly described and incompletely understood. Despite its status as a small proportion of a much more extensive area, given its wider distribution in Oman, measures are needed to ensure its preservation. The importance of such measures is apparently strengthened by recent evidence from Oman (A. Miller *pers comm.*). This suggests that substantial destruction, through increased access due to road-building and the use of four-wheel drive vehicles and overgrazing, has taken place in the Omani sector in recent years. Survey attention was centred on Wadi Mararah and the Shahrut hills.

The bird community within the drought-deciduous woodland of central south-coastal Arabia, together with that of the western fringe of montane south-west Arabia, represents an essentially Afrotropical enclave, differing greatly from the communities typical throughout more than 95% of the Arabian peninsula (Martins & Hirschfeld 1994).

Major water courses

Permanently flowing surface water is extremely scarce in southern Yemen but subterranean flow, occasionally with semi-permanent residual surface pools, may sustain either permanent cultivation or riparian vegetation locally along major wadis. Protection of such areas is a crucial priority for conservation. Beyond the attention received by such areas during the survey, enormous scope exists for further investigation and key-site identification, given the length of some of the major water courses.

Wadi Hajr * is worthy of note as the only water course draining into the Gulf of Aden with apparently permanent surface stream-flow. While under active management through damming, irrigation and cultivation near the coast, the riparian habitats it presumably supports farther north await investigation. Wadi al-Jahr* is also exceptional. Stretches of this are well-vegetated, supporting extensive stands of *Typha* and mature *Tamarix* trees. A complete survey of these wadis and Wadi Bana would probably reveal a number of significant sites of importance for nature conservation in Yemen.

Marine and coastal environments

Coastal upwelling, at its most pronounced farther east off the coast of Oman, is an important phenomenon influencing the coastal environment of southern Yemen. Information on the seasonal duration and spatial extent (and movements) of the zone of upwelling is scarce. It apparently extends west at least to Ras Fartak on the southern Yemen coast. See also Bailey (1966).

Cool, nutrient-rich upwelling water supports substantial marine biomass which sustains important seabird colonies along the coast of southern Arabia. These are located principally in Omani waters but islands off Bir Ali, midway along the coast of southern Yemen, apparently support breeding populations of Socotra Cormorant *Phalacrocorax nigrogularis* and Sooty Gull *Larus hemprichii*. No ornithologist has visited the islands for many years. Headlands such as Ras Fartak are perhaps also significant as mainland breeding stations for Brown Booby *Sula leucogaster* and Red-billed Tropicbird *Phaethon aethereus*.

The possibility that Jouanin's Petrel *Bulweria fallax*, a locally common species in the Gulf of Aden and adjacent waters, might breed on the mainland coast of southern Yemen is little more than an intriguing idea; as yet no breeding colonies are known. Nonetheless, the species is sufficiently common in waters off the south coast of Arabia through most, or all, of the year, to strongly indicate regional breeding and must visit (assumed) colonies only at night. A night survey of the upper slopes of Jabal al-'Urays might be the most useful first step in the search for breeding sites but this is merely a speculative suggestion.

CONCLUDING REMARKS

The broad range of plant communities, habitats and geographical regions found in southern Yemen presents a unique combination of opportunities for the conservation of Arabian and Middle Eastern biodiversity. This uniqueness results from the location of southern Yemen within the south-western region of the Arabian peninsula (the area of greatest topographical and ecological diversity), favourable demographic factors and the limited extent of man-induced desertification. Concentration of population in urban centres or intensively cultivated areas and its consequent low density throughout much of southern Yemen has spared plant communities (and associated life-forms) from the radical adaptation or wholesale destruction typical in many parts of Arabia. Beyond the boundaries of the (merged) modern Yemen, localised opportunities for the preservation of scarce and significant habitats certainly exist. However, it is perhaps only in Oman and small areas of south-western Saudi Arabia that substantial areas of unmodified habitats that are not strictly arid remain.

From a conservation perspective, significant features of the environment of southern Yemen include an 'ancient' forest region comprising a distinct and unique phytogeographical unit (which apparently pre-dates the vicissitudes of the Pleistocene); pristine examples of continuous vegetation succession across a broad altitudinal range, extensive areas supporting lowland desert plant communities; wadi-systems with little or no agriculture; montane isolates with

associated highly localised habitats and a coastline characterised by an exceptionally productive and diverse marine ecosystem. An action plan to advance conservation within the region which prioritises the themes outlined above is now required. Ideally, the implementation of such a plan should proceed concurrently with the creation of appropriate legislation. Some progress has been made in this area in recent years and fresh signs of new initiatives appear annually. At present Yemeni government and non-governmental agencies are active in the conservation field but they are under-resourced. The region merits greater attention and funding from the international conservation community and associated agencies. They will need to be sensitive to local culture and traditions.

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The status of non-passerines in southern Yemen and the records of the OSME survey in spring 1993

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As this is the first systematic collation and overview of bird records from southern Yemen, it is necessary to outline the policy adopted towards assessment of records of rarities, primarily those resulting from casual observations during earlier periods. Such records appear in (and have been repeated throughout) both published and unpublished material and have seldom been supported by documentation of the standard which is both commonplace and expected today. R. F. Porter and R. P. Martins have reviewed such records in the light of available information and contemporary understanding of movements, status and distribution. Where it has been necessary to treat a record as not fully proven, or rejected, it has nonetheless been included in the systematic list (indented and in smaller type for ease of reference), both for completeness and as a record of the decision; brief comments are offered on the reasons for such decisions. Should further evidence emerge, certain records may merit review but meantime the exclusion of such species from the known avifauna of southern Yemen seems the most appropriate approach to this problem.

AREA COVERED

In this paper southern Yemen is considered to include all of the previous People's Democratic Republic of Yemen (South Yemen) and, in addition, three contiguous areas of the previous Yemen Arab Republic (North Yemen):

1. The Tihamah from Bab al-Mandab to 10 km north of Dhubab.
2. Jabal Iraf and the adjacent highlands to the north.
3. The plateau north of al-Bayda' to al-Mardam.

The area covered is that presented in Figure 1 in Porter *et al.* (1996) which also shows the localities visited during the survey.

SOURCES OF INFORMATION AND ACKNOWLEDGEMENTS

The reference material consulted during the preparation of the second paragraph of the species' accounts has been the published observations of ornithologists who have worked in the region in the past. Included also are unpublished observations contributed by D. Farrow, M. D. Gallagher, A. C. Gallon, H. P. Medhurst, N. J. Redman and J. Sims. These are acknowledged by initials. Particular mention should be made of contributions from Gallagher and Medhurst who covered Aden and its environs extensively in the early

1960s and kindly made their records available for inclusion. Steen Christensen, Klaus Malling Olsen and Per Schiermacker-Hansen gave valuable help in discussing identification issues. Finally, but most crucially, we are especially grateful for the assistance given by Mrs F. E. Warr in providing a copy of her referenced list of known southern Yemen records, compiled with meticulous care over many years. This proved invaluable for the preparation of material on status and distribution.

SYSTEMATIC LIST

The first paragraph of each species account details observations made during the survey. Figures quoted for the number of individuals recorded are day totals summed for the whole period; where a site was visited for more than one day, the highest count has been used. Generally, this gives an accurate picture of relative abundance.

The second paragraph summarizes the known status of all species recorded from southern Yemen, though it should be remembered that enormous gaps remain in coverage of the region.

For convenience reference details are given in Martins *et al.* 1996.

Ostrich *Struthio camelus*

Extinct in Arabia, but egg-shell fragments (age unknown) found in the Ramlat al-Sab'atayn (see Spencer 1996).

Bury (1911) stated, apparently referring to southern Yemen territory, that the Ostrich was still hunted in the early twentieth century.

Little Grebe *Tachybaptus ruficollis*

One on a roadside pool east of Aden 21 April. A pair with two young at Mar'ayt springs (110 km west of al-Ghaydah) 1 May was the first definite breeding record from southern Yemen.

A rare visitor or resident breeder when local conditions allow. Recorded at three additional sites in southern Yemen in January, June, July and October.

Black-necked Grebe *Podiceps nigricollis*

Not recorded during the survey.

Apparently a rare winter visitor. All records are from Aden: one in October (Barnes 1893), two December 1946 to February 1947 (Browne 1950) and up to three from November 1961 to March 1962 (MDG, HPM).

Jouanin's Petrel *Bulweria fallax*

188 recorded between 4 and 30 km offshore during a pelagic transect south of Sayhut 23 April. Maximum of 119 in one two-hour period between 10 and 30 km offshore, ie. a mean of about six per km of transect. Four also recorded offshore from Ras Fartak 25 April.

Recorded at sea off southern Yemen apparently throughout the year, with large flocks in August off Ras Fartak (Bailey 1966). Presumed to breed in the Gulf of Aden region but no nesting localities have been discovered.

Pale-footed Shearwater *Puffinus carneipes*
Not recorded during the survey.

Large flocks reported at sea off and east of Ras Fartak from late July to October (Bailey 1966).

Wedge-tailed Shearwater *Puffinus pacificus*
One recorded at Sayhut 22 April feeding with terns inshore, and three off al-Fatk 27 April. In addition, 11 other large dark shearwaters thought to be this species were seen offshore between 23 and 27 April.

Previously recorded at sea in the vicinity of the Gulf of Aden throughout the year (Bourne 1960). Most previous records were unsubstantiated and may refer to Jouanin's Petrel, but H. P. Medhurst has reported collecting one at Aden (Bailey 1966), and NJR recorded two off al-Mukalla, 28 October 1993.

Persian Shearwater *Puffinus (lherminieri) persicus*
123 recorded close inshore, feeding in rafts on the surface. 48 at Jabal Rub'ut 27 April and 75 at al-Fatk 30 April.

Recorded in the Arabian Sea and Gulf of Aden (mostly November to April) and from Ras Fartak eastwards in July, August, October and November (Bailey 1966; Jennings *et al.* 1991; NJR).

Wilson's Storm-petrel *Oceanites oceanicus*
Not recorded during the survey.

An abundant summer visitor to the seas off south-east Arabia, most arriving during May and departing September to November; rare in winter. Large concentrations at sea off Ras Fartak in June and July (Bailey 1966).

Black-bellied Storm-petrel *Fregetta tropica*
Not recorded during the survey.

Status unclear because of possible confusion with White-bellied Storm-petrel *F. grallaria*. Large numbers of *Fregetta* sp. recorded in May and June, all more than 50 km off the coast of Arabia, mostly identified as Black-bellied; also on three occasions in July (Bailey 1966).

White-faced Storm-petrel *Pelagodroma marina*
Not recorded during the survey.

Status unclear; recorded in Arabian Sea by Bailey (1966) and others from May to July between 80 and 170 km offshore, apparently in small numbers.

Swinhoe's Storm-petrel *Oceanodroma monorhis*
Not recorded during the survey.

Status unclear. The only definite record is one collected at 15°47'N 52°25'E at sea off Ras Fartak, 18 August 1963 (Bailey 1966).

Red-billed Tropicbird *Phaethon aethereus*
Seen only around the cliffs at Ras Fartak (three, 25 April) and inshore near al-

Fatk (one, 27 April), where perhaps breeding.

Recorded in the Arabian Sea in most months, although the only breeding evidence is from Jezat Saba, south of Perim Island in August 1944 (Bark Jones & Hartley 1957).

Masked Booby *Sula dactylatra*

An immature at sea off Jabal Rub'ut' 27 April.

Unpublished records and those detailed by Bailey (1966) demonstrate that this species is present throughout the year off southern Arabia.

Brown Booby *Sula leucogaster*

A total of 80 recorded along the coast between al-Mukha and al-Fatk, between 25 March and 29 April. Notable counts were ten at Aden, 32 south of al-Mukha and 12 near Wadi Hajr. Birds were seen settling on rocky cliffs at Aden, which may be a possible breeding site.

A non-breeding visitor in small numbers to the coasts of southern Yemen in most months.

Cormorant *Phalacrocorax carbo*

Not recorded during the survey.

Apparently a scarce winter visitor (as in Oman), observed in the Aden area and at al-Shihr from October to April.

Socotra Cormorant *Phalacrocorax nigrogularis*

2,548 between Aden and al-Fatk between 25 March and 30 April. At Aden, where 19 were seen, at least two juveniles were present with adults on a cliff at Crater Aden 25 March. There were at least 2,500 off Qishn 24 April. Actively feeding flocks were noted at several localities on the coast.

A breeding resident in southern Yemen, nesting on islands (e.g. Jezirat Baraqa and nearby islands off Bir 'Ali). The largest number observed was 33,000 along 10 km of coast west of Wadi Hajr 6 November 1989 (Jennings *et al.* 1991). There was a wreck numbering thousands on the Aden shoreline in July 1960 (MDG, HPM).

White Pelican *Pelecanus onocrotalus*

Not recorded during the survey.

A vagrant; the only records being one inland at Qaimivat (Thesiger 1959) and one dead at Aden in February 1969 (MDG, HPM).

Dalmatian Pelican *Pelecanus crispus*

Not recorded during the survey.

Previous claims of two at Aden 10 July and one 30 March (Ennion 1962) lack supporting details. In view of the unlikeliness of such records (in Arabia it is only known as a vagrant to the Gulf States) and general similarity between this species and Pink-backed Pelican *Pelecanus rufescens*, further evidence is required before occurrence in Yemen can be considered proven.

Pink-backed Pelican *Pelecanus rufescens*
Four south of al-Mukha and one at Qishn 17-24 April.

Apparently a non-breeding visitor with records from all months, mostly during April-November, including flocks of up to 150. Scarcer along the coast of the Gulf of Aden than along the Red Sea coastline of northern Yemen.

Bittern *Botaurus stellaris*
Not recorded during the survey.

A vagrant; one found exhausted at Aden 2 November 1962 (HPM).

Little Bittern *Ixobrychus minutus*
Not recorded during the survey.

A passage migrant in small numbers recorded from August to October and in early May though doubtless overlooked.

Night Heron *Nycticorax nycticorax*
An immature at Wadi al-Masilah 3 May.

Apparently a rare passage migrant and winter visitor. Two previous records: an immature collected at Aden before 1889 (in BMNH) and one collected in Wadi Hadramawt February 1932 (Bates 1938).

Striated Heron *Butorides striatus*
Up to four 24 and 25 March at Aden harbours.

Apparently a very local resident with definite records only from the Aden area where present in breeding plumage March and May (MDG, HPM).

Squacco Heron *Ardeola ralloides*
Four between 27 March and 1 May at Wadi al-Jahr, Mar'ayt Springs and one on the coast at Wadi Hajr.

An uncommon passage migrant in spring (March and May) and autumn (September and October).

Cattle Egret *Bubulcus ibis*
Surprisingly absent from most areas. 270, of which 250 were at Aden or its northern environs. The remaining 20 were in flocks of up to seven along the coast between Aden and Wadi Hajr.

A breeding resident in the south-west, with eggs recorded in February and July.

Western Reef Heron *Egretta gularis*
124 recorded along the coast in March, April and May including 18 between al-Mukha and Dhubab, 77 between Aden and al-Mukalla and 29 between Sayhut and al-Fatk apparently indicating distribution along the entire coast.

Resident, although no evidence of breeding. One inland record at Lahej in November (Browne 1950).

Little Egret *Egretta garzetta*
36 recorded in March and April, all except three on the coast especially in areas with running fresh water. Most were seen at Wadi Hajr or between here and al-Mukalla.

Apparently migrants and non-breeding birds are present throughout the year.

Great White Egret *Egretta alba*
Two near Ras Fartak 25 April were the first records for this century.

Status uncertain. Barnes (1893) recorded the species at salt-pans in the Aden area but there are no subsequent records until 1993.

Black-headed Heron *Ardea melanocephala*
Not recorded during the survey.

A vagrant; one at Aden 21 November and four 30 November 1984 (Ash 1988).

Grey Heron *Ardea cinerea*
117 along the coast between al-Mukha and Aden and between Aden and al-Fatk in March and April. Generally scarce, but a concentration of up to 38 recorded in the Aden harbours. Two inland records in March and May.

Apparently a non-breeding visitor and passage migrant, mostly to the coast. Recorded in all months.

Purple Heron *Ardea purpurea*
One near al-Ghaydah 26 April, the first spring record for southern Yemen.

A passage migrant recorded in autumn from 1 September to 14 October, with a flock of 13 in September 1961 (Ogilvie-Grant 1900 and MDG, HPM).

Goliath Heron *Ardea goliath*
Not recorded during the survey.

A vagrant; recorded at Aden 18 November 1958 (Sage 1959) Abyan 7 August 1960 (MDG, HPM) and Burum 5 November 1989 (Jennings *et al.* 1991).

Hamerkop *Scopus umbretta*
At least two pairs and two active nests in Wadi al-Jahr 27 March.

Apparently resident in the south-west.

Black Stork *Ciconia nigra*
Not recorded during the survey.

Apparently a passage migrant in small numbers with four flocks (8-15 individuals) recorded from October to April.

Abdim's Stork *Ciconia abdimii*
Not recorded during the survey.

Apparently an irregular breeding summer visitor to the south-west from March to early September. Occupied nests recorded May to July (Gallagher 1986).

White Stork *Ciconia ciconia*
Not recorded during the survey.

A scarce and irregular passage migrant and winter visitor with records from September to March. Bury saw 'immense swarms' at Dathina in September 1897 (Bates 1938).

Glossy Ibis *Plegadis falcinellus*
Three recorded: singles at Wadi al-Jahr, at a roadside pool east of Aden and at Mar'ayt Springs between 26 March and 1 May.

Apparently an uncommon passage migrant with four previous records, two at Aden May-July 1961, 135 there November 1984, 16 at al-Mukalla November 1984 and six at Huwairah October 1989 (Clarke 1967, Ash 1988, Jennings *et al.* 1991).

Bald Ibis *Geronticus eremita*
Not recorded during the survey.

Status uncertain; very rare. One record, a pair collected in January 1949 at Lodar in the western Hadramawt (Meinertzhagen 1954). However, the skin at the BMNH is labelled 13 December 1948.

Sacred Ibis *Threskiornis aethiopicus*
Not recorded during the survey.

A vagrant or irregular visitor. Recorded at Aden in January, March (two), April and June (Browne 1950) and al-Mukalla February 1945 (Bark Jones & Hartley 1957).

Spoonbill *Platalea leucorodia*
78 recorded on coastal lagoons and estuaries from al-Mukha to al-Fatk, in March and April including 31 south of al-Mukha and 13 at Aden harbours.

A passage migrant and winter visitor recorded throughout the year in flocks of up to 170 (in April).

African Spoonbill *Platalea alba*
Not recorded during the survey.

Recorded by HPM in the early 1960s and listed by Hollom *et al.* (1988). Further details are awaited at the time of publication.

Greater Flamingo *Phoenicopterus ruber*
341 recorded in March and April on coastal lagoons between al-Mukha and al-Fatk. 235 were between Aden and Bab al-Mandab (largest flocks 140 and 92) and 102 between Aden and al-Fatk (largest flock 44).

A passage migrant and winter visitor to coastal lagoons and estuaries, most numerous in the Aden area.

Lesser Flamingo *Phoenicopterus minor*
Five at Aden on 25 March.

Apparently an irregular visitor. Recorded only from the Aden area since 1961, where seen in all months (maximum 120). Birds building nest mounds were observed in February and August but there was no evidence of egg-laying (Clarke 1966, Clarke 1967, Ennion 1962, MDG and HPM).

Bean Goose *Anser fabalis*
Not recorded during the survey.
A goose shot at Zinjibar 23 November (Ennion 1962) was identified from a colour cine-film and reported to show the markings, colouration and of size Bean Goose. These details are insufficient to substantiate such an unlikely record.

Greylag Goose *Anser anser*
Not recorded during the survey.
Apparently a vagrant. One shot al-Mukalla during winter 1960/61. In addition, a party of unidentified grey geese were seen on the sea near Ahwar 17 April. Local people report geese visiting al-Mukalla in small numbers annually (Grimwood 1963).

Ruddy Shelduck *Tadorna ferruginea*
Not recorded during the survey.
A vagrant; three records, the most recent being two at Wadi Kebir towards the end of 1936 (Bark Jones & Hartley 1957).

Shelduck *Tadorna tadorna*
Not recorded during the survey.
A vagrant; one at Aden 27 January 1947 (Browne 1950) and eight at Abyan 4 December 1960 (MDG, HPM).

Wigeon *Anas penelope*
Not recorded during the survey.
A passage migrant and winter visitor, recorded from November to early April.

Gadwall *Anas strepera*
Not recorded during the survey.
An uncommon winter visitor with records from mid-October to early December.

Teal *Anas crecca*
Not recorded during the survey.
A passage migrant and winter visitor, recorded from September to February.

Mallard *Anas platyrhynchos*
Not recorded during the survey.
A winter visitor in very small numbers, apparently more numerous in some years than others.

Pintail *Anas acuta*
Three at the Aden harbours 24 March, one there 25 March.
A winter visitor, probably in small numbers from October to early April.

Garganey *Anas querquedula*
Not recorded during the survey.
A passage migrant (and possibly winter visitor) recorded from mid-August to early November, with one record in March.

Shoveler *Anas clypeata*
22 at Aden 25 March was the first spring record for southern Yemen.
Apparently a winter visitor and passage migrant, recorded in small numbers from October to March.

Pochard *Aythya ferina*
Not recorded during the survey.
A winter visitor and passage migrant, apparently in small numbers, recorded in November, December, early April and early May.

Ferruginous Duck *Aythya nyroca*
Not recorded during the survey.
Apparently an occasional winter visitor. Recorded in 'small numbers' at al-Mukalla and Lahej (Bark Jones & Hartley 1957) with additional coastal records in November/December and April (Guichard & Goodwin 1952, Grimwood 1963) and three at Wadi Tibban January 1961 (MDG, HPM).

Tufted Duck *Aythya fuligula*
Not recorded during the survey.
A winter visitor in small numbers, recorded from November to January.

Black-winged Kite *Elanus caeruleus*
Not recorded during the survey.
Apparently present all year in the west, though records sporadic and very locally distributed. Recorded in August, December, February and March.

African Swallow-tailed Kite *Chelictinia riocourii*
Not recorded during the survey.
Recorded by HPM in the early 1960s and listed in Hollom *et al.* (1988). Further details are awaited at the time of publication.

Black Kite *Milvus migrans*
A total of 697 recorded throughout southern Yemen, but absent from Aden and its environs and none recorded east of al-Ghaydah. All birds positively identified were of the yellow-billed race *M. m. aegyptius*.
A breeding resident and passage migrant in small numbers, but apparently absent in the east. Eggs recorded November to June.

White-bellied Sea-eagle *Haliaeetus leucogaster*
Not recorded during the survey.
An immature at Aden 19 October (Barnes 1893) was regarded as improbable (Ogilvie-Grant 1900). As there are no supporting details for this record it cannot be considered proven.

Lammergeier *Gypaetus barbatus*
Not recorded during the survey.
A rare resident breeder in the mountains, recorded from Mukheiras, Dhala, Jabal Jihaf and Am Kuleita in the early 1960s (MDG, HPM).

Egyptian Vulture *Neophron percnopterus*
A total of 79 recorded; two near Aden with all others in the east (east of Wadi al-Masilah and from al-Ghaydah to Wadi Hadramawt). The largest groups were 16 at Qishn and 17 at Wadi al-Jiz'.
A scarce breeding resident, found mostly in the east. Also a passage migrant and winter visitor from September to April.

Griffon Vulture *Gyps fulvus*
16 recorded in groups of up to five; most were in the al-Mihal/Jabal Iraf area (in the southern highlands). Only two in the east.
Apparently a winter visitor and clearly much rarer than in northern Yemen; flocks of up to 70 recorded e.g. Sheikh Othman, October 1961, (MDG, HPM).

Rüppell's Vulture *Gyps rueppellii*
Not recorded during the survey.
Two past claims, four at Lodar in January (Meinertzhagen 1954) and one at Tawahi March 1945 (Bark Jones & Hartley 1957) lack supporting details. Further evidence is required before occurrence in Yemen can be considered proven.

Lappet-faced Vulture *Torgos tracheliotus*
14 recorded on the gravel plain between al-Ghaydah and the oasis at Mar'ayt springs; seven were observed together around a dead camel. This area also held one of the largest concentrations of Egyptian Vultures.
Perhaps a resident breeder; two previous records, one dead at Aden 3 March 1962 (MDG, HPM) and one on the edge of the Rub' al-Khali (Jennings *et al.* 1991). Survey observations therefore indicate a previously undiscovered population.

Black Vulture *Aegypius monachus*
Not recorded during the survey.
The following historical claims pre-date awareness that the potentially confusable Lappet-faced Vulture *Torgos tracheliotus* occurs widely throughout Arabia, singles at Aden (Barnes 1893, Ogilvie-Grant 1900, Meinertzhagen 1924) and near Bab al-Mandab 10 December 1954 (Smith 1956). Additionally, Meinertzhagen (1924) reports it as a common resident at Aden, although there is no information to support this. It is suggested that these records be considered unproven unless further evidence emerges. However, the following records are

fully substantiated: one at Hiswa 8 March 1961 and two there 17 December 1961 (MDG, HPM).

Short-toed Eagle *Circaetus gallicus*
Not recorded during the survey

An uncommon passage migrant or winter visitor with about 10 records, October-December and March.

Bateleur *Terathopius ecaudatus*
Not recorded during the survey.

Probably resident; records are from the following areas: Lahej with local reports of nesting by Bark Jones & Hartley (1957) and Browne (1950), Amiri district north of Aden (Meinertzhagen 1954) and 17 miles east of al-Mukalla, (Browne 1950), north of Abyan, Mudhia, Wadi Tibban, Mahfid and Little Aden (MDG, HPM).

Marsh Harrier *Circus aeruginosus*
Single migrants 21 and 29 March.

Apparently an uncommon migrant, recorded in January (one), March (two), April (one), October and November.

Pallid Harrier *Circus macrourus*
Two migrants flying east 25 March, north of Aden.

Apparently an uncommon passage migrant or winter visitor recorded in January (one), February (one), March (three), April (one), September, November (one) and December (one).

Montagu's Harrier *Circus pygargus*
Not recorded during the survey.

A rare passage migrant or winter visitor recorded in October, January and February.

Pallid/Montagu's Harrier *Circus macrourus/pygargus*
Three single ring-tailed harriers to the west and north of Aden 20, 24 and 25 April.

Dark Chanting Goshawk *Melierax metabates*
Eight recorded, all in the west of southern Yemen, south of al-Turbah (one), Wadi Zirayqah (one), Jabal Iraf (four), Tihamah north of Aden (one), and near Wadi al-Jahr (one), the most easterly record.

Probably a scarce resident breeder largely confined to the west, with records also from Shabwah (Bates 1938) and Wadi al-Jahr. Eggs have been recorded in April. Much less common in the south than in the Tihamah and the foothills of northern Yemen.

Gabar Goshawk *Micronisus gabar*
Not recorded in southern Yemen during the survey, but one just north of survey area at al-Khaw'ah at 2,000 m 9 April was at an exceptionally high altitude.

Apparently a rare resident, with records from Lodar and Dhala in January, November and December (Meinertzhagen 1949, Ennion 1960, MDG, HPM).

Sparrowhawk *Accipiter nisus*
Seven between 21 March and 20 April, all in the west.

A winter visitor and passage migrant, probably in small numbers, with records from at least January, March and April. Yerbury (1886) reported the species to be not uncommon in the Aden district and it is therefore surprising that the only other record this century (excluding those seen during the 1993 survey), was in January 1922 (Meinertzhagen 1924). A claim of a pair at Aden in July (Barnes 1893) is probably erroneous.

Buzzard *Buteo buteo*
Five between 21 and 29 March in the Jabal Iraf/Aden/Wadi al-Jahr area.

A winter visitor and passage migrant in small numbers; flocks of up to ten recorded from November to April, all in the west.

Long-legged Buzzard *Buteo rufinus*
A total of five between 21 March and 1 May from the following widely scattered locations, Wadi Zirayqah, the Tihamah north of Aden, Wadi Hajr and near al-Ghaydah.

Apparently resident in very small numbers, with eggs recorded in April.

Spotted Eagle *Aquila clanga*
Not recorded during the survey.

Probably a winter visitor in small numbers, although only five previous records, one at Sheikh Othman in November (Bark Jones & Hartley 1957), one near Aden (Paige 1960), up to 15 in the Aden area 18-30 November 1984 (Ash 1988), one at Sheikh Othman December 1960 to January 1961 and one at Hiswa November 1961 (MDG, HPM).

Tawny Eagle *Aquila rapax*
Not recorded during the survey.

Apparently resident in very small numbers in the south-west.

Steppe Eagle *Aquila nipalensis*
Not recorded during the survey.

A passage migrant and winter visitor; the most common eagle in Aden from September to March, with up to 12 recorded together (Ennion 1962). One at Wadi Hajr November (Jennings *et al.* 1991).

Imperial Eagle *Aquila heliaca*
Not recorded during the survey.

Status uncertain; probably a rare winter visitor. Barnes (1893) states this species is not uncommon in Aden, with records from October to March. However, in view of identification difficulties, these observations should probably be treated with caution. Recorded in December and January (Ennion 1962).

Golden Eagle *Aquila chrysaetos*
Not recorded during the survey.

Status uncertain. The only claims are those made by Bark Jones & Hartley (1957), who recorded the species twice in Aden January 1945.

Verreaux's Eagle *Aquila verreauxii*
Not recorded during the survey.

Status uncertain. Probably a very rare resident. Recorded in the Amiri district, north of Aden, in December 1948 (Meinertzhagen 1954); two adults with a juvenile in the Habban district 18 February 1992 (ACG) and one at Tarim 24 October 1993 (NJR).

Booted Eagle *Hieraaetus pennatus*
One near Dar al-Qudaymi, north of Aden 23 March was the second record for southern Yemen.

Apparently a rare pasage migrant, previously recorded in September at Sheikh Othman (MDG, HPM).

Bonelli's Eagle *Hieraaetus fasciatus*
Six recorded at four sites, Ras Fartak, in the Mahrah, between al-Ghaydah and Wadi Wa'shah, and at Wadi Fughmah where a fledged juvenile was seen in a nest on a cliff face at 800 m 2 May. All records were between sea-level and 800 m.

Resident in small numbers and probably the most common breeding eagle in southern Yemen. Previously recorded near Aden, Lahej, Abyan, al-Hawf, Tarim and Wadi Hadramawt.

Osprey *Pandion haliaetus*
67 recorded, all on the coast where fairly evenly distributed. Although no detailed survey was attempted it would not be unreasonable to suggest a pair was present along every 3 km, suggesting a population in the order of 500 pairs along the entire southern Yemen coast.

A widespread coastal breeder with eggs recorded in December; also a passage migrant and winter visitor; one inland record, presumably a migrant, in Wadi Hadramawt 2 November 1989 (Jennings *et al.* 1991).

Lesser Kestrel *Falco naumanni*
Five at four widely scattered localities between 24 March and 23 April, the first spring records for southern Yemen.

A passage migrant in small numbers. Recorded in late September/early October in small flocks inland of al-Mukalla (Smith 1956).

Kestrel *Falco tinnunculus*
77 recorded; widely distributed with up to four daily.
A widespread resident with eggs recorded in April and May; also probably a winter visitor.

Amur Falcon *Falco amurensis*
Not recorded during the survey.
A vagrant; one at Gaar 25 November 1984 (Ash 1988).

Merlin *Falco columbarius*
Not recorded during the survey.
A vagrant; one 10 December at Aden (Ennion 1962).

Hobby *Falco subbuteo*
Three between al-Mukalla and the Mahrah between 22 and 30 April.
An uncommon spring and autumn passage migrant.

Sooty Falcon *Falco concolor*
One, apparent migrant in the Mahrah 29 April (4 km from the coast) was the first record for mainland southern Yemen.
A scarce breeder and migrant, previously only recorded on the Jezat Saba islands (south of Perim), where breeding (Bark Jones & Hartley 1957).

Lanner *Falco biarmicus*
One near Wadi Yashbum 28 March and two near Ras al-'Arah (west of Aden) 21 April, may have been breeding.
Probably an uncommon resident with records from February, March, April, July, September, October and December.

Saker *Falco cherrug*
A vagrant; one at al-Mardam 8 April, was the first record for southern Yemen.

Peregrine *Falco peregrinus*
Not definitely recorded, but two falcons north-west of Aden 20 April were possibly this species. One with jesses 5 May near al-Qatn.
A winter visitor. According to Meinertzhagen (1954) not uncommon on the coast, with up to 10 recorded in a day between Aden and Shukra; all confirmed records are from winter (November-January).

Barbary Falcon *Falco pelegrinoides*
18 recorded at eight widely distributed localities with most in the Jabal Iraf area (where nesting) and in the Mahrah.
A resident with breeding recorded at Aden (Meinertzhagen 1954) and Shibam

in September (Guichard & Goodwin 1952) and at al-Mukalla in January (Bark Jones & Hartley 1957).

Chukar *Alectoris chukar*
Not recorded during the survey.
Claimed near Aden in the last century (Barnes 1893). Potential confusion with *A. melanocephala* would seem to be the only plausable explanation.

Arabian Partridge *Alectoris melanocephala*
82 recorded from ten localities in two areas: the western highlands and coastal hills in the east. In the western highlands there are records from six localities (460 to 2000 m), with a maximum of ten pairs at Jabal Iraf. In the east found in four localities above 100 m in coastal areas; common at Wadi Mararah (360 m) and in the Shahrut hills (680 m) in the Mahrah. Also observed in the hills inland from Ras Fartak (one pair with two half-grown pulli at 460 m) and at Wadi Irkhawt. Occurs in a wide variety of habitats including sandy plains, steep sided wadis, *Juniperus* woodland and *Anogeissus/Commiphora* woodland on steep hills in the east.

A locally common resident. The species was not recorded during the survey in the interior, but has been reported from the northern Hadramawt (Gallagher & Woodcock, 1980) although this may have been meant to include the Mahrah also.

Sand Partridge *Ammoperdix heyi*
75 recorded from 19 localities in three areas from sea level to 830 m. Recorded in the western highlands sparsely between 460 and 625 m, between Ras al-'Arah and Dar al-Qudaymi, in coastal areas from Sayhut to the Mahrah and inland from Wadi al-Jiz' through Wadi Hadramawt to Shabwah.

A widely distributed resident.

Quail *Coturnix coturnix*
Two at Jabal Iraf 21-23 March and two at Wadi al-Jahr 27 March.

A passage migrant and winter visitor from September to March. Two heard calling 17 July 1960 (MDG, HPM).

Harlequin Quail *Coturnix delegorguei*
Not recorded during the survey.

Perhaps a scarce irregular breeder. There are no records since the last century when apparently abundant, at least at times (Barnes 1893, Yerbury 1896). The species is scarce in south-west Arabia and in view of the abundance of Quail *C. coturnix* as a migrant, reports of large numbers seem highly questionable.

Pheasant *Phasianus colchicus*
Not recorded during the survey

A male listed as collected in the Hadramawt and registered in the BMNH in 1932 cannot now be traced. Such an occurrence is surely unbelievable.

Helmeted Guineafowl *Numida meleagris*
Not recorded during the survey.

Reported to be present throughout the year in the northern Aden Protectorate but no other records.

Little Button Quail *Turnix sylvatica*
One at Wadi al-Jahr 27 March.

A resident or nomadic breeder. Recently recorded breeding in the coastal plains north of Aden (Obadi 1989), but otherwise recorded only during the last century, when apparently not uncommon in Aden area in winter (Barnes 1893, Yerbury 1896). The potential for confusion between this species and Quail *Coturnix coturnix* should be borne in mind when considering the status of this species.

Water Rail *Rallus aquaticus*
One at Wadi al-Jahr 27 March was the first record this century.

A vagrant; previously, two recorded near Aden in March (Yerbury 1896).

Spotted Crake *Porzana porzana*
Not recorded during the survey.

A vagrant; individuals recorded in April and September (Meinertzhagen 1924, Browne 1950).

Little Crake *Porzana parva*
Not recorded during the survey.

Probably an uncommon passage migrant; five records from September to October.

Corncrake *Crex crex*
Not recorded during the survey.

A scarce migrant in autumn (from August to October) and spring (one record in February and two in May).

White-breasted Waterhen *Amaurornis phoenicurus*
A vagrant; one at Wadi Hajr 29 March was the first record for Yemen (see Kirwan 1994).

Moorhen *Gallinula chloropus*
Recorded at two sites with permanent pools: up to four at Wadi al-Jahr 26-27 March and two at Mar'ayt springs 1 May.

Probably a very local resident breeder.

Coot *Fulica atra*
Not recorded during the survey.

A rare winter visitor; six recorded from October to February.

Houbara *Chlamydotis undulata*
Not recorded during the survey but local people interviewed at Mar'ayt springs reported a small bustard from the nearby plains, pointing to this species in a field-guide.

Status uncertain; probably a very rare visitor which may have bred in the last century (Barnes 1893). Recorded in December (Bark Jones & Hartley 1957) and between Aden and al-Mukalla in May 1986 (JS).

Arabian Bustard *Ardeotis arabs*
One in a patch of coastal grassland in *Acacia tortilis* savannah between al-Hajaf and Hiswat al-Hujaymah. Despite a careful survey of the area, this was the only record. Local bedouins confirmed the regular presence of the species east to Wadi Harim and south from the foothills to the coast, but others interviewed knew it only as a rare visitor. Soldiers posted at nearby Ras al-'Arah reported occasionally shooting bustards. Others in the village had not seen the species reporting, however, that their fathers spoke of it as abundant in the past. One older man said that bustards could be found in the area to the north and east of Ras al-'Arah and numbers as great as 20 in a group were mentioned. Villagers said the bustards 'arrive' after the rains.

Once fairly common in the Aden area, especially in the foothills around Lahej, with young recorded in August (Barnes 1893, Yerbury 1896, Ogilvie-Grant 1900, Bury 1911, Bark Jones & Hartley 1957). The species could still be present in substantial numbers and presents a priority for conservation.

Pheasant-tailed Jacana *Hydrophasianus chirurgus*
Not recorded during the survey.

A vagrant; one near Riyan 2 December 1950 (Guichard & Goodwin 1952).

Painted Snipe *Rostratula benghalensis*
Not recorded during the survey.

A vagrant; singles in June and July 1960 (Gallagher 1986).

Oystercatcher *Haematopus ostralegus*
52 along the coast. Excepting 35 at the Aden beaches on 24-25 March, most records were of one to four birds.

A common winter visitor along the coast, a few remaining in summer.

Black-winged Stilt *Himantopus himantopus*
Two near Aden 26 March, one at al-Mukalla 29 March and one near Aden 21 April.

A common winter visitor from September to March, although recorded in all months. Over 300 at Aden in November (Ash 1988). A passage migrant and localised breeder in the south-west.

Avocet *Recurvirostra avosetta*
Four at 'Abdullah Gharib 30 April.

A winter visitor from September to April, small numbers remaining in summer.

Crab Plover *Dromas ardeola*
176 around Bab al-Mandab, with 170 on the Dhubab flats 18 April. Many were in pairs and display was noted, perhaps indicating local breeding. Only a fraction of the flats at Dhubab was surveyed and this site may hold much larger numbers than recorded.

Status uncertain, recorded in small parties from March to mid-November in numbers up to 300 in September (Meinertzhagen 1954; MDG, HPM). Breeding is reported from Shad-es-Din island (Bark Jones & Hartley 1957) but its location is unclear.

Stone Curlew *Burhinus oedicnemus*
Not recorded during the survey.

A winter visitor, probably in small numbers. Claimed breeding records have been shown to reflect confusion with Spotted Thick-knee *Burhinus capensis* (Gallagher & Stanley Price 1990).

Spotted Thick-knee *Burhinus capensis*
Not recorded during the survey.

Probably a resident breeder (Gallagher & Stanley Price 1990).

Cream-coloured Courser *Cursorius cursor*
An apparent pair recorded near Saqr April 24.

A resident or migrant breeder. Previous records are from October to December and in February.

Collared Pratincole *Glareola pratincola*
Not recorded during the survey.

Probably a rare passage migrant, recorded from July to September and in April.

Little Pratincole *Glareola lactea*
Not recorded during the survey.

A vagrant; recorded by HPM in the early 1960s and listed by Hollom *et al.* (1988). Further details are awaited at the time of publication.

Little Ringed Plover *Charadrius dubius*
Eight at Aden 25-26 March and one inland near Wadi Wa'shah 2 May.

A passage migrant and winter visitor in small numbers, recorded in July, September to January and March to May.

Ringed Plover *Charadrius hiaticula*
57 recorded on the coast with a maximum of 23 at Dhubab flats 18 April.

A passage migrant and winter visitor, recorded throughout the year.

Kentish Plover *Charadrius alexandrinus*
92 recorded on the coast with a maximum of 30 at Dhubab flats 18 April.
A breeding resident in the south-west and common winter visitor (and passage migrant?).

Lesser Sand Plover *Charadrius mongolus*
89 recorded on the coast with a maximum of 70 at Dhubab flats 18 April.
A common winter visitor and passage migrant from mid-July to April with a few remaining until June.

Greater Sand Plover *Charadrius leschenaultii*
Three at Dhubab flats 18 April, one near Ras al-'Arah 20 April and one at 'Abdullah Gharib 30 April.
A passage migrant and winter visitor, mostly from mid-July to April but also recorded in May and June (MDG, HPM).

Caspian Plover *Charadrius asiaticus*
Not recorded during the survey.
A vagrant; one near Aden, 18 August 1961 (Clarke 1967).

Dotterel *Charadrius morinellus*
Not recorded during the survey.
A flock reported on the beach at Abian, September 1944 (Bark Jones & Hartley 1957) would seem best regarded as unproven, given the lack of substantiating evidence.

Pacific Golden Plover *Pluvialis fulva*
A flock of 21 at lagoons near Ras Fartak 25 April.
A winter visitor and passage migrant in small numbers from August to April (MDG, HPM).

Golden Plover *Pluvialis apricaria*
Not recorded during the survey.
One at Aden 27 January (Ennion 1962) would seem to be best regarded as unproven given the lack of substantiating evidence.

Grey Plover *Pluvialis squatarola*
519 recorded on the coast, 417 at the Aden beaches 25 April and 69 at the Dhubab flats 18 April.
A winter visitor and passage migrant from July to May, with a few remaining in June.

Sociable Plover *Chettusia gregaria*
Not recorded during the survey.
A vagrant; one collected near Aden 18 January 1927 (Meinertzhagen 1954).

White-tailed Plover *Chettusia leucura*
Not recorded during the survey.
A vagrant; one at al-Mukalla 27 November 1984 (Ash 1988).

Red Knot *Calidris canutus*
One at 'Abdullah Gharib 30 April.
A scarce passage migrant with records from January (four), June (two) and July (one), (Browne 1950, Paige 1960 and Ennion 1962).

Sanderling *Calidris alba*
430 recorded at ten coastal localities, 300 were at Qishn 24 April.
A common passage and winter visitor from early August to late April, recorded less commonly from May to July.

Little Stint *Calidris minuta*
107 recorded at six coastal localities, with highest counts of 25 at Dhubab flats 18 April, 24 near al-Shihr 25 April and 25 on lagoons near Ras Fartak 25 April.
A common passage and winter visitor from August to May, also recorded in June and July.

Temminck's Stint *Calidris temminckii*
Five at Aden 26 March and one near Ras al-'Arah 20 April.
An uncommon passage and winter visitor from September to May.

Long-toed Stint *Calidris subminuta*
Not recorded during the survey.
Perhaps a very rare passage migrant with singles in the Aden area on 1 May, 15 September, 7 and 14 October 1960 and 18 February 1962 (MDG, HPM).

Curlew Sandpiper *Calidris ferruginea*
One at Aden 25 March, two at Dhubab flats 18 April and two near al-Shihr 25 April.
A common passage and winter visitor, with records from all months, mostly in June (up to 500) and August (530) (MDG, HPM).

Dunlin *Calidris alpina*
107 recorded of which 105 at Aden 25 March.
A common passage migrant and winter visitor from August to May.

Broad-billed Sandpiper *Limicola falcinellus*
29 at Dhubab flats 18 April.
Recorded from the Aden area, where seen in all months, with up to 30 in June, 20 in September and 100 in May (MDG, HPM).

Ruff *Philomachus pugnax*
Not recorded during the survey.

A passage migrant and winter visitor in very small numbers from July to January and in May.

Jack Snipe *Lymnocryptes minimus*
Not recorded during the survey.

A vagrant; one 24 January (Ennion 1962) and one shot (undated) (Bark Jones & Hartley 1957).

Snipe *Gallinago gallinago*
One at Wadi al-Jahr 27 March.

A passage migrant and winter visitor in small numbers from August to at least November.

Asian Dowitcher *Limnodromus semipalmatus*
Not recorded during the survey.

One recorded on the Aden mudflats, 22 and 23 August 1958 (Paige 1965). The authenticity of this record is now questioned as some of the features described do not support the claim (A. J. Prater *pers comm*, RPM, RFP)

Black-tailed Godwit *Limosa limosa*
Two at Aden 25 March and two at 'Abdullah Gharib 30 April.

A passage migrant and winter visitor in small numbers from mid-September to April, with several summer records.

Bar-tailed Godwit *Limosa lapponica*
106 recorded on the coast including 22 at Aden 24 March, with 49 at Dhubab flats 18 April.

A common passage and winter visitor from November to February but recorded in all months.

Whimbrel *Numenius phaeopus*
359 recorded on the coast, including 225 near Bab al-Mandab 18 April.

A common passage migrant and winter visitor from mid-July to late April, with several summer records.

Curlew *Numenius arquata*
43 recorded on the coast including 16 at Aden 25 March and 17 at Dhubab flats 18 April.

A passage migrant and winter visitor from late June to mid-March, some remaining in summer.

Spotted Redshank *Tringa erythropus*
One recorded at a lagoon at Ras al-'Arah 20 April.

A scarce passage migrant and winter visitor, with records from November

(seven), December (three), January (three) and February (two), all in the Aden area.

Redshank *Tringa totanus*
335 recorded on the coast including 258 at Aden harbour, 25 March.
A passage migrant and winter visitor from late June to mid-April, a few remaining in summer.

Marsh Sandpiper *Tringa stagnatilis*
One at Aden 25 March.
A passage migrant and winter visitor, with small numbers recorded from the Aden area throughout the year but mostly from mid-September to March.

Greenshank *Tringa nebularia*
84 recorded including 56 at Aden 25 March; one inland record at Mar'ayt springs 1 May.
A passage migrant and winter visitor in small numbers, primarily from late July to April, some remaining through the summer.

Green Sandpiper *Tringa ochropus*
One near Wadi al-Jahr 26 March.
A passage migrant and winter visitor from July to November with smaller numbers recorded until March.

Wood Sandpiper *Tringa glareola*
Eleven recorded at five locations from 26 March to 26 April.
An uncommon passage migrant and winter visitor from August to April, recorded occasionally in June and July.

Terek Sandpiper *Xenus cinereus*
137 recorded on the coast with five at Aden 25 March, 85 at Dhubab flats 18 April, two at Qishn 24 April, 25 at Ras Fartak 25 April, six at al-Faydami 27 April and 14 at 'Abdullah Gharib 30 April.
A passage migrant and winter visitor recorded throughout the year.

Common Sandpiper *Actitis hypoleucos*
65 at 20 localities (one inland), in flocks of up to seven.
A passage migrant and winter visitor from mid-July to April, with a few summer records.

Turnstone *Arenaria interpres*
71 at ten localities along the coast with a maximum of 29 at Aden 25 March.
A common passage migrant and winter visitor, recorded mostly from the Aden area from mid-August to mid-October, with smaller numbers in winter and spring (to May).

Red-necked Phalarope *Phalaropus lobatus*
One at Aden 25 March and 30 at sea off Sayhut 23 April.

A common winter visitor to the Arabian Sea from the end of July through to April and May.

Grey Phalarope *Phalaropus fulicarius*
Not recorded during the survey.

A record of small flocks of Grey and Red-necked Phalaropes *P. lobatus* at sea in February 1937 (Meinertzhagen 1954) would seem to be best regarded as unproven. The occurrence of the species as a winter visitor in the Arabian Sea is disputed (Cramp & Simmons 1983).

Pomarine Skua *Stercorarius pomarinus*
41 at five coastal localities: one at Aden 24 March, three there 25 March, three between al-Mukalla and Wadi Himarah 7 April and one at al-Faydami 27 April.

Probably a regular winter and passage visitor. Medhurst recorded the species off Aden in substantial numbers (Bailey 1966), few other records however. The Arabian Sea is well-known as a wintering area and individuals wintering farther south might pass through the area (Meininger & Sørensen 1986).

Arctic Skua *Stercorarius parasiticus*
67 at 12 coastal localities with highest counts of 16 at Aden 25 March, 18 in the Bab al-Mandab 18 April, and eight at sea off Sayhut 23 April. Only light-phase birds were recorded.

Probably a regular passage migrant in spring, perhaps also a winter visitor e.g. Medhurst recorded the species in substantial numbers at Aden (Bailey 1966). Wintering of Arctic Skuas in the Arabian sea is disputed and needs confirmation; birds from wintering areas off southern Africa may follow a direct route to breeding areas in arctic Eurasia and may thus pass through the region (Meininger & Sørensen 1986).

Sooty Gull *Larus hemprichii*
19,770 along the coast with the following concentrations (all numbers are estimates): 2,000 between al-Mukalla and Sayhut 22 April, 600 at sea off Sayhut 23 April, 7,800 at Qishn 24 April, 500 Sayhut to Saqr 24 April, 1,000 at al-Faydami 26-27 April, 1,500 between al-Faydami and Wadi Mararah 27 April, 1,720 at 'Abdullah Gharib 30 April and 2,750 between the Sharut hills and al-Ghaydah 30 April.

A common resident which is known to breed on islands off the coast.

White-eyed Gull *Larus leucophthalmus*
80 along the coast, with a maximum of 45 around Bab al-Mandab 18 April. The easternmost record was three at Qishn 24 April.

A regular passage migrant and winter visitor to the Red Sea and the Gulf of Aden. Breeding known from the islands of Jezat Saba in Bab al-Mandab.

Great Black-headed Gull *Larus ichthyaetus*
17 along the coast from 24 March to 30 April with a maximum of eleven at Aden 24 March.

Probably a scarce (or uncommon) winter visitor and passage migrant with sub-adult individuals moving through or lingering within the region irregularly, although previously recorded only in winter (Yerbury 1886, Barnes 1893) and in October and January (MDG, HPM).

Black-headed Gull *Larus ridibundus*
Seven at three sites, including five between Wadi Hajr and al-Mukalla 29 March.

A passage migrant and winter visitor in small numbers from November to April, typically recorded in flocks of up to 100. Very small numbers may oversummer (Clarke 1967).

Brown-headed Gull *Larus brunnicephalus*
Not recorded during the survey.

Barnes (1893) claimed the species was fairly numerous but doubt was expressed by Meinertzhagen (1954). Given the unlikelihood of such a record this is best regarded as unproven.

Slender-billed Gull *Larus genei*
Nine at three coastal locations with seven at 'Abdullah Gharib 30 April.
A winter visitor and passage migrant to the coast from late October to May with additional records from June and August (Clarke 1967, MDG, HPM).

The Lesser Black-backed Gull/Yellow-legged Gull complex *Larus fuscus/cachinnans*
Large gulls were recorded in small numbers on the coast. Adults were classified only as either black-backed ('Lesser Black-backed Gull' type) or lighter-backed birds ('Yellow-legged Gull' type). Recent studies on the systematics of larger gulls have revealed the complexity of the problem their identification presents. The following is based both on birds identified in the field and from subsequent examination of slides.
Black-backed type – mainly *L. f. fuscus* but including some dark-backed *L. f. heuglini*: 109 on the coast, with maximum of 17 at 'Abdullah Gharib 30 April.
Lighter-backed type – includes several forms: lighter-backed *L. f. heuglini, L. f. taimyrensis, L. c. cachinnans* and/or *L. c. barabensis*.
179 along the coast, with maximum of 35 at Aden 25 March and 17 at 'Abdullah Gharib 30 April.

Large gulls in this complex are common passage migrants and winter visitors from October to April, smaller numbers oversummering. Understanding of the status of large gulls in Yemen remains rudimentary.

Great Black-backed Gull *Larus marinus*
Not recorded during the survey.

Records of small parties (Barnes 1893) and one with *L. fuscus* (Ennion 1962) seem doubtful, almost certainly refering to *L. f. heuglini*. Further evidence is required before occurance in Yemen can be considered proven.

Gull-billed Tern *Gelochelidon nilotica*
30 along the coast, with a maximum of 15 at 'Abdullah Gharib 30 April.

A common passage migrant and winter visitor e.g. in flocks of up to 200 in March (MDG, HPM) but also recorded throughout the year.

Caspian Tern *Sterna caspia*
96 along the coast, with most birds at two localities, 36 at Aden 25 March and 39 at 'Abdullah Gharib 30 April.

A winter visitor and passage migrant in small numbers mostly from November to April but recorded in all months.

Swift Tern *Sterna bergii*
4,150 along the coast with highest counts of 650 at Aden 24-25 March and 1,750 at 'Abdullah Gharib 30 April.

Common along the coast, mostly recorded from April to October (the breeding season).

Lesser Crested Tern *Sterna bengalensis*
93 along the coast, with a maximum of 30 at 'Abdullah Gharib 30 April.

Common from May to August with smaller numbers during the rest of the year.

Sandwich Tern *Sterna sandvicensis*
1,581 along the coast with a maximum of 622 at 'Abdullah Gharib 30 April.

A fairly common passage migrant and winter visitor.

Common Tern *Sterna hirundo*
459 along the coast, mainly in the east. Northward migration of adults was observed: 72 at sea off Sayhut 23 April, 76 at Saqr 25 April and 149 at al-Faydami 26 April.

A passage migrant, previously recorded only in early October 1954, when common at al-Mukalla (Smith 1956).

White-cheeked Tern *Sterna repressa*
4,697 along the coast. Most birds were observed in the Red Sea north of Bab al-Mandab 18 April a large concentration of 4,500 at al-Jadid during strong onshore winds when 2,000 birds per hour passed northwards. In the east immatures were observed as follows: 35 at Ras Fartak 25 April, 51 between al-Faydamì and Wadi Mararah April 27, three at 'Abdullah Gharib 30 April.

Either a common passage migrant or a passage migrant and local breeder.

Bridled Tern *Sterna anaethetus*
Recorded along the Red Sea coast north of Bab al-Mandab as follows: 2,300 at al-Jadid, 800 between Dhubab and Bab al-Mandab 18 April, ten between Bab al-Mandab and al-Suqayyah and ten at al-Suqayyah 19 April. Additionally, one in the east at al-Fatk 30 April.

Probably a regular passage migrant, reportedly abundant in the Gulf of Aden from March to October.

Sooty Tern *Sterna fuscata*
Not recorded during the survey.

Status uncertain; recorded May, September and November in small numbers and probably a regular passage migrant.

Little Tern *Sterna albifrons*
Not recorded during the survey.

Status uncertain, past claims may reflect confusion with Saunders' Little Tern *S. saundersi*. Further evidence is required before occurrence in Yemen can be considered proven.

Saunders' Little Tern *Sterna saundersi*
120 in the Bab al-Mandab 18 April with a maximum of 115 at al-Jadid. In the east, 16 at 'Abdullah Gharib 30 April and one between the Shahrut hills and al-Ghaydah 30 April.

Probably a resident breeder in small numbers.

Whiskered Tern *Chlidonias hybridus*
Not recorded during the survey.

A rare passage migrant with one record in June and six from September to November.

White-winged Black Tern *Chlidonias leucopterus*
Two at 'Abdullah Gharib on 30 April.

A passage migrant and winter visitor in small numbers from September to May.

Common Noddy *Anous stolidus*
Not recorded during the survey.

A vagrant; one at Aden 11 November 1923 (Meinentzhagen 1954 but the skin at BMNH is labelled 'February') and two near Shukra 21 December 1954 (Smith 1956).

Lichtenstein's Sandgrouse *Pterocles lichtensteinii*
88 at 21 widespread localities, mostly in small flocks of 2-10 with a maximum of 14 in *Acacia* savanna between al-Hajaf and Hiswat al-Hujaymah 20 April.

A widespread resident throughout rocky terrain although breeding not yet proven.

Chestnut-bellied Sandgrouse *Pterocles exustus*
322 at 11 widespread localities including 110 at Wadi al-Khabt (a sandy plain at 460 m) and 136 on the Tihamah 20 km inland from Aden.

A common resident breeder. Flocks of 3,000-4,000 were estimated at a spring near Sanau, October 1965 (Brown 1969).

Rock Dove *Columba livia*
1,001 at 40 localities.

A very common and widespread resident.

African Collared Dove (Pink-headed Dove) *Streptopelia roseogrisea*
296 at 28 localities, with concentrations on the south-western coastal plain between al-Mukha and Aden, in Wadi Himarah, Wadi Hadramawt and Wadi al-Jiz'. Mostly recorded below 600 m but also up to 1,200 m at Wadi Yashbum. The most easterly record was one at al-Ghaydah. Not encountered in the Mahrah.

A common and fairly widespread resident in lowland areas except in the east.

Red-eyed Dove *Streptopelia semitorquata*
Singles in the highlands near Jabal Iraf 21 and 23 March.

A resident, all records are from the south-west in winter and spring.

Turtle Dove *Streptopelia turtur*
Up to seven at Shabwah 4 and 5 May; some individuals were calling and displaying and may have been breeding.

A passage migrant from March to June and September to mid-October. There is also one record of a young bird, 20 August (Ogilvie-Grant 1900).

Dusky Turtle Dove *Streptopelia lugens*
None recorded during the survey.

Recorded once in southern Yemen: four near Lahej 30 March 1945 (Bark Jones & Hartley 1957).

Laughing Dove (Palm Dove) *Streptopelia senegalensis*
1,444 at 62 sites; recorded in a wide variety of habitats.

A common and widespread resident.

Namaqua Dove *Oena capensis*
110 at 22 localities, absent in the Mahrah.

A widespread and locally common resident east to Wadi Hadramawt and al-Mukalla; eggs recorded in May.

Bruce's Green Pigeon (Yellow-bellied Green Pigeon) *Treron waalia*
51 recorded at 12 sites.

A resident breeder, recorded locally throughout southern Yemen east to the Mahrah.

Rose-ringed Parakeet *Psittacula krameri*
Common around Aden with a maximum of six 26 April.
Introduced; recorded commonly in the Aden area since the early 1950s.

Jacobin Cuckoo *Clamator jacobinus*
Not recorded during the survey.
A scarce passage migrant, with six records from late March to late May and in August.

Great Spotted Cuckoo *Clamator glandarius*
Not recorded during the survey.
A vagrant; one at Aden 12 July 1958 (Paige 1960).

Didric Cuckoo *Chrysococcyx caprius*
Five in the Mahrah 27-29 April
Probably a scarce migrant breeder, though previously recorded only by Bury at Mafari in June (Meinertzhagen 1954).

Klaas's Cuckoo *Chrysococcyx klaas*
One in the *Juniperus* woodland on Jabal Iraf 16 March.
A vagrant or a rare migrant breeder; a young bird obtained by Bury in the Amiri district 2 August (Meinertzhagen 1954).

Common Cuckoo *Cuculus canorus*
One at Aden 24 March and one at Shabwah 6 May.
A passage migrant in spring and autumn.

White-browed Coucal *Centropus superciliosus*
Not recorded during the survey.
A rare resident breeder from the south-west to the western Hadramawt. A nest was found at Lahej 7 June (Meinertzhagen 1954).

Barn Owl *Tyto alba*
Not recorded during the survey.
Apparently a breeding resident, probably rare or uncommon.

African Scops Owl *Otus senegalensis*
At least 28 records including five seen and heard on Jabal Iraf 21-22 March and five in the Mahrah 28 April. 18 other individuals recorded from widespread localities.
Previously known only as a resident in the Amiri district (Meinertzhagen 1954) but now known to be widely distributed.

Scops Owl *Otus scops*
Not recorded during the survey.
Five records; one at Aden 29 September (Barnes 1893), one collected by Bury

at Azrahi ravine 21 May (in BMNH), one at Tawahi 22 September and one there 28 September to 7 October (Browne 1950) and one late September/early October 1954 (Smith 1956). Sight records should probably be treated with caution given the potential for confusion with African Scops Owl *O. senegalensis*.

Spotted Eagle Owl *Bubo africanus*
Heard calling in the Mahrah 29 April. A secondary feather was found at the same site.

Apparently a scarce resident in the south-west and the Mahrah.

Little Owl *Athene noctua*
One between Wadi Himarah and al-Mardam 8 April, three in a rocky valley near Tarim 3 May and two in palm groves at Sayun 4 May.

Probably an uncommon resident although previously recorded only from Wadi Hadramawt May 1986.

Short-eared Owl *Asio flammeus*
Not recorded during the survey.

Apparently a very scarce or occasional winter visitor. Six records, all from the Aden area from November to March. Five of these were dead birds (Yerbury 1896, Meinertzhagen 1954, Bark Jones & Hartley 1957, Browne 1950 and Ash 1988).

Nubian Nightjar *Caprimulgus nubicus*
Eight at six localities from sea-level to 600 m: al-Jadid, Ras al-'Arah, in plains north-west of Aden and at Wadi al-Jahr, Wadi Himarah and Wadi Hajr.

Status uncertain but probably a widespread resident in the west, occurring in a remarkably broad range of habitats.

European Nightjar *Caprimulgus europaeus*
Three singles at Saqr 25 April, al-Ghaydah and on al-Faydami plain 26 April.

A passage migrant although seldom recorded; the only autumn record is one at Tawahi 13 October (Browne 1950).

Egyptian Nightjar *Caprimulgus aegyptius*
None recorded during the survey.

A vagrant; one obtained near Aden in December (Meinertzhagen 1954).

Plain Nightjar *Caprimulgus inornatus*
13 at four localities. Three calling in *Juniperus* woodland on Jabal Iraf, 21-23 March and two were calling in rocky hillsides with sparse vegetation near al-Sawm 3 May. Three near Tarim 3 May and five in a dry wadi at al-Qatn 6 May. For further details see Dymond (1996).

Status uncertain; probably a fairly common breeder in the Jabal Iraf and Wadi Hadramawt regions but likely to be much more widespread. Old records are: seven collected between 29 August and 1 October 1899 (Ogilvie-Grant 1900).

One in the Amiri district 17 June 1907 (or 1901) collected by Bury (in BMNH). One long dead at Shabwah in the Hadramawt and two at Wadi Dau'an May 1934 (Bates 1938).

Swifts *Apus* spp.
The identification of swifts *Apus* proved problematical. Whilst the following observations of Common Swift *Apus apus* and Pallid Swift *A. pallidus* record what was identified at the time, on reflection it is likely that a number of swifts would have been better noted as swift sp. *Apus* sp. For example, a swift trapped 25 April at Saqr and identified as Pallid was later considered to be possibly Forbes-Watson's Swift *A. berliozi* when the slides were examined by members of the survey with experience of this species on Socotra. This species could easily be overlooked in flocks of either Pallid or Common Swifts.

Common Swift *Apus apus*
25 definitely identified, all 21-22 April including 21 at Ras al-'Arah.

Status uncertain due to potential confusion between this species and Pallid Swift *Apus pallidus*.

Pallid Swift *Apus pallidus*
Much commoner than Common Swift *Apus apus* with 1,219 recorded at 13 localities. Numbers exceeded 100 at several sites including a maximum of 500 over the al-Faydami plain 25 April.

A passage migrant, commonly recorded from February to May and October to early November.

Alpine Swift *Apus melba*
170 clearly on passage at 15 locations 20-31 March.

Status uncertain; a regular passage migrant in spring and autumn but also recorded in the Hadramawt from March to June and at Lahej in January.

Little Swift *Apus affinis*
164 at 16 localities including 62 at Dar al-Qudaymi, north of Aden and 40 at Wadi Yashbum. Not recorded in the east.

Apparently a fairly common but local summer visitor from March to September, east to Wadi Yashbum and Wadi Hajr; two at Lahej in January.

Grey-headed Kingfisher *Halcyon leucocephala*
Nine at six localities: Wadi Harim, between al-Hajaf and Hiswat al-Hujaymah, Qishn, the Mahrah, al-Sawm and al-Qatn.

A widespread, but fairly local migrant breeder, recorded from March to October and exceptionally in January.

Malachite Kingfisher *Alcedo cristata*
A pair at Wadi Hajr 29 March were associating with an apparent nest hole in a sandy bank (Farrow 1994). This is the first record of probable breeding in

Arabia.

Apparently an occasional or rare breeder. One collected near Tarim February 1932 (Bates 1938) is considered doubtful because the specimen is probably mislabelled.

White-throated Bee-eater *Merops albicollis*
48 at six localities from 18 to 21 April. Most were apparently migrants although display was noted east of Aden.

A migrant breeder from April to November with exceptional winter records from December and February (Meinertzhagen 1954, Sclater 1917).

Little Green Bee-eater *Merops orientalis*
186 at 44 localities, usually in pairs or loose associations. Recorded at Wadi al-Jahr, Wadi Hajar, Wadi al-Masilah and Wadi Hadramawt (where over 60 recorded). One record of a single individual from the Mahrah.

A common and widespread resident although apparently rare in the Mahrah.

Blue-cheeked Bee-eater *Merops superciliosus*
363 at 18 localities. Active passage was conspicuous between 7 April and 1 May, typically in an easterly direction; heard calling on migration at night.

A passage migrant, sometimes in considerable numbers, from March to May and September to November; the breeding reported in the Hadramawt (Bark Jones & Hartley 1957), is most unlikely.

European Bee-eater *Merops apiaster*
51 at two localities, 31 on 26 March and 20 on 19 April.

A passage migrant from March to April and August to September.

European Roller *Coracias garrulus*
21 at five localities, the maximum being eight on 24 April.

A passage migrant from March to May and August to December. Barnes (1893) apparently recorded the species wintering in the Aden area.

Abyssinian Roller *Coracias abyssinicus*
Not recorded during the survey.

Status uncertain. Reported to occur in the west (Meinertzhagen 1954) but, surprisingly, there are no recent records.

Indian Roller *Coracias benghalensis*
Not recorded during the survey.

A claim of 'small numbers' at an oasis west of al-Mukalla in early October 1954 (Smith 1956) would seem best regarded as unproven given the lack of substantiating evidence.

Lilac-breasted Roller *Coracias caudata*
Not recorded during the survey.

Recorded in the early 1960s (HPM) and listed by Hollom *et al.* (1988). Further details are awaited at the time of publication.

Rufous-crowned Roller *Coracias naevia*
Not recorded during the survey.
Recorded in the early 1960s (HPM) and listed in Hollom *et al.* (1988). Further details are awaited at the time of publication.

Hoopoe *Upupa epops*
22 at seven widely distributed localities.
Status uncertain. A passage migrant and winter visitor but there is some evidence to suggest breeding.

African Grey Hornbill *Tockus nasutus*
Nine at three localities west of Aden: four at Jabal Iraf, two at Dar al-Qudaymi (north-west of Aden) and three in Acacia savannah near Ras al-'Arah.
Resident in the south-west from sea-level to 1,450m.

Wryneck *Jynx torquilla*
Not recorded during the survey.
An uncommon passage migrant recorded in March, September and October.

Arabian Woodpecker *Dendrocopos dorae*
Three at 1,450 m on Jabal Iraf where an active nest was found in *Acacia* woodland 23 March.
An apparently local resident breeder. The only other record is one collected at Lodar (1,000 m) in 1948 by Meinertzhagen (skin in BMNH). Jabal Iraf is the most southerly known breeding site.

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For all other references cited see reference list presented in the paper cited above.

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Sandgrouse (1996) 17: 54-72

The status of passerines in southern Yemen and records of the OSME survey in spring 1993

R. P. MARTINS, C. G. BRADSHAW, ALAN BROWN, G. M. KIRWAN AND R. F. PORTER

For the policy adopted on record-assessment, area surveyed, sources of past records and treatment in this systematic list see Porter *et al.* (1996).

Singing Bush Lark *Mirafra cantillans*
Two in cultivation near Zinjibar 26 March and two at Wadi al-Jahr 27 March.

Apparently a highly localised resident in cultivated areas, mainly in the lowlands near Aden but also recorded east to Zinjibar and Wadi al-Jahr (600 m).

Black-crowned Finch Lark *Eremopterix nigriceps*
175 recorded, mostly in the Tihamah and the coastal fringe, where widespread, with relatively small numbers in Wadi Hadramawt between al-Qatn and Shabwah. Large numbers recorded in three areas: 519 20 km north of Aden, 367 30 km north of Aden and 160 at Saqr beach, west of Qishn. Most records involved pairs and/or small groups.

A resident breeder (eggs recorded January to May) principally reported from the Tihamah and coastal lowlands, often in areas with recent rainfall.

Dunn's Lark *Eremalauda dunni*
25 recorded between Shabwah and Marib 6 May including seven, some in pairs performing display flights and apparently breeding, 45 km north-west of Shabwah in one closely-investigated part of an extensive area of ephemeral steppe-desert grassland. Growth of grass had clearly been induced by recent rainfall.

Status unclear, but perhaps an irregular wanderer, breeding where and when local conditions are suitable. The species is known to be highly nomadic. Singles have been collected as follows: one at Sheikh Othman, Aden 15 January 1922 (Meinertzhagen 1923); at Zumukh, Hadramawt 31 October 1950 (Guichard & Goodwin 1952), at Umm al-Samr, east of Mushainiqa 5 August 1936 collected by Philby (Bates 1938 and BMNH). The last named locality is on the border between previous North and South Yemen. The only other recent record is of three, 30 km south of al-'Abr 13 January 1994 (DF).

Bar-tailed Desert Lark *Ammomanes cincturus*
Not recorded during the survey.

One collected at Zumukh, Hadramawt where 'very common' (Guichard & Goodwin 1952) and one collected at Wadi Mitan 17 May where several small parties (Grimwood 1963). Status unclear; extremely scarce in south-west Arabia

(e.g. merely one record from northern Yemen, Brooks *et al.* 1987). The numbers recorded by Guichard & Goodwin 1952 (very common in Hadramawt) and Grimwood 1963 (small parties at Wadi Mitan) contrast with recent experience, suggesting that occurrence is highly erratic or perhaps that at least some claims refer to Desert Lark *Ammomanes deserti*. However, observer activity in relevant areas has been minimal in the past and the following series of recent records indicate the possibility of regular occurrence: ten 11 February, three 23 December 1993 and five 13 January 1994 on the plains south of al-'Abr, between Jabal Aththatiyah and Taraf al-'Ayn (DF).

Desert Lark *Ammomanes deserti*
252 recorded in rocky terrain throughout.

A widespread resident in rocky areas at all altitudes.

Hoopoe Lark *Alaemon alaudipes*
A total of 263 recorded from the following areas: the Aden environs, from Dhubab to Bab al-Mandab, at al-Suqayyah, on coastal Tihamah east of Ras al-'Arah, Biram Muhammadiyah between Qishn and Saqr, at Ras Fartak, at al-Ghaydah, between Mar'ayt springs and Wadi al-Jiz', between Tarim and Wadi Fughmah and during the desert crossing between Shabwah and Marib.

A resident, widely but patchily distributed, primarily through low altitude sandy areas where locally very common. More common in suitable habitat fringing the coast than around the rim of the Rub' al-Khali.

Bimaculated Lark *Melanocorypha bimaculata*
Not recorded during the survey.

A vagrant. One collected from a small flock 'of about half a dozen', al-Mukalla 4 December 1950 (Guichard & Goodwin, 1952).

Red-capped Lark *Calandrella cinerea*
16 at al-Mardam, 10 km north-west of al-Bayda' 8-9 April.

Not previously recorded from southern Yemen, but presumably a resident breeder or occasional visitor to high altitude areas fringing the central plateau (most of which lies in northern Yemen).

Short-toed Lark *Calandrella brachydactyla*
One at al-Faydami, east of al-Ghaydah 27 April was presumably a migrant. This is the only known spring record.

A passage migrant, recorded late September to mid-December in autumn (when heaviest passage occurs in northern Yemen). Perhaps likely to be scarcer than in northern Yemen (where the Tihamah apparently offers a favoured passage route).

Crested Lark *Galerida cristata*
549 recorded throughout all habitats except woodland.

A widespread and common resident.

Skylark *Alauda arvensis*
Not recorded during the survey.
A claim of four at Dhala 26 December 1959/60 (Ennion 1962), has subsequently been questioned by Dowsett & Dowsett-Lemaire (1993) who suggest the record requires confirmation. In view of the absence of this species from south-west Arabia and lack of supporting details, this recommendation seems prudent.

Sand Martin *Riparia riparia*
Not recorded during the survey.
A passage migrant, recorded late April and May and mid-August to October.

Rock Martin *Ptyonoprogne fuligula*
132 recorded at a minimum of 36 localities throughout the area covered by the survey. Closely associated with rocky terrain and not normally encountered in non-rocky lowland areas such as the Tihamah.
A widespread resident.

Barn Swallow *Hirundo rustica*
493 recorded 23 March-6 May. Active passage apparent throughout this period.
A fairly common passage migrant. A nest containing three eggs at Steamer Point, Aden (Barnes 1893) is surely questionable, being so far from the known breeding range.

Red-rumped Swallow *Hirundo daurica*
44 recorded in the Wadi Zirayqah region, at Wadi Yashbum and between al-Bayda' and 30 km north of al-Khaw'ah 20 March-15 April.
A passage migrant although could breed (as in northern Yemen). Has been recorded in February to May and in August.

House Martin *Delichon urbica*
Not recorded during the survey.
A rare winter visitor or passage migrant. Two at Musseina 9 November (Ennion 1962). Two at Habilayn 3 February 1966 (Latham 1967).

Richard's Pipit *Anthus novaeseelandiae*
Not recorded during the survey.
Status unclear. Described as 'Resident in the hilly country on the Aden-Yemen border ... but not very common and with a patchy distribution' (Meinertzhagen 1954); also collected Dhala (December) and Habil (February) by Meinertzhagen. One at Habilayn 14 January and 6 February 1966 (Latham 1967). The systematic position of Old World non-migratory populations is confused and further clarification of apparent breeding in Yemen is needed.

Tawny Pipit *Anthus campestris*
Three at Wadi al-Khabt 24 March and two in Acacia parkland east of al-Hajaf 20 April.

An uncommon winter visitor and passage migrant, November to April. A claim by Meinertzhagen (1954) that *A. c. griseus* possibly breeds in the Aden Protectorate was based on a family party of adults and juveniles at Dhala in November.

Long-billed Pipit *Anthus similis*
51 recorded in the Wadi Zirayqah region, al-Mihal, Jabal Iraf, al-Mardam and the Mahrah, where 18, the maximum recorded at any location.

A locally common resident in rocky upland areas.

Tree Pipit *Anthus trivialis*
18 recorded from several localities in the west.

A passage migrant during February to May and August to November.

Meadow Pipit *Anthus pratensis*
Not recorded during the survey.

A possible record at Aden 19 November 1984 (Ash 1988). Further evidence is required before occurrence in Yemen can be considered proven.

Red-throated Pipit *Anthus cervinus*
Five recorded: four at al-Mardam (2,000 m) 9 April and one at al-Jadid 18 April.

Apparently a scarce passage migrant in spring. Recorded as common in 'small parties' 18-27 March (Meinertzhagen 1924) with additional records in February, April and May (Bates 1938; MDG, HPM). There are no autumn records but the species is likely to occur in small numbers in northern Yemen (Brooks *et al.* 1987).

Yellow Wagtail *Motacilla flava*
15 migrants recorded at four localities from 23 March to 20 April. 12 arrived from off-shore at al-Suqayyah 19 April. Sub-species identified were *flava, thunbergi* and *lutea* (one individual).

A passage migrant and winter visitor, September to May.

Citrine Wagtail *Motacilla citreola*
One (*M. c. werae*) near Zinjibar 26 March was the first record.

Presumably a scarce winter visitor to suitable wetland areas (as in northern Yemen).

Grey Wagtail *Motacilla cinerea*
Not recorded during the survey.

Presumably a scarce winter visitor recorded September to early November.

White Wagtail *Motacilla alba*
Two near Zinjibar 26 March.

A common winter visitor, late September to late April.

White-cheeked Bulbul *Pycnonotus leucogenys*
Not recorded during the survey.
One presumed escape at Steamer Point, Aden 6 March 1961 (MDG, HPM).

Yellow-vented Bulbul *Pycnonotus xanthopygos*
1,348 recorded in most habitats from the coast to the interior desert fringe, up to 2,000 m. Highest counts were 102 at Jabal Iraf 22 March and 104 in date palm groves at Sayun 4 May.

A common resident breeder, with eggs recorded March and April and young just out of the nest in August.

Grey Hypocolius *Hypocolius ampelinus*
Not recorded during the survey.

A vagrant, one recorded November 1950 (Meinertzhagen 1954), one at Lodar 20 January 1961 (MDG, HPM) and a probable at Aden (Barnes 1893).

Arabian Accentor *Prunella fagani*
Not recorded during the survey.

A resident, endemic to montane Yemen. In southern Yemen, one collected north of Habil 13 February 1923 (Meinertzhagen 1924) and several observations from Lahej (Bark Jones & Hartley 1957).

Rufous Bush Robin *Cercotrichas galactotes*
137 recorded at 24 localities between 23 March and 3 May, mostly in coastal areas, but also in the Shahrut hills (the Mahrah) and between there and Wadi Hadramawt (at up to 800 m). Peak passage occurred in the third week of April with highest counts of 19 at Wadi al-Masilah 22 April, 30 east of Sayhut 23 April and 16 at Wadi Irkhawt 24 April.

A common passage migrant recorded from 23 March to mid-May and from August to mid-October. It appears that a few may winter as there is a record of one at Tawahi 13 January (Ennion 1962) and it has been noted as present in winter in the central Hadramawt (J. F. Pavey *in litt.*).

Black Bush Robin *Cercotrichas podobe*
313 recorded from the Tihamah east to 100 km west of al-Ghaydah and inland to Wadi Hadramawt, mostly up to 1,200 m but three noted on a rocky, cultivated plateau at al-Mardam (2,000 m) 8 April. Not recorded in the Mahrah. Highest counts were 43 at Wadi Hajr 29 March, 36 at al-Sawm 3 May and 47 in date palm groves at Sayun 4 May.

A common resident breeder, up to 1,200 m, from the south-west to Wadi Hadramawt with eggs recorded in April and young in August. Survey records suggest that small numbers may breed in suitable habitat above 1,200 m, an exceptionally high altitude.

Thrush Nightingale *Luscinia luscinia*
Not recorded during the survey.

A scarce passage migrant. Several at Aden 20 April 1922 (Meinertzhagen 1924). One at Aden 23 April and 7 October 1960 (MDG, HPM).

Nightingale *Luscinia megarhynchos*
Not recorded during the survey.

Status uncertain but probably similar to status in northern Yemen where rare in spring but fairly common in autumn (Brooks *et al.* 1987). Recorded at Aden, Lahej and in Amiri district, all in September.

Bluethroat *Luscinia svecica*
Not recorded during the survey.

Apparently a scarce winter visitor and passage migrant. One collected by Boscawen at Wadi Khun in the Hadramawt 16 February 1932 (Bates 1938 and BMNH) and two at Aden 18 September 1944 (Bark Jones & Hartley 1957).

White-throated Robin *Irania gutturalis*
Recorded on passage at two coastal sites: two at al-Jadid 18 April and one at Wadi al-Masilah 22 April, the first spring records.

A scarce spring migrant; probably more common on autumn passage as in northern Yemen (Brooks *et al.* 1987). Collected by Bury in Amiri district in July, September and October (Sclater 1917); two collected at Shabwah in August (Bates 1938).

Black Redstart *Phoenicurus ochruros*
Not recorded during the survey.

A winter visitor in small numbers, recorded September to April (Ennion 1962, Meinertzhagen 1954, MDG, HPM).

Redstart *Phoenicurus phoenicurus*
29 recorded at ten localities 21 March to 24 April, from the Tihamah west to Wadi Irkhawt, at altitudes up to 1,760 m.

A fairly common spring migrant (although only two previous spring records). In autumn recorded in the south-west from mid-August to early December.

Blackstart *Cercomela melanura*
285 recorded at 41 sites from sea-level to 1,450 m (Jabal Iraf). Widespread, especially common in hills near al-Sawm, Wadi Harim and in the Mahrah.

A locally common and widespread resident breeder.

Red-tailed Chat (Familiar Chat) *Cercomela familiaris*
Not recorded during the survey.

Recorded by HPM in the early 1960s and listed in Hollom *et al.* (1988). Further details are awaited at the time of publication.

Whinchat *Saxicola rubetra*
Two coastal records: one at al-Jadid 18 April and one between al-Hajaf and Hiswat al-Hujaymah 20 April.

A passage migrant recorded mid-April to early June and September to early November.

Stonechat *Saxicola torquata*
One on the coast at al-Jadid 18 April was presumably a migrant.

The only other record is one collected at Dhala 30 November 1948 (Meinertzhagen 1954).

Isabelline Wheatear *Oenanthe isabellina*
One at Jabal Iraf 22 to 23 March and one at al-Mardam 8 April.

A widespread winter visitor and passage migrant with records from August to early April.

Red-breasted Wheatear *Oenanthe bottae*
Eight at three sites, all in the highlands: one at Qarrayshah, south of al-Turbah 21 March; five between Wadi Himarah and al-Mardam 8 April and two at al-Mardam 9 April.

Presumably a scarce and local resident breeder in the highlands. Three were seen and one collected north of Habil 13 February (Meinertzhagen 1924).

Northern Wheatear *Oenanthe oenanthe*
One at al-Mardam (2,000 m) 9 April and one on the coast at al-Jadid 18 April.

A passage migrant, apparently scarce in spring but more common in autumn, with a few wintering.

Pied Wheatear *Oenanthe pleschanka*
24 recorded at eight localities 23 March to 26 April from the Tihamah to 1,450 m on Jabal Iraf. The maximum number recorded on a single date was 18 between al-Jadid and Dhubab 18 April.

A passage migrant and winter visitor, recorded from late September to late April.

Black-eared Wheatear *Oenanthe hispanica*
Not recorded during the survey.

A vagrant, one at Wadi Hadramawt 27 September 1954 (Smith 1956).

Desert Wheatear *Oenanthe deserti*
Not recorded during the survey.

Apparently a fairly common winter visitor and passage migrant, recorded from September to April.

Red-tailed Wheatear *Oenanthe xanthoprymna*
Not recorded during the survey.

A vagrant or scarce winter visitor. One collected by Ingrams in a wadi north of Saiwun in February (Bates 1938) and one at Mukheiras 14 March 1962 (MDG, HPM).

South Arabian Wheatear *Oenanthe lugentoides*
Two disjunct and morphologically distinct populations. West of al-Mukalla, 66 *lugentoides* were recorded 21 March - 10 April, mainly on high rocky ground from 1,450 m to 2,350 m. In the east, between Sayhut and the Mahrah region adjacent to the Oman border, 25 apparent *boscaweni* were recorded 24-30 April in barren, rocky hills down to below 200 m.

A resident breeder, fledged young noted in April.

Hooded Wheatear *Oenanthe monacha*
Not recorded during the survey.

Apparently a resident, but only recorded from al-Mukalla and Wadi Hadramawt.

Little Rock Thrush *Monticola rufocinerea*
Recorded at two localities: five at al-Mihal near al-Turbah (1,760 m) 21 March and at Jabal Iraf (1,450 m) where maximum of 16 on 22 March.

An uncommon localised resident, apparently restricted to the limited montane areas in the west.

Rock Thrush *Monticola saxatilis*
Five recorded: four on the coast between al-Jadid and Dhubab 18 April and one in desert between Shabwah and Marib 6 May.

Apparently a scarce passage migrant, with merely two singles in April (Browne 1950), but fairly common during autumn passage in September and October.

Blue Rock Thrush *Monticola solitarius*
Not recorded during the survey.

A common winter visitor, late September to March. Also one at Aden May 1944 (Bark Jones & Hartley 1957).

Black-throated Thrush *Turdus ruficollis*
Not recorded during the survey.

A vagrant, one collected by Bury at Wadi Yashbum 4 January 1913 (Sclater 1917).

Song Thrush *Turdus philomelos*
Not recorded during the survey.

Apparently a rare winter visitor. One at Tawahi 26-31 December 1947 (Browne 1950) and one at Sheikh Othman 7 March 1961 (MDG, HPM).

Fan-tailed Cisticola *Cisticola juncidis*
12 in cultivation near Zinjibar 26 March.

A resident breeder in cultivated areas of the lowlands between Aden and Zinjibar. A nest was found at Lahej in March (Meinertzhagen 1954).

Graceful Prinia *Prinia gracilis*
511 recorded from widespread localities. Highest counts were 49 at Wadi Hajr 29 March, 33 at Wadi Himarah 7 April and 39 at Sayun 4 May.

A common and widespread breeding resident, absent only from areas with little or no vegetation.

Scrub Warbler *Scotocerca inquieta*
24 recorded at four sites: Tur al-Baha (north of Aden), Wadi Fughmah, al-Sawm and al-Qatn, the last two sites in Wadi Hadramawt; all are sparsely vegetated, barren, rocky or semi-desert areas from 500 to 820 m.

An uncommon and remarkably localised resident in dry, rocky country.

River Warbler *Locustella fluviatilis*
Not recorded during the survey.

A vagrant, one dead at Khormaksar 8 May 1961 (Clarke 1967) is the only record for the Republic of Yemen.

Sedge Warbler *Acrocephalus schoenobaenus*
Not recorded during the survey.

Presumably a scarce passage migrant. One at Khormaksar from late April to 25 May, two there 17 May 1961 (Clarke 1967) and one at Aden 6 May 1960 (MDG, HPM) are the only records.

Marsh Warbler *Acrocephalus palustris*
One between Aden and Wadi al-Jahr 26 March; three at Wadi al-Jahr 27 March and one in the Mahrah 29 April. See also Reed Warbler *A. scirpaceus*.

A passage migrant but only two previous (specimen) records; one collected by Philby in Wadi 'Abr 7 August (Bates 1938) and one collected by Bury in Amiri district in October (Sclater 1917).

Reed Warbler *Acrocephalus scirpaceus*
Two at Shabwah 6 May and one to four at Wadi Hajr, 28-29 March were either this species or Marsh Warbler *A. palustris*.

A passage migrant, recorded in spring only, with six records from February to May.

Great Reed Warbler *Acrocephalus arundinaceus*
Not recorded during the survey.

A passage migrant recorded in September, October and February.

Olivaceous Warbler *Hippolais pallida*
51 recorded at 16 localities between 26 March and 6 May. Maximum of 13 at Wadi Hajr 29 March. All other records involved 1-6 individuals. The first spring records for southern Yemen.

A passage migrant, recorded from September to December and late March to early May.

Booted Warbler *Hippolais caligata*
Not recorded during the survey.

A published record of one collected at Aden 13 January 1922 (Meinertzhagen 1924) is not mentioned in Meinertzhagen (1954) and is erroneous: the skin has been reidentified as Olivaceous Warbler *Hippolais pallida* (P. Colston *pers. comm.*). Therefore, there is no evidence for the occurence of this species in southern Yemen.

Upcher's Warbler *Hippolais languida*
81 recorded at 17 sites 28 March-6 May with highest counts of 29 east of Sayhut 22 April and 18 at Wadi al-Masilah 22 April.

A passage migrant recorded from late March to early May and in August.

Icterine Warbler *Hippolais icterina*
Not recorded during the survey.

A vagrant, one collected at Hiswa 20 April 1947 (Browne 1950).

Ménétries's Warbler *Sylvia mystacea*
Single birds were recorded at Wadi al-Masilah 22 April, Wadi Irkhawt 24 April and Wadi Mararah 27 April.

Apparently a rare passage migrant. There are three previous records: one collected in Amiri district by Bury, one at Sheikh Othman 11 March 1922 (in BMNH) and one at Hiswa 30 November 1984 (Ash 1988).

Desert Warbler *Sylvia nana*
Not recorded during the survey.

A scarce winter visitor or passage migrant, with records from October and March.

Arabian Warbler *Sylvia leucomelaena*
65 recorded at 11 sites from near sea-level to 1,450 m (Jabal Iraf), with most above 350 m. The highest count was 15 in the Shahrut hills, the Mahrah (640 m) 30 April.

Presumably a local resident, breeding at moderate elevations.

Orphean Warbler *Sylvia hortensis*
Not recorded during the survey.

A vagrant, one collected at El Khaur 9 October 1899 (Ogilvie-Grant 1900). Another, listed as taken at Aden in December (Meinertzhagen 1954), may actually refer to a specimen (in BMNH) taken by Meinertzhagen at Ta'izz (northern Yemen), 25 December 1948.

Barred Warbler *Sylvia nisoria*
123 recorded at 17 sites between 23 March and 6 May, with a maximum of 30 at Wadi Harim 19 April.

A passage migrant, recorded March to early May and October, occasionally in large numbers, e.g. 150 at al-Abr 25 April (Grimwood 1963).

Lesser Whitethroat *Sylvia curruca*
Ten recorded at five sites 22 to 28 March were all of the sub-species *curruca*.

A passage migrant, with some perhaps overwintering. Recorded September to April.

Common Whitethroat *Sylvia communis*
41 recorded at 16 sites 9 April to 6 May, with highest count of five at al-Faydami 27 April and in the hills near al-Sawm 3 May.

A passage migrant. Recorded from late March to mid-May and in September and October, with a single winter record: one collected by Meinertzhagen at Aden 30 December 1948.

Garden Warbler *Sylvia borin*
One at Wadi Habban 29 March was the first spring record.

A vagrant. Meinertzhagen (1954) lists a specimen apparently taken by Percival at Aden in October but no mention of this record is made by Ogilvie-Grant (1900), so it is perhaps best treated as uncertain. One at Sheikh Othman 30 October (Ennion 1962).

Blackcap *Sylvia atricapilla*
236 recorded at 17 localities between 21 March and 6 May.

A common passage migrant, especially in autumn, recorded from March to early May and September to early November.

Brown Woodland Warbler *Phylloscopus umbrovirens*
21 recorded in *Juniperus* woodland at Jabal Iraf (1,450 m), where clearly breeding (in pairs/singing), 21-23 March. Not previously recorded in southern Yemen. Jabal Iraf is the most southerly known breeding site in Arabia.

Presumably a migrant (or partial migrant) breeder, as in northern Yemen.

Wood Warbler *Phylloscopus sibilatrix*
Two at Wadi Irkhawt (near Ras 'Uqab) 24 April were the first spring records.

A scarce passage migrant. All six previous records are in autumn from September to 2 November.

Chiffchaff *Phylloscopus collybita*
12 at seven sites 21 March to 19 April.

A winter visitor and passage migrant, recorded from November to April.

Willow Warbler *Phylloscopus trochilus*
115 recorded at 17 sites between 15 April and 6 May.
A passage migrant recorded from late March to 2 June and in September.

Spotted Flycatcher *Muscicapa striata*
104 recorded between 9 April and 5 May. Highest counts were ten at Wadi Irkhawt 24 April, 22 at Saqr 25 April and 11 at al-Ghaydah 26 April, perhaps indicating a peak in passage in late April.
A common and widespread passage migrant from late March to May and late August to early November. One record in early December.

Gambaga Flycatcher *Muscicapa gambagae*
Not recorded by the survey.
Status unclear, the only record is from Amiri (north of Aden) at over 1,000 m (Meinertzhagen 1954); the species is a locally common migrant breeder in northern Yemen.

African Paradise Flycatcher *Terpsiphone viridis*
37 recorded at five sites. Most numerous in *Anogeissus/Commiphora* woodland in the Mahrah, where 19 at Wadi Mararah (360 m) 29 April and 13 in the Shahrut hills (680 m) 30 April; in addition recorded at Jabal Iraf, Wadi al-Masilah and Wadi Hajr.
A localised resident breeder, especially in areas of riparian vegetation. Eggs have been recorded in February.

Arabian Babbler *Turdoides squamiceps*
103 recorded at 12 sites. None recorded from the Mahrah.
A fairly common resident where scrub is present but apparently absent from the Mahrah. Eggs have been recorded in April.

Nile Valley Sunbird *Anthreptes metallicus*
326 recorded from widespread localities up to 1,200 m, but none in the Mahrah. Highest counts were 34 at Wadi al-Khabt 24 March, 65 at Wadi Himarah 8 April and 30 at Shabwah 5 May.
A fairly common and widespread resident but apparently absent from the Mahrah.

Shining Sunbird *Nectarinia habessinica*
175 recorded from widespread localities. The largest concentrations were 41 at Wadi al-Masilah 22 April and 75 at Wadi Mararah (the Mahrah) 28 April. Both areas support extensive vegetation.
A widespread resident breeder, with eggs recorded in May and June.

Orange-tufted Sunbird *Nectarinia osea*
141 recorded from widespread localities. Most counts were of 1-15 birds but

larger numbers were recorded in the Mahrah, with 22 at Wadi Mararah 28 April and 53 in the Shahrut hills 29 April.

A widespread resident.

White-breasted White-eye *Zosterops abyssinica*

109 recorded at eight sites between 360 and 1,760 m. Highest counts were 26 in *Juniperus* woodland at Jabal Iraf (1,450 m) 22 March, and in *Anogeissus/Commiphora* woodland in the Mahrah, with 36 at Wadi Mararah (360 m) 29 April and 16 in the Shahrut hills (680 m) 30 April.

A widespread local resident, not recorded below 360 m.

Golden Oriole *Oriolus oriolus*

16 at Wadi Harim 19 April and singles in Acacia savannah between al-Hajaf and Hiswat al-Hujaymah 20 April, at Wadi al-Masilah 22 April and at Shabwah 6 May.

A passage migrant from March to May, (passage perhaps peaking during the second half of April) and from late August to early October. One additional record, 5 July 1947 (Browne 1950).

Black-crowned Tchagra *Tchagra senegala*

39 recorded at seven sites between 360 m and 1,450 m. Most common in the Mahrah where nine at Wadi Mararah 29 April and 14 in the Shahrut hills 30 April.

An uncommon resident occurring, apparently disjunctly, in the south-west and the Mahrah.

Isabelline Shrike *Lanius isabellinus*

20 recorded at 11 sites between 23 March and 1 May.

A common winter visitor and passage migrant between September and May.

Red-backed Shrike *Lanius collurio*

16 recorded at nine sites between 18 April and 6 May.

A passage migrant during April and May and from September to early November.

Lesser Grey Shrike *Lanius minor*

Two at Shabwah 6 May.

A passage migrant during September to October and April to May. An exceptional count of 100 was in gardens at Aden 29 April 1940 (Bark Jones & Hartley 1957).

Great Grey Shrike *Lanius excubitor*

139 recorded from at least 13 localities between 10 m and 2,000 m. Especially common in *Acacia* savannah between al-Hajaf and Hiswat al-Hujaymah, where 78 recorded 20 April. Not recorded from the Mahrah.

A widespread and locally common resident, although apparently absent from the Mahrah, breeding from March to June. Probably also occurs as a passage migrant and winter visitor.

Woodchat Shrike *Lanius senator*
One between Aden and Wadi al-Jahr 26 March.

Records from Amiri district in January and March suggest this species is an uncommon passage migrant and/or winter visitor.

Masked Shrike *Lanius nubicus*
Not recorded during the survey.

An uncommon winter visitor and passage migrant, recorded mainly from the Aden area between September and early April.

Drongo sp. *Dicrurus* sp.
Not recorded during the survey.

A Drongo generally resembling Black Drongo *D. adsimilis* was present at Aden from 28 October 1946 to 28 February 1947 (Browne 1950).

House Crow *Corvus splendens*
966 recorded, mostly in the Aden area, where the peak count was 210 on 25 March.

An abundant breeding resident, mainly in Aden and its environs but increasingly recorded in villages along the coast east to al-Mukalla. Eggs recorded February to September (MDG, HPM). One at al-Ghaydah in autumn 1989 (Jennings *et al.* 1991).

Brown-necked Raven *Corvus ruficollis*
119 recorded, most records involving 1-10 birds but a concentration of 53 was noted at Wadi al-Khabt, north of Aden, 24 March.

A widespread and locally abundant breeding resident, with flocks of up to 150 recorded at Abyan cotton fields (MDG, HPM).

Raven *Corvus corax*
Not recorded during the survey.

Claimed sightings at Sheikh Othman and Lahej (Bark Jones & Hartley 1957) lack supporting details. Therefore, occurrence cannot be considered proven.

Fan-tailed Raven *Corvus rhipidurus*
542 recorded at numerous and widespread localities. The largest concentrations were 50 at Ras al-'Arah 20 April and 137 in the Mahrah 28 April.

A common and widespread breeding resident. Flocks of up to 1,000 recorded near Lahej and 2,000 at Dhala (MDG, HPM).

Tristram's Starling *Onychognathus tristramii*
459 recorded. Widespread through most of the south, fairly common in the east,

but few in Wadi Hadramawt.

A widespread resident breeder.

Amethyst Starling *Cinnyricinclus leucogaster*

108 recorded at 18 localities. Highest counts were ten at al-Mihal 21 March, nine at Wadi Yashbum 28 March and ten at Wadi Harim 19 April.

A passage migrant, which may breed in the west. Recorded from March to May and in October.

Starling *Sturnus vulgaris*

Not recorded during the survey.

A vagrant, the only record being 100 at Aden 8 December 1965 (MDG, HPM).

Rose-coloured Starling *Sturnus roseus*

Not recorded during the survey.

A vagrant, one near Aden 30 October 1946 (Browne 1950) and one there 7 November (Ennion 1962).

Wattled Starling *Creatophora cineracea*

Not recorded during the survey.

An irregular visitor, recorded in the Aden area in April and from July to September (MDG, HPM). Two recorded at sea off southern Yemen, July 1963 (Bailey 1966).

House Sparrow *Passer domesticus*

1,545 recorded, all in areas with human settlements.

A widespread resident breeder.

Arabian Golden Sparrow *Passer euchlorus*

Ten recorded, six on the Tihamah 30 km inland from Aden, 25 March and four near Hisn al-Sawat 21 April.

A scarce local breeding resident on the Tihamah north of Aden and eastward; the record from Hisn al-Sawat demonstrates an eastward range extension of 400 km.

***Passer* sp.**

A small juvenile sparrow superficially resembling juvenile House Sparrow was trapped at Wadi Himarah 8 April. Measurements (in millimetres, excepting weight in grams) were: max wing chord 68; head and bill 28.1; max tarsus 19.1; tail 54.0; weight 18.3. A number of slides were taken but identification remains unclear and the possibility remains that the bird could perhaps be Somali Sparrow *Passer castanopterus* or a hybrid.

Pale Rock Sparrow *Petronia brachydactyla*

Not recorded during the survey.

A vagrant; three at Habilayn 27 December 1965 (Latham 1967).

Bush Petronia *Petronia dentata*
Not recorded during the survey.

Apparently a very local resident breeder, with records from Amiri and Dhala in the west (Sclater 1917, Meinertzhagen 1954; MDG, HPM).

Rüppell's Weaver *Ploceus galbula*
1978 recorded, from the Tihamah near Aden to Wadi al-Masilah in the east, with a maximum of 263 roosting at Wadi Himarah 7 April. Common in Wadi Hadramawt, for example 150 at al-Sawm 3 May and 174 at Sayun 4 May.

A resident breeder throughout western and central regions east to Wadi al-Masilah. Apparently absent from the Mahrah.

Arabian Waxbill *Estrilda rufibarba*
159 at eight localities: from 625 m (Wadi Hadramawt) to 1,450 m (Jabal Iraf). No large concentrations noted. Highest counts were: 20 at Jabal Iraf 22 March; 18 at Wadi al-Jahr 27 March and 37 at Wadi Yashbum 27 March. Recorded in Wadi Hadramawt on an intensively farmed silt plain and elsewhere in highland wadis, often in cultivated or wetter areas; also in *Juniperus* woodland on Jabal Iraf. Recently fledged juveniles were recorded at Jabal Iraf and Wadi al-Jahr and a bird was carrying nest material at Tarim 4 May, the first breeding evidence from southern Yemen.

A resident breeder, fairly common from the south-west east to Wadi Hadramawt.

African Silverbill *Euodice cantans*
280 recorded at numerous and widespread localities at low elevations. Localities include Wadi al-Jahr, Wadi Hajr, Wadi Himarah, Saqr, al-Ghaydah and, in Wadi Hadramawt, al-Sawm, Tarim, Sayun, and al-Qatn. On the fringe of the interior desert three were noted on the desert crossing from al Qatn to Shabwah.

A widely distributed resident breeder.

Arabian Serin *Serinus rothschildi*
57 recorded from near sea-level to 1,450 m. Common in *Juniperus* woodland on Jabal Iraf; also recorded at Wadi al-Jahr, Wadi Yashbum and Wadi Hajr.

Apparently a localised resident breeder in the west, extending east to Wadi Hadramawt and Wadi Hajr.

Yemen Serin *Serinus menachensis*
Not recorded during the survey.

Status unclear. Two records, both collected by Meinertzhagen, at Amiri, February 1923 and Dhala, November 1948.

Golden-winged Grosbeak *Rhynchostruthus socotranus*
104 recorded at three sites: in *Juniperus* woodland on Jabal Iraf (1,450 m), at Wadi Mararah (360 m) and in the Shahrut hills (680 m) in the Mahrah.

Clearly a resident, although previously recorded only in January, July and December, with no proof of breeding. Singing birds were noted at all localities but no other evidence of breeding was recorded; display and song have been noted in October to November and spring in northern Yemen (Martins 1987). In northern Yemen the species is primarily dependent on *Euphorbia* scrub but all observations from southern Yemen were associated with *Juniperus, Acacia,* or (in the Mahrah) *Anogeissus/Commiphora* woodland.

Yemen Linnet *Acanthis yemenensis*
13 recorded on the escarpment at 2,000 m in the al-Mardam area on the border of former North and South Yemen are the first records.

Probably an uncommon breeding resident.

Trumpeter Finch *Bucanetes githagineus*
Three in rocky hills near al-Sawm in eastern Wadi Hadramawt, 3 May.

Probably an uncommon breeding resident in Wadi Hadramawt, previously recorded March to June 1985 and 1986 (J. F. Pavey *pers. comm.*).

House Bunting *Emberiza striolata*
97 recorded; 90 were in Wadi Hadramawt between Mar'ayt and al-Qatn (with 39 at Wadi Fughmah, 2 May). In addition, five at Wadi Harim in the extreme south-west, one at Wadi Irkhawt and one between Shabwah and Marib on the fringe of the interior desert.

A scarce and remarkably localised resident breeder, most common in Wadi Hadramawt; apparently absent in the east.

African Rock Bunting *Emberiza tahapisi*
77 recorded at five sites, including Jabal Iraf and Wadi Himarah in the Mahrah.

A rather localised resident breeder in rocky hills.

Ortolan Bunting *Emberiza hortulana*
Seven recorded at al-Mihal 21 March, the first spring record.

A scarce passage migrant, recorded in September, October and March.

Cretzschmar's Bunting *Emberiza caesia*
Not recorded during the survey.

A vagrant, one on a ship near Aden Spring 1891 (Tristram 1891).

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Sandgrouse (1996) 17: 73-80

An introduction to Socotra and its birds

R. F. PORTER AND FRANCINE STONE

The island of Socotra lies in the Gulf of Aden some 800 km east of Aden and 350 km from the nearest coastline of the Republic of Yemen. It is 110 km from east to west, 40 km from north to south and reaches an altitude of over 1,500 m. Together with the neighbouring island groups of The Brothers (al-Ikhwan), 'Abd al-Kuri and Sabuniya, it is much closer to the Horn of Africa than Yemen, from which it is administered. The human population is estimated at between 20,000 and 80,000, but it is probably nearer the lower figure. There are no port facilities or metalled roads, the availability of electricity is restricted and medical facilities do not exist. The population is supported primarily through subsistence animal husbandry, farming and fishing.

GEOLOGY

It is commonly held that the Socotra archipelago is a fragment of the Afro-Arabian tectonic plate which began to break away from the African mainland at least 10 million years ago in the upheavals that created Arabia and the Gulf of Aden. Geologically, Socotra comprises an igneous and metamorphic basement dating from the Pre-Cambrian Era and a complex of early Paleozoic volcanic rocks which are overlain by a mantle of limestones, marls and sandstones of Cretaceous and Eocene age. Intrusive granites of the Hajhir massif break through the older metamorphic and magmatic formations exposing riebeckite, an unusual form of peralkaline mineral first found and identified on Socotra by Aemilius Riebeck in 1881 (Naumkin 1993, Beydoun & Bichan 1970).

TOPOGRAPHY

The topography of Socotra can be divided into three main zones: 1) the alluvial coastal plains which range in width up to 5 km, the longest being the Noged plain which stretches 60 km along the south coast; 2) the limestone plateaux covering a majority of the island and averaging 300-700 m in altitude, with poor soils except in the gullies and rock crevices on the surface and in fissures of the nearly vertical escarpments; and 3) the Hajhir mountains in the north-west where the soils can be well developed in the valleys and on the more gentle slopes.

The Hajhir mountains, with their jagged granite pinnacles, form the spine of the island. They rise dramatically to a height of 1,519 m (Jabal Mashanig) on the sheer northern face and slope off more gently on the south and eastern flanks. The limestone plateaux which surround this elevation to the east, west and south drop away at the edges in steep cliffs and are eroded on their surfaces into a karst topography aptly described as 'clint fields with grooved, fractured, cellular and cavernous holes' (Naumkin 1993) that make heavy going for the sturdiest of footwear (Bent 1900). The northern coastal plain lying at the feet of

the Hajhir granites and the limestone bluffs consists of alluvial gravels, stones and coarse sands. The sector of the island south of the Hajhir massif descends in terraces to the Noged plain, the marine sediments of which meet a strip of dunes at the shoreline and continue at a shallow gradient at least 15 km out to sea. To the west there is very little wadi drainage off the limestone plateaux except at Ras Sha'b and Ras Katanahan, and it is here that coral reefs are the best developed. In the east toward Ras Momi sections of aeolian sand deposits on the northern exposure, so-called 'leaned dunes', can reach as high as 360 m where they are blown against the cliff faces of the Hamadiroh plateau by the monsoon winds. The sea shelf at Ras Dehammeri (Rhiy di-Hamri) drops away precipitously to a depth of 1,000 m within 5 km of the shore. Otherwise, the coastal waters surrounding the archipelago are relatively shallow. The interior of the island is dissected by wide basins studded with outcrops of lightly-eroded volcanic rock, and the rolling relief of the limestone platforms is broken in places by spectacular gorges (Naumkin 1993, WWF & IUCN 1994, Beydoun & Bichan 1970).

VEGETATION

The Socotra archipelago is relatively sparsely vegetated and dominated by xeromorphic plants. Its botany has been extensively studied and is renowned for its high level of endemism: of about 800 vascular plants recorded, some 30% are endemic (A. G. Miller *in prep*). Desiccating winds associated with the summer monsoon restrict lush vegetation to the sheltered valleys in the mountains, to gullies and clefts in the cliffs not exposed to the elements. Sparse shrubland characterises the open summits of the limestone plateaux, and on the coastal plain conditions are best described as semi-desert, in some places almost devoid of vegetation, notably on the Noged plain. In this context, the unique flora of the islands can nevertheless be found in all the various vegetation zones. Furthermore, the most abundant plants (*Croton socotranus* and *Jatropha unicostata*), and the most common shrubs and trees are endemic to the islands.

A. G. Miller of the Royal Botanic Garden Edinburgh, who is developing the authoritative description of Socotran flora, divides the island's vegetation into four principal categories (further subdivided into seven main types in Figure 1).

1. Open deciduous shrubland of coastal plains and low inland hills, up to 150 m (types 1 & 2 on Figure 1). As this terrain is dominated by the endemic *Croton socotranus*, he terms it 'Croton shrubland' but also notes the scattered emergent trees, *Euphorbia arbuscula*, *Dendrosicyos socotranus* and *Zizyphus spina-christi*, and low cushion shrubs and a good ground cover of grasses and herbs after the rains.

2. Open deciduous or succulent shrubland of lower mountain slopes, limestone plateaux and escarpments, sea-level to 550 m (type 3 on Figure 1). This zone is richer in species than the Croton shrubland and the vegetation is the most widespread of any zone on the island. It is here, notably on the seaward

escarpments, that one finds the distinctive succulent trees, such as the *Adenium obesum* ssp. *sokotranum*, which give Socotra its other-worldly aspect. The emergent trees include *Euphorbia arbuscula, Dendrosicyos socotranus, Sterculia africana* var. *socotrana, Boswellia* spp. and *Commiphora* spp., and the main shrubs are *Croton socotranus* and *Jatropha unicostata*.

3. Submontane, semi-deciduous thicket, mainly 380 - 750 m (types 4, 5 & 6 on Figure 1). In this topography of limestone plateaux and middle slopes of the granite mountains, the dominants which thrive in rich quantities of species include *Rhus thyrsiflora, Buxus hildebrandtii, Carphalea obovata, Sterculia africana,* with emergent *Dracaena cinnabari,* the famed Dragon's Blood tree. Here too, the pomegranate species, *Punica protopunica,* once mistakenly thought endangered, is readily found.

4. Mosaic of dense thicket, low shrubland, grassland and rock vegetation 750 - 1,500 m (type 7 on Figure 1). Over the higher slopes and rock pinnacles of the granite mountains, one encounters this patch-work of dense thicket, at times impenetrable at the feet of the pinnacles, which merges higher up into a low shrubland mainly of *Hypericum* spp. and grassland on the gentler slopes where cattle graze. The thicket feature is dominated by *Rhus thyrsiflora, Cephalocroton socotranus* and *Allophylus rhoidiphyllus* with emergent *Dracaena cinnabari*.

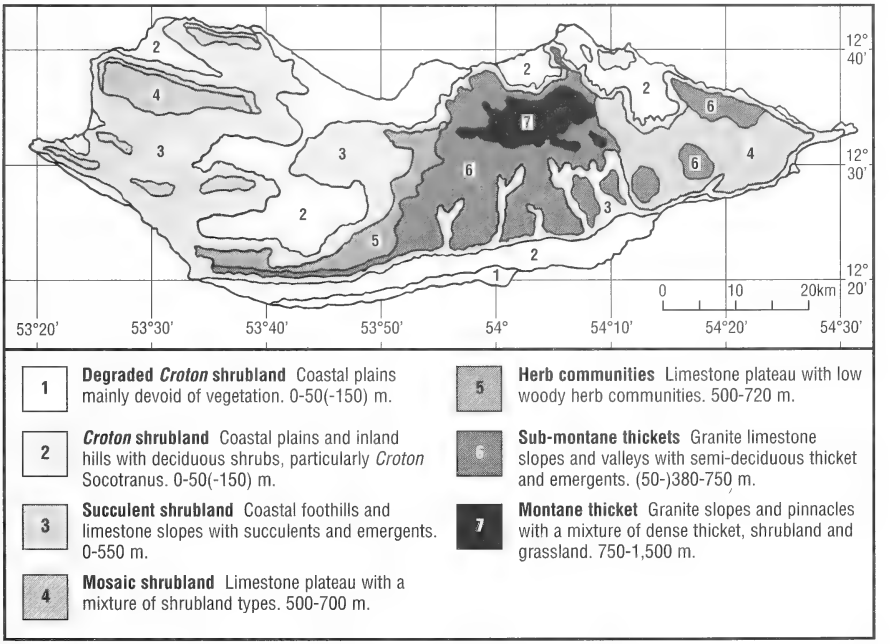

Figure 1. The main vegetation types on Socotra (A. G. Miller *pers. comm.*; WWF & IUCN 1994).

LAND USE

The grazing of livestock is the major land-use, and there are smaller areas of cultivation. In recent years water cisterns have been constructed on the island and are attracting larger grazing stocks than in the past. However, as yet there is no practicable way to provide supplementary fodder, and drought and disease continue to provide their traditional control on livestock numbers.

Currently the coastal waters are abundantly stocked with fish, and fishing is a widespread activity. Communications from the mainland by air and by boat are severely restricted by lack of harbours, airport facilities and adequate aircraft, and by monsoon conditions which effectively shut the island off for four months every year (from July to October). Prospecting for minerals and offshore natural gas is taking place. There is very little tourism on the island.

Plans for future development of the island include an asphalt runway, a harbour jetty at Hadibu and extended road infrastructure; tourism is under discussion. The prospect for these plans is uncertain, but private enterprise has already constructed a fish refrigeration plant at Suq near Hadibu in anticipation of a serviceable jetty.

CLIMATE

Socotra's position in the zone of the Indian Ocean where the northern tropical and the sub-equatorial air masses merge subjects it to a semi-annual climate cycle. The hot, dry south-west monsoon brings heavy winds from April until October, and is replaced in November by the wet north-east monsoon. The period of calm air between the two monsoons in the spring is characterised by both great heat and humidity. The south-west monsoon can pick up to gale force on the coasts, and tropical cyclones cause high seas and unstable conditions, closing the island to access by sea and by air intermittently during the late spring and summer months. Temperatures range from 17°C in January to 37°C in July. Average annual rainfall measures 150 mm. However, the west of the island, lying in the shadow of the Hajhir mountains, experiences greater aridity, and in the Hajhir peaks above 200 m, average rainfall increases to 300 mm. This is in part because the mountains create their own mists and cloud, with a fine rain. Amid the granite pinnacles of the Hajhir (above 1,500 m) annual precipitation can be as great as 1,000 mm, giving rise to permanently lush vegetation and relatively abundant surface water.

ORNITHOLOGICAL HISTORY

The ornithology of Socotra has been little studied and many areas of the island, notably the west, remain unvisited by ornithologists. The most extensive survey was undertaken between 7 March and 14 June 1964 by Alec D. Forbes-Watson, his results being presented in Ripley & Bond (1966). This involved the collection of over 500 bird specimens.

Prior to Forbes-Watson's visit, expeditions were conducted by Professor I. B. Balfour of Glasgow University between February and 30 March 1880 and by Dr

Riebeck and Dr Schweinfurth in 1881. These resulted in annotated lists of birds collected being published by Sclater and Hartlaub (1881).

Further bird collections were made by E. N. Bennett in 1888 and by Henry Forbes and W. R. Ogilvie-Grant in winter 1898-9, details being presented in Ogilvie-Grant & Forbes (1903). Prior to the OSME survey, the status of birds on Socotra and its associated islands was summarised by Dowsett & Dowsett-Lemaire (1993).

THE 1993 SURVEY

The OSME survey was conducted from 30 March to 6 April 1993. Offshore islands were not visited. During this period, 12 species of birds previously unrecorded were observed, bringing the total number of species recorded from Socotra, its associated islands in the archipelago and neighbouring seas to 110. A summary of what is currently known of the status and distribution of birds in Socotra is presented in Kirwan *et al.* (1996).

AREAS COVERED

The areas covered by the survey are mapped in Figure 2 in Porter *et al.* (1996); the itinerary was as follows:

March

30 Flight: al-Mukalla to Socotra
lagoons at Erhina (Hadibu)
Ras Hebak

31 Ras Hebak
Hadibu
Qariyah lagoons
Rizeleh (or Dihur) below
Hamadiroh plateau
Hamadiroh plateau

April

1 Rizeleh below Hamadiroh plateau
Hamadiroh plateau
Fikhah
Ras Momi

2 Fikhah
Ras Momi
Pelagic transect from Ras Momi
Pass south of Rookib
Shidadah

3 Shidadah
Pass south of Rookib
Jabal Jaaf
Hakari wells
Ras Diblih (south coastal plain)

4 Ras Diblih
Wadi near Shibrhoh (south coastal
plain)
Di-Ishal
Jabal Jaaf
Rookib pass

5 Hadibu
Wadi Ayhaft
Di-Ishal
Ehrina

6 Ras Hebak
Qadub marsh
Dunes west of the airport
Flight: Socotra to al-Mukalla

Wider coverage was achieved by splitting the survey team into two groups.

ORNITHOLOGICAL OVERVIEW

110 species have been recorded from Socotra, of which 31 are known or thought to breed. Of these, six are endemic to the island (Sibley & Monroe 1990), whilst the populations of a further ten have been treated as endemic sub-species (Ripley & Bond 1966). With one exception, we have followed this approach, which is discussed in further detail by Martins (1996).

Common birds

Based upon survey observations the most common and widespread species are (in systematic order): Egyptian Vulture *Neophron percnopterus*, Laughing Dove *Streptopelia senegalensis*, Forbes-Watson's Swift *Apus berliozi*, Long-billed Pipit *Anthus similis*, White-breasted White-eye *Zosterops abyssinicus*, Great Grey Shrike *Lanius excubitor*, Socotra Sunbird *Nectarinia balfouri*, Somali Starling *Onychognathus blythii* and Socotra Sparrow *Passer insularis*. The population of Egyptian Vulture may exceed 1,000 pairs, signifying that Socotra supports the most important breeding population in the Middle East. The relative abundance and densities of these and other species encountered during systematic transects of the island is presented in Davidson (1996).

Endemics

Study of the endemic species occurring on Socotra was one of the main objectives of the survey and the information collected is presented through various relevant papers in this report.

The Socotra Sparrow was found to be by far the most common and widespread endemic species, often occurring in large concentrations. Less common but also widespread were Socotra Sunbird and Socotra Warbler *Incana incana*, though this species has a more patchy distribution, occuring in low scrub from sea-level to 1,000 m. The Socotra Starling *Onychognathus frater* is also patchily distributed (and is much rarer than the non-endemic Somali Starling), generally occurring in hilly areas with fruiting trees at altitudes up to at least 500 m. The Socotra Cisticola *Cisticola haesitata* appears to require areas of low scrub and, together with the apparently montane Socotra Bunting *Emberiza socotrana*, is probably the rarest endemic.

Collar *et al.* (1994), categorise three endemic species occurring on Socotra as 'vulnerable' in the world list of threatened species: Socotra Starling, Socotra Cisticola and Socotra Bunting, each having an estimated world population of less than 1,000 individuals. These clearly present the highest priority for conservation action. Initially, this should include a survey of their populations and habitat requirements.

IMPORTANT BIRD AREAS

A major objective of the survey was to identify sites meriting inclusion in *Important Bird Areas in the Middle East* (Evans 1994). Selection of such sites is based on carefully agreed criteria which review such issues as the presence of

globally-threatened species, concentrations of regional populations, presence of regionally-threatened or declining species and species with small world ranges. Whilst this survey of Socotra was not comprehensive, we benefited greatly from discussions with A. G. Miller and Dr Miranda Morris, and thus combined the known ornithological data with their extensive vegetation surveys. This enabled identification of predicted Important Bird Areas based upon their clarification of the vegetation zones of the island. Nineteen important bird areas were identified, ten resulting from our surveys. Protection of these sites and identification of new ones through further surveys is the highest conservation priority.

FUTURE ACTION

As the ornithology of the island is poorly known, further studies are imperative. Suggested priorities include:

- collection of further information on unsurveyed Important Bird Areas listed in *Important Bird Areas of the Middle East* and identification of new areas.
- breeding surveys and assessment of conservation requirements of the three globally-threatened species ocurring in Socotra: Socotra Bunting, Socotra Starling and Socotra Cisticola.
- further study of the taxonomy and ecology of the 11 putative endemic sub-species listed in Martins (1996).
- further study of the taxonomy and ecology of the sedentary *Buteo* population.
- identification of areas for breeding seabirds: for example, do Jouanin's Petrel *Bulweria fallax* and Socotra Cormorant *Phalacrocorax nigrogularis* breed?

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MAPS

Abd al Kuri to Suqutra (Socotra) 1:350000, inset *Ghubbet Kallansiya* 1:360000 and *Tamrida* or *Hadibo* 1:720000, chart No. 5. British Admiralty, London: 1987.

Peoples Democratic Republic of Yemen 1:500000, sheet No. 4. Petroleum and Minerals Board. Aden: 1979 (from Landsat imagery 1972/3).

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Plate 1. *Acacia tortilis* woodland, southern Yemen, April; this savanna woodland extends for over 100 km in the coastal plain between Bab al-Mandab and Aden. (*R. F. Porter*)

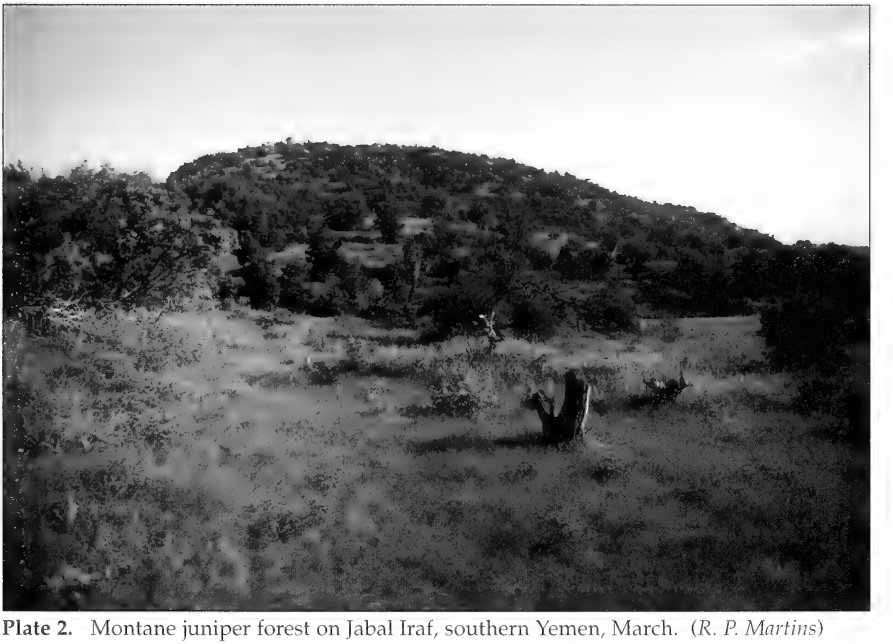

Plate 2. Montane juniper forest on Jabal Iraf, southern Yemen, March. (*R. P. Martins*)

Plate 3. The coast east of al-Fatk, southern Yemen, April; coastal beaches provide important breeding sites for marine turtles. (*R. P. Martins*)

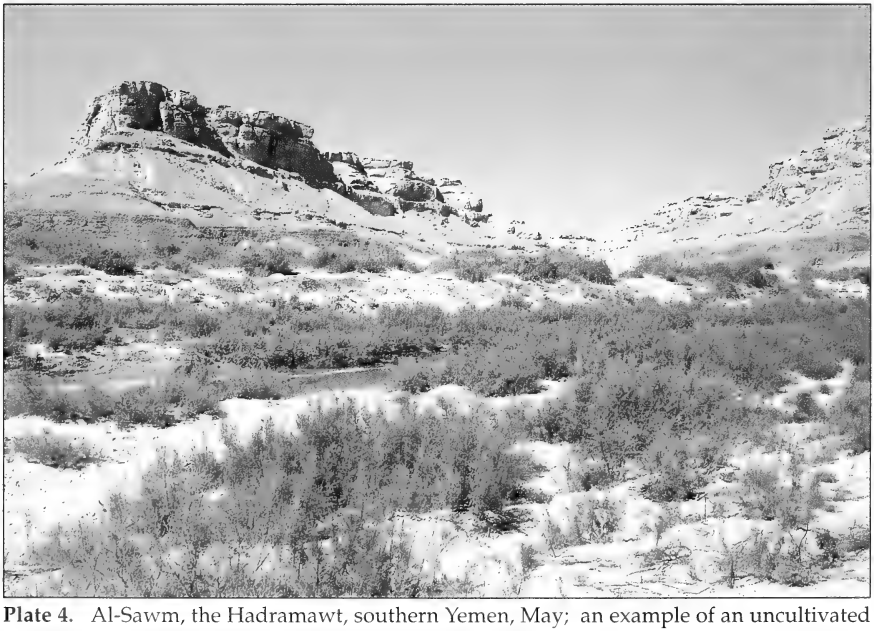

Plate 4. Al-Sawm, the Hadramawt, southern Yemen, May; an example of an uncultivated foothill wadi in the interior. (*C. G. Bradshaw*)

Plate 5. Small scale subsistence agriculture on coastal dunes at Saqr, southern Yemen, April. (*C. G. Bradshaw*)

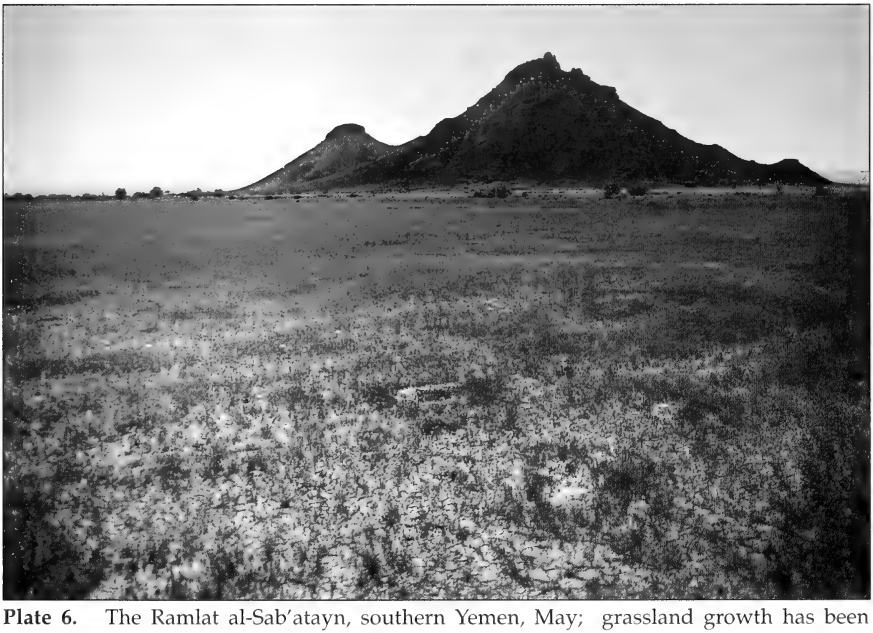

Plate 6. The Ramlat al-Sab'atayn, southern Yemen, May; grassland growth has been induced by recent rainfall. (*R. P. Martins*)

Plate 7. The Mahrah, southern Yemen, April; typical *Commiphora/Anogeissus* woodland on the hills adjacent to the Oman border. (*R. F. Porter*)

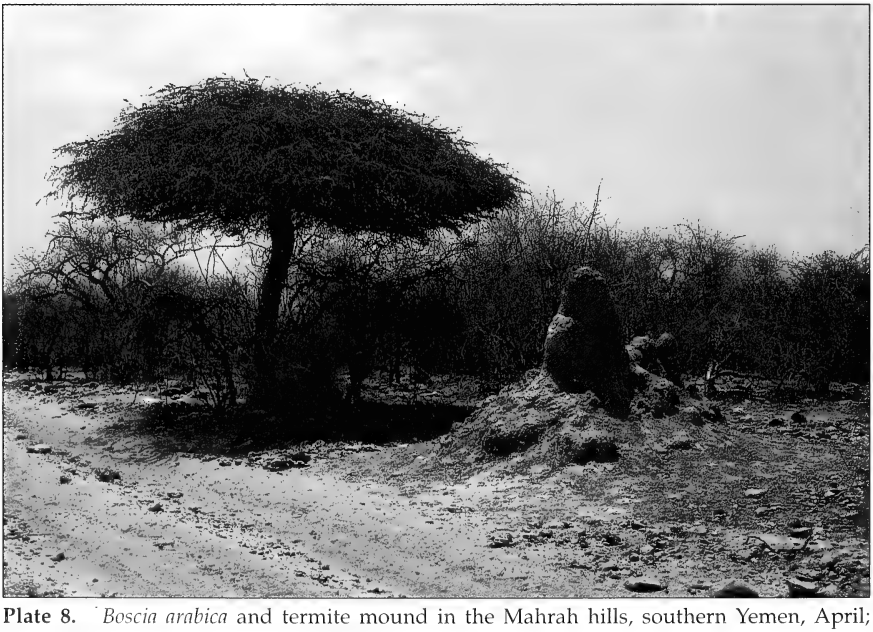

Plate 8. *Boscia arabica* and termite mound in the Mahrah hills, southern Yemen, April; termite mounds are frequent in parts of this heavily-overgrazed area. (*J. W. Spencer*)

Plate 9. Coastal cliffs near Ras Momi, Socotra, April. (*R. P. Martins*)

Plate 10. The Hamadiroh plain, Socotra, April. (*R. P. Martins*)

Plate 11. *Adenium obesum*, Socotra, April; this is a common species on the foothills and highlands. (*R. P. Martins*)

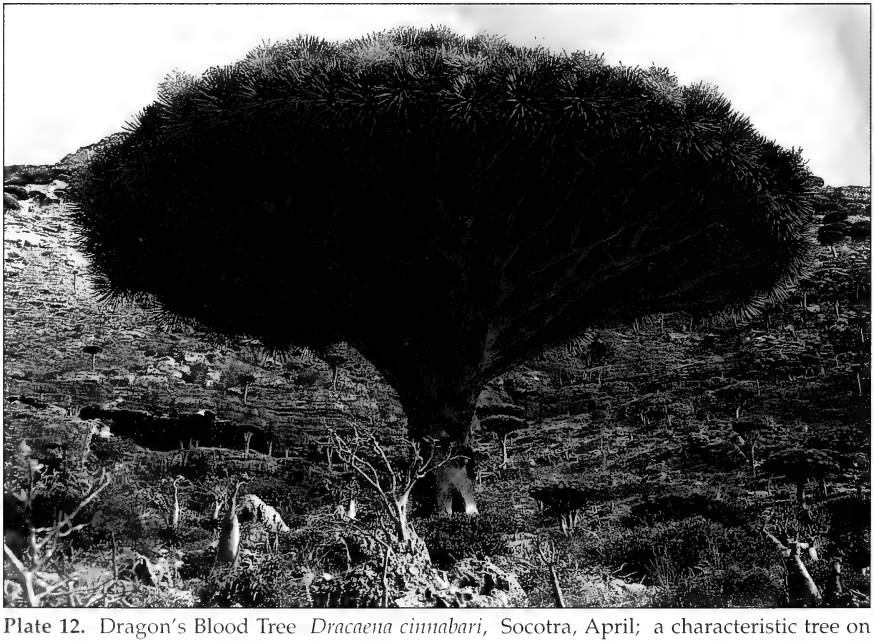

Plate 12. Dragon's Blood Tree *Dracaena cinnabari*, Socotra, April; a characteristic tree on the limestone plateaux. (*R. P. Martins*)

Plate 13. Frankincense Trees *Boswellia elongata*, Socotra, April; apparently an important habitat for African Scops Owl *Otus senegalensis*. (*R. F. Porter*)

Plate 14. Wooded foothills, Wadi Ayhaft, Socotra, April; the lower slopes of the Hajhir mountains are in the background. (*R. F. Porter*)

Plate 15. Spotted Eagle Owl *Bubo africanus*, al-Mahwit (northern Yemen), April; heard in the Mahrah, southern Yemen in late April. (*P. Bison*)

Plate 16. African Scops Owl *Otus senegalensis*, Wadi Yashbum, March. (*P. Bison*)

Plate 17. Arabian Woodpecker *Dendrocopos dorae*, female, Jabal Iraf, March; Jabal Iraf is the most southerly breeding site of this species in Arabia. (*P. Bison*)

Plate 18. Dunn's Lark *Eremalauda dunni*, Ramlat al-Sab'atayn, May; 25 were observed including displaying pairs. (*P. Bison*)

Plate 19. Brown Woodland Warbler *Phylloscopus umbrovirens*, Jabal Iraf, March; the most southerly breeding site of this species in Arabia. (*P. Bison*)

Plate 20. Juvenile Great Grey Shrike *Lanius excubitor*, Hiswat al-Hujaymah, April; a common breeding species in *Acacia* woodland between Bab al-Mandab and Aden. (*R. F. Porter*)

Plate 21. House Bunting *Emberiza striolata*, Wadi Hadramawt, April; a localised resident breeder in southern Yemen. (*P. Bison*)

Plate 22. Jouanin's Petrel *Bulweria fallax*, off Socotra, April; widespread at sea off southern Yemen and Socotra. (*R. F. Porter*)

Plate 23. The breeding *Buteo* in Socotra, April. For discussion of the taxonomy of this species, see Martins & Porter, this volume. (*R. F. Porter*)

Plate 24. Egyptian Vultures *Neophron percnopterus* scavenging for food at a camp site in Socotra, April; the island supports a population of conservation significance. (*R. F. Porter*)

Plates 25 and 26. Forbes-Watson's Swift *Apus berliozi*, Socotra, April. For discussion of this species, see Porter, Dymond & Martins, this volume. (*R. F. Porter*)

Plate 27. Long-billed Pipit *Anthus similis*, Socotra, April; a common resident breeder in Socotra. (*P. Bison*)

Plates 28 and 29. Socotra Sunbird *Nectarinia balfouri*, Socotra, April; a common endemic in Socotra. For discussion of this species, see Showler & Davidson, this volume. (*P. Bison*)

Plates 30 and 31. Socotra Warbler *Incana incana*, Socotra, April; endemic in Socotra. For discussion of this species, see Dymond, this volume. (*P. Bison*)

Plate 32. White-breasted White-eye *Zosterops abyssinica*, Socotra, April; widespread in Socotra. (*P. Bison*)

Plate 33. Socotra Starling *Onychognathus frater*, Socotra, April; a globally threatened endemic. For discussion of this species, see Porter & Martins, this volume. (*R. F. Porter*)

Plate 34. Somali Starlings *Onychognathus blythii*, male and female, Socotra, April; widespread and common in Socotra. For discussion of this species, see Porter & Martins, this volume. (*R. F. Porter*)

Plate 35. Socotra Bunting *Emberiza socotrana*, Socotra, April; one of two individuals seen in Socotra in April 1993. For discussion of this species, see Morton, this volume. (*P. Bison*)

Plate 36. African Rock Bunting *Emberiza tahapisi*, Socotra, April. A common breeder in Socotra. (*P. Bison*)

Plate 37. Socotra Sparrow *Passer insularis*, male, Socotra, April. A common breeder in Socotra, April. (*P. Bison*)

Plate 38. Socotra Sparrow *Passer insularis*, male, Socotra, April. (*R. F. Porter*)

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Taxonomic treatment of endemic taxa in Socotra

R. P. MARTINS

Bird populations endemic to Socotra are little studied. Some comments on the systematic treatment adopted in this report are, therefore, appropriate. During the survey, field-time on Socotra was very limited. It has, therefore, not been possible to conduct the detailed study necessary for a full review of endemic taxa described from Socotra (either at species or 'sub-species' level). Excepting the local *Buteo* populations the approach taken here is simply to adopt the treatment proposed by Sibley & Monroe (1990) where six taxa are treated as species endemic to Socotra. These are:

Onychognathus frater Socotra Starling
Nectarinia balfouri Socotra Sunbird
Cisticola haesitatus Socotra Cisticola (Island Cisticola)
Cisticola incanus/Incana incana Socotra Warbler
Passer (motitensis) insularis Socotra Sparrow
Emberiza socotrana Socotra Bunting

The most recent review of the Socotran avifauna (Ripley & Bond 1966) lists an additional ten or eleven (including the local *Buteo*, for which no firm conclusions were offered) local populations as endemic sub-species as follows (taxa - or putative taxa - marked * were not encountered during the survey):

Buteo buteo 'sub-species?'
*Centropus superciliosus sokotrae**
Otus scops socotranus
*Caprimulgus nubicus jonesi**
Eremopterix nigriceps forbeswatsoni
Lanius elegans uncinatus
Anthus similis sokotrae
Zosterops abyssinicus socotranus
Passer insularis hemileucus (on Abd-el-Kuri only)*
Rhynchostruthus socotranus socotranus
Fringillaria (=Emberiza) tahapisi insularis

While it is beyond the scope of this report to undertake a reassessment of these taxa, the serious need for this is well illustrated by recent work in the Cape Verde archipelago (Hazevoet 1995) where similar difficulties in interpreting local taxa exist. The Cape Verdes and Socotra are located off continental Africa at similar latitudes, show limited but significant zoogeographical similarities and have apparently experienced a parallel history of environmental change since the Tertiary. Conclusions from a comprehensive reassessment of the systematics of Cape Verdean taxa, therefore, constructively inform any analysis

of similar phenomena on Socotra. The analysis conducted by Hazevoet employs the Phylogenetic Species Concept, which views a species as the smallest diagnosable cluster of individual organisms "within which there is a parental pattern of ancestry and descent" (Cracraft 1983 and 1987, see also Hazevoet 1995).

By contrast, the past treatment of certain populations on Socotra at the level of locally endemic 'sub-species' has reflected the application of the more traditional Biological Species Concept. There is a clear need for a review of the avifauna of Socotra which reflects contemporary systematic thinking. Thus sub-species which have been described from Socotra in the past may or may not merit recognition as valid and discrete taxa (perhaps as Phylogenetic species). Hopefully, this problem will receive more attention in the future.

Two important conclusions from Hazevoet's work in the Cape Verdes of relevance to the Socotran avifauna are:

1. Endemic breeding populations may be more closely related to (common) ancestral stock than widespread continental congeners (or conspecifics). The former may be relict populations derived from pre-pleistocene, previously widespread African populations, now extinguished through environmental change, while the latter (at least in Eurasia) are of more recent origin. This may imply that the treatment, for example, of the endemic(?) Socotran populations of *Apus* and *Buteo* as (phylogenetic) species more accurately reflects their true evolutionary history and relationship to more widely distributed continental congeners. Arguments for the adoption of this approach to the systematic treatment of, for example, *Apus* and *Buteo* populations on the Cape Verdes are presented by Hazevoet.

2. Morphological differences (e.g. minor variation in plumage characters) between local populations of species which are extralimitally widespread are often most meaningfully interpreted as a reflection of the influence of local environmental conditions and not as evidence which adequately justifies treatment as a unique taxon. Under the traditional approach to avian systematics (through application of the Biological Species Concept) such populations would qualify for treatment as 'sub-species' while, under the Phylogenetic Species Concept, such differences are viewed as virtually insignificant. The Socotran population of Long-billed Pipit *Anthus similis (sokotrae?)* offers a good example of a situation where such considerations are perhaps relevant.

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The status of birds in Socotra and 'Abd Al-Kuri and the records of the OSME survey in spring 1993

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This paper presents the results of the OSME survey of Socotra from 30 March to 6 April 1993.

The itinerary and area surveyed are presented in Porter & Stone (1996), which also outlines the previous ornithological studies undertaken on the island and describes the general habitats. The observers (the survey team members) are listed in Porter *et al.* (1996).

The **first paragraph** of each species account details observations made during the survey. Figures quoted for the number of individuals recorded are day totals summed for the whole period; where a site was visited on more than one day, the highest count has been used. Generally, this gives an accurate picture of relative abundance. The **second paragraph** summarises the known status to date.

Jouanin's Petrel *Bulweria fallax*

Ten on 30 March from the shore at Hadibu/Ras Hebak. 260 on a pelagic transect, north-east of the island, 2 April; all more than 4 km from shore and fairly evenly distributed to 20 km from shore, with up to 55 recorded per hour.

Recorded at sea around Socotra and in the Arabian Sea and Gulf of Aden, apparently throughout the year. No breeding colony has yet been found. Ripley & Bond (1966) postulate that 'it probably breeds in burrows on Socotra, 'Abd al-Kuri, and the Kuria Muria islands off eastern Aden, possibly from October to March'.

Streaked Shearwater *Calonectris leucomelas*

Not recorded during the survey.

A vagrant from the western Pacific. Mackworth-Praed & Grant (1952) report that it is 'recorded in April from seas just east of Socotra Island, and may occur in the Gulf of Aden'.

Persian Shearwater *Puffinus (lherminieri) persicus*

Six on a pelagic transect, north-east of the island, 2 April. Seven from the shore at Ras Hebak, 6 April.

Occurs in the Arabian Sea and Gulf of Aden throughout the year. Breeds in the Persian Gulf, perhaps also the Red Sea (Brown *et al.* 1982, Harrison 1985) and on the Kuria Muria islands (Hollom *et al.* 1988).

Red-billed Tropicbird *Phaethon aethereus*
Two off Ras Hebak, 30 March. Two on a pelagic transect, north-east of the island, 2 April.

Resident in the region. Forbes-Watson considered that three or four birds in March on Jazirat Sabuniya were preparing to breed (Ripley & Bond 1966).

Red-footed Booby *Sula sula*
Not recorded during the survey.

Socotra is on the very edge of its known pelagic range in the Indian Ocean. There is no evidence of breeding. Referring to this species, Ogilvie-Grant & Forbes (1903), under the heading *Sula piscatrix*, ambiguously report 'an immense flock of Gannets' from the seas around Socotra and a 'small flock of the White Booby' off 'Abd al-Kuri.

Masked Booby *Sula dactylatra*
One off south coast, near Ras Diblih, 4 April.

A resident, breeding on outlying islands. Forbes-Watson recorded about 100 pairs on Kaal Firaon and Jazirat Sabuniya in mid-March. All stages of incubation and nestling development were noted (Ripley & Bond 1966).

Brown Booby *Sula leucogaster*
Seen daily between 30 March and 6 April with a total of 32 records. The maximum was 15 off Ras Hebak and Erhina, 30 March.

A resident, breeding on outlying islands.

Socotra Cormorant *Phalacrocorax nigrogularis*
Maximum of 35 off Ras Hebak, 6 April. One off Fikhah, 2 April. Three off south coast, 2 km west of Ras Diblih, 4 April. Six off Erhina, just east of Hadibu, 5th April.

A non-breeding visitor. Although recorded at all the island groups in the Socotran archipelago, breeding has not been proven. Forbes-Watson considered breeding unlikely (Ripley & Bond 1966).

Night Heron *Nycticorax nycticorax*
Single immatures at Hadibu, 31 March, and en-route from the south coast to Rookib pass, 4 April.

These are the first records for Socotra. It seems likely that this species is a scarce or very scarce passage migrant.

Striated Heron *Butorides striatus*
One at Erhina lagoon, just east of Hadibu, 5 April.

This species is largely sedentary throughout its range but some passage is reported from Oman (Hollom *et al.* 1988), so its status on Socotra is possibly that of scarce passage migrant. Two or three records by Forbes-Watson in March are the only others on Socotra (Ripley & Bond 1966).

Cattle Egret *Bubulcus ibis*
One at Erhina lagoon, just east of Hadibu, 30 March.

A scarce or very scarce passage migrant. One seen by Forbes-Watson in early June is the only previous record (Ripley & Bond 1966).

Western Reef Heron *Egretta gularis*
Three at Qariyah lagoons, 31 March. 12 between Rizeleh and Ras Momi, 1 April. One during a pelagic transect, north-east of the island, 2 April. Three at Ras Hebak, 5 April. Six between Ras Hebak and Qadub marsh, 6 April.

Principally sedentary, but apparently undertakes at least limited dispersion, which may account for the Socotran records. Forbes-Watson recorded birds in March but none remained until April (Ripley & Bond 1966).

Little Egret *Egretta garzetta*
One at Erhina lagoon, 5 April. Two at Qadub marsh, 6 April.

A scarce passage migrant.

Grey Heron *Ardea cinerea*
38 seen at 12 sites. Most records were of one to three birds, but 14 were observed at Qariyah lagoons, 31 March.

A passage migrant. Although Forbes-Watson recorded the species from March to June (Ripley & Bond 1966), he found no evidence of breeding.

Purple Heron *Ardea purpurea*
Not recorded during the survey.

A passage migrant or scarce passage migrant. Forbes-Watson recorded two in May (Ripley & Bond 1966) and Ogilvie-Grant & Forbes (1903) collected a single immature.

Glossy Ibis *Plegadis falcinellus*
One at Wadi Ayhaft, 5 April is the first record for Socotra.

Spoonbill *Platalea leucorodia*
Not recorded during the survey.

Sclater and Hartlaub (1881 (who collected one at Cadhoop)) mention Spoonbills as having been seen by Balfour on the margins of stagnant pools near the villages on the north coast. Mackworth-Praed & Grant (1952), without indicating their source, state that the migrant Palearctic race *leucorodia* and the mainly sedentary north-east African race *archeri* both occur, the latter as a non-breeding visitor. There are no modern records.

Greater Flamingo *Phoenicopterus ruber*
49 at Qariyah lagoons, 31 March and eight at Ras Momi, 2 April.

A passage migrant. The Bent expedition recorded 'quantities of Flamingos on the beach' in 1888 (in Ogilvie-Grant & Forbes 1903). Forbes-Watson saw small

numbers of flamingos, presumably of this species, as late as mid-June (Ripley & Bond 1966).

Wigeon *Anas penelope*
Not recorded during the survey.

A common winter visitor to adjacent areas of north-east Africa. Ogilvie-Grant & Forbes (1903) 'found the Wigeon fairly common about the mouths of the rivers near Hadibu and met with large flocks in a patch of marshy ground bordering the Dimichiro river near its entrance into Khor Garieh'.

Gadwall *Anas strepera*
Not recorded during the survey.

A common winter visitor in the adjacent parts of north-east Africa. Ogilvie-Grant & Forbes (1903) describe the species as 'fairly common on the brackish estuaries of the rivers traversing the Hadibu plain and in the swamps near Khor Garieh'.

Teal *Anas crecca*
Not recorded during the survey.

A common winter visitor in the adjacent parts of north-east Africa. Sclater and Hartlaub (1881) state that Balfour found the species 'specially prevalent on the Debeni river and Khorfariah', with up to 14 recorded together.

Mallard *Anas platyrhynchos*
Not recorded during the survey.

Ogilvie-Grant & Forbes (1903) state that Bennett obtained Mallard on Socotra. Neither they nor Forbes-Watson (Ripley & Bond 1966) recorded the species.

Garganey *Anas querquedula*
Not recorded during the survey.

A female obtained by Forbes-Watson in March at a lagoon near Hadibu is the only record (Ripley & Bond 1966).

Ferruginous Duck *Aythya nyroca*
Not recorded during the survey.

Ogilvie-Grant & Forbes (1903) recorded 'a small flock swimming in a brackish estuary of the Wadi Dinehan'. Hartlaub (1881) reports that Riebeck shot a female at Gollensir.

Egyptian Vulture *Neophron percnopterus*
A total of 618 recorded. Seen daily in all areas visited, often in considerable numbers. Greatest densities occurred in association with human settlements and activity; often very tame. Largest concentrations were: 100 between the airstrip and Hadibu, 30 March; 60 at Hadibu, 31 March; 35 at Hamadiroh plateau, 1 April (attracted by survey campsite); 40 at airport, 6 April.

A conspicuous resident. Forbes-Watson describes it as 'one of the most obvious birds on Socotra'. He found one nest at Kishin at 500 m with young between mid-April and mid-May. He did not find the species on 'Abd al-Kuri (Ripley & Bond 1966). Ogilvie-Grant & Forbes (1903) likewise found the species 'very common at all our camps'.

Marsh Harrier *Circus aeruginosus*
Not recorded during the survey.

Forbes-Watson saw a single on two or three occasions in March flying over the lagoon at Hadibu (Ripley & Bond 1966).

Buzzard *Buteo buteo*
A total of 31 sightings, the maximum being six at Jabal Jaaf, 4 April. Five recorded at Di-Ishal, 5 April, were a family party.

A resident and possibly a rare passage migrant though this is far from clear. Ogilvie-Grant & Forbes (1903) were the first to record the species and found 'a good many pairs' nesting. Forbes-Watson 'noted these birds occasionally on the Hadibu plain, the cliffs near the sea, and in the limestone country to the east of Kallansiya'. In the Hajhir mountains, he observed a pair carrying sticks to a nest on a cliff at Kishin (Ripley & Bond 1966). For discussion of the taxonomy see Martins & Porter (1996).

Osprey *Pandion haliaëtus*
One between Rizeleh and Ras Momi, 1 and 2 April.

Possibly a resident but no confirmed breeding. Ripley & Bond (1966) report that Forbes-Watson 'found ospreys to be common on Socotra and 'Abd al-Kuri, but no nests were seen.' Ogilvie-Grant & Forbes (1903) recorded 'a good many' on 'Abd al-Kuri where they collected 'a pair of very old birds'.

Kestrel *Falco tinnunculus*
Widespread and common throughout the area covered by the survey, with up to seven daily.

A resident breeder.

Lanner *Falco biarmicus*
Not recorded during the survey.

Perhaps a resident breeder. Two pairs of possible Lanners were recorded on Dimimi (in the Hagghier range) and in the Dimichiro valley in 1898-99 (Ogilvie-Grant & Forbes 1903) but it appears that comprehensive views were not obtained of either pair. Occurrence of this species on Socotra perhaps requires confirmation, as indicated by Dowsett & Dowsett-Lemaire (1993).

Peregrine *Falco peregrinus*
One, about ten kilometres south of Jabal Jaaf, 3 April.

Status uncertain; at least a winter visitor. Previously recorded in winter and

in the breeding season but confusion with Barbary Falcon *Falco pelegrinoides* cannot be ruled out.

Barbary Falcon *Falco pelegrinoides*
One, Rizeleh, 31 March and two, apparently paired, Hamadiroh plateau, 1 April.

Probably a resident breeder, although not previously recorded from Socotra.

Quail *Coturnix coturnix*
One, Jabal Jaaf, 3 April.

A passage migrant. Forbes-Watson saw 'one *coturnix*' near Suk at the end of March 1964 (Ripley & Bond 1966) and Ogilvie-Grant & Forbes (1903) report 'only a few' from Socotra and 'Abd al-Kuri. The species is easily confused with Harlequin Quail *Coturnix delegorguei* if seen only in flight. The extent to which this problem might be reflected in past observations of the two species is unknown.

Harlequin Quail *Coturnix delegorguei*
Not recorded during the survey.

A vagrant. Mackworth-Praed & Grant (1952) list the species as occurring on Socotra but there are apparently no published records. See remarks under Quail *Coturnix coturnix*. It is suggested that this species is removed from the Socotran list pending further evidence.

Spotted Crake *Porzana porzana*
Not recorded during the survey.

A vagrant. One was collected by Bennett, but no date or locality is recorded (Ogilvie-Grant & Forbes 1903).

Moorhen *Gallinula chloropus*
Not recorded during the survey.

A vagrant. Riebeck obtained five adults (Hartlaub 1881), but no date or locality was given.

Black-winged Stilt *Himantopus himantopus*
Up to 16 at Erhina lagoons, 30 March - 5 April.

A passage migrant, not previously recorded from Socotra.

Crab Plover *Dromas ardeola*
Not recorded during the survey.

A vagrant. Balfour reported the species to be common at Kallansiya (Sclater & Hartlaub 1881). No further observations were detailed in Ripley & Bond (1966) and this is apparently the only record.

Cream-coloured Courser *Cursorius cursor*
A pair with two fledged young at Hakari wells, 4 April.

A migrant or resident breeder, recorded from areas on both north and south coasts. Seven reported breeders were collected by Forbes-Watson between March and June 1964, who regarded the species as 'common' east of Hadibu on the Ras Kharma airstrip and near Eriosh (Ripley & Bond 1966).

Little Ringed Plover *Charadrius dubius*
Two, Erhina Lagoons 31 March and 5 April.

A passage migrant. Forbes-Watson collected one near Hadibu, 9 March 1964 (Ripley & Bond 1966).

Ringed Plover *Charadrius hiaticula*
Eight at three localities in the eastern half of the north coast, 30 March - 5 April, and 14 on the south coast at Ras Diblih, 3 April.

A passage migrant. Forbes-Watson collected one east of Hadibu, 13 March 1964 and saw the species on 'Abd al-Kuri during this month (Ripley & Bond 1966).

Kentish Plover *Charadrius alexandrinus*
A total of 24 at three localities along the eastern half of the north coast, 30 March - 5 April. Maximum ten at Qariyah lagoons, 3 April.

A common resident breeder. Forbes-Watson found the species to be common along the ponds and lagoons on the north coast (Ripley & Bond 1966).

Lesser Sandplover *Charadrius mongolus*
One, Qariyah lagoons, 31 March and four, Ras Momi, 1-2 April.

Presumed to be a passage migrant. Not previously recorded from Socotra.

Greater Sandplover *Charadrius leschenaultii*
Three, Ras Momi, 2 April.

Presumed to be a passage migrant. Not previously recorded from Socotra.

Pacific Golden Plover *Pluvialis fulva*
Two, Erhina lagoons, 30 March and one there, 5 April.

Apparently a scarce passage migrant (as is the case on the fringe of mainland Arabia). Forbes-Watson collected one, two miles east of Hadibu, 17 May 1964 (Ripley & Bond 1966). This is the only other record from the islands.

Grey Plover *Pluvialis squatarola*
Eight along the eastern half of the north coast, 31 March - 6 April.

A passage migrant. Presumably also a winter visitor. Forbes-Watson collected one near Hadibu, 13 March 1964 (Ripley & Bond 1966).

Common Snipe *Gallinago gallinago*
One, Erhina lagoons, 30 March, where two, 5 April and one on the Hamadiroh plateau, 1 April.

A passage migrant and perhaps also a winter visitor. Ogilvie-Grant & Forbes (1903) found the species common at Homhil, although it was not recorded by Forbes-Watson (Ripley & Bond 1966).

Pintail Snipe *Gallinago stenura*
Not recorded during the survey.

A vagrant. Two shot at Homhil during the Ogilvie-Grant & Forbes (1903) expedition of 1898-99 are the only records. No date, locality or description are given. Recent records indicate that this species is a scarce but regular passage migrant and a winter visitor to the eastern fringe of Arabia. There are also three records from Yemen.

Bar-tailed Godwit *Limosa lapponica*
Not recorded during the survey.

Ripley & Bond (1966) reported that Forbes-Watson saw this species during the period 7 March - 14 June 1964. There are apparently no further details available and this is the only record.

Whimbrel *Numenius phaeopus*
29 at four sites along the eastern half of the north coast, 30 March - 6 April.

A common passage migrant. Presumably also a winter visitor.

Curlew *Numenius arquata*
One, Qariyah lagoons, 31 March and one, Ras Momi, 2 April.

A passage migrant.

Redshank *Tringa totanus*
Nine, Qariyah lagoons, 31 March and three, Qudub Marsh (east of the airstrip), 6 April.

A common passage migrant.

Marsh Sandpiper *Tringa stagnatilis*
One, Qudub marsh (east of the airstrip), 6 April.

A passage migrant. Not previously recorded from Socotra.

Greenshank *Tringa nebularia*
Widespread in small numbers at five localities along the eastern half of the north coast and at one locality on the south coast.

A common passage migrant. Presumably also a winter visitor.

Wood Sandpiper *Tringa glareola*
Two, Qariyah lagoons, 31 March.

A passage migrant.

Common Sandpiper *Actitis hypoleucos*
Widespread in small numbers; at least 33 at a minimum of six localities along the eastern half of the north coast.

A passage migrant and perhaps also a winter visitor. Recorded from 'Abd al-Kuri (Ogilvie-Grant & Forbes 1903) and from near Hadibu where Forbes-Watson collected two, 11 and 15 March 1964 (Ripley & Bond 1966).

Turnstone *Arenaria interpres*
18 recorded at three localities (Ras Hebak, Erhina lagoons and Ras Momi) along the eastern half of the north coast, 30 March - 5 April.

A winter visitor (although non-breeders perhaps linger through the spring and summer).

Red Knot *Calidris canutus*
One near Di-Lishah, 3 April was the first record for Socotra.

A vagrant or rare passage migrant in east and north-east Africa. There are two extralimital records from Somalia (Urban *et al.* 1986). The species is a vagrant in Yemen and Oman (Hollom *et al.* 1988).

Sanderling *Calidris alba*
One at Ras Momi, 1 April, and two at the same locality, 2 April.

Probably a scarce passage migrant, although listed as a vagrant by Dowsett & Dowsett-Lemaire (1993). In winter this species is widespread on coasts throughout north-east and east Africa (Urban *et al.* 1986). Forbes-Watson (in Ripley & Bond 1966) did not record this species on Socotra in 1964. Bennet is credited with having obtained a specimen in 1898 or 1899 (Ogilvie-Grant & Forbes 1903).

Temminck's Stint *Calidris temminckii*
Three records, two at Erhina lagoon, 30 March, 12 on shoreline at Hadibu, and 7 on Qariyah brackish lagoons, 31 March.

Probably a regular passage visitor in small numbers. Ogilvie-Grant & Forbes (1903) report having shot one from a flock along the Hanefu river, 20 Feb 1899. The only other records are of two males and a female collected near Hadibu by Forbes-Watson in March 1964 (Ripley & Bond 1966).

Black-headed Gull *Larus ridibundus*
Two at Erhina lagoon, 30 March was the first record for Socotra.

In east Africa this species winters regularly from the Red Sea south to Kenya (Harrison 1985).

Lesser Black-backed Gull *Larus fuscus*
Three at Erhina lagoon, 30 March.

In 1964 Forbes-Watson noted small numbers of gulls including *L. fuscus* along the entire north coast. Probably an uncommon non-breeding/winter visitor.

L. f. fuscus is apparently the only subspecies wintering in the Middle East and east Africa (Grant 1986).

Lesser black-backed Gull *Larus fuscus* complex
The systematics of the Lesser Black-backed Gull complex are open to much debate. We have included the sub-species *heuglini* and *taimyrensis* under Lesser black-backed Gull, though often they are treated as sub-species of Herring Gull. No Yellow-legged Gulls *L. cachinnans* were observed.
A total of 1,015 recorded, principally along the north coast from Ras Hebak to Ras Momi with maximum counts of 74 off Hadibu, 31 March and 650 at Ras Momi, 1 April. Recorded once on the south coast: five at Ras Diblih, 4 April. All birds examined from slides taken were either *heuglini* or *taimyrensis*.

Observed in 1964 by Forbes-Watson (Ripley & Bond 1966) along the north coast, this species is a regular non-breeding visitor. In this region *L. a. heuglini* is known to winter in the southern Red Sea, Gulf of Aden and south along the African coast to Tanzania. The winter range of *taimyrensis* is not fully understood, but some birds wintering in Kenya may be this subspecies (Grant 1986) and so it could possibly occur on Socotra.

White-eyed Gull *Larus leucophthalmus*
Two at Ras Momi, 1 April.

In 1964 Forbes-Watson (Ripley & Bond 1966) encountered small numbers of gulls, including this species, along the north coast. Probably a regular non-breeding visitor in small numbers.

Sooty Gull *Larus hemprichii*
A total of 688 recorded. Regularly seen off the north coast with the following maxima: 50 off Ras Hebak, 30 March; 60 off Ras Momi, 2 April and 53 during a north coast pelagic transect, 2 April.

Forbes-Watson (Ripley & Bond 1966) noted small numbers of gulls including *L. hemprichii* along the north coast in 1964. Apparently a fairly common non-breeding visitor. Breeding occurs in the southern Red Sea to Gulf of Aden, off the Makran coast and locally along the east Somalia coast to Kiunga, Kenya and also the Arabian Gulf. It is present off the Arabian coast throughout the year, but many migrate south to Kenya and Tanzania in the winter (Harrison 1985).

Swift Tern *Sterna bergii*
A total of 417 recorded, principally on the north coast, with the following maxima: 80 off Ras Hebak, 30 March; 50 between Riseleh and Ras Momi, 1 March; and 66 off Fikhah, 2 April. On the south coast, 20 at Ras Diblih, 4 April.

Noted as the most common tern species along the north coast in 1964 by Forbes-Watson (Ripley & Bond 1966). Either a common migrant or present throughout the year in Socotran waters, where it may breed on islands in the archipelago.

Lesser Crested Tern *Sterna bengalensis*
A total of 17 recorded along the north coast, from Ras Hebak, Ras Momi, Fikhah and the coast near the airport.

Recorded at Qadhub and Kallansiya with Swift Terns by Forbes-Watson (Ripley & Bond 1966). Either a migrant or a resident in waters around Socotra, where it may breed on islands in the archipelago.

Sandwich Tern *Sterna sandvicensis*
A total of 268 recorded, with a maximum of 150 off Ras Hebak, 30 March.

A passage migrant and non-breeding visitor to waters around Socotra.

Roseate Tern *Sterna dougallii*
Two off Ras Hebak, 6 April was the first record for Socotra.

Probably a scarce migrant; the sub-species concerned, *S. d. bangsi*, breeds in the Arabian Sea on islands off Oman (Harrison 1985).

White-cheeked Tern *Sterna repressa*
A total of 10,261 recorded, with large numbers counted on three sea-watches: 400 (+ 1,000 terns that were either this species or *S. hirundo*) off Ras Hebak, 30 March; an estimated 2,500 per hour flying east near Dibleh, 4 April; 4,380 per hour flying west and 2,390 per hour flying east during a timed count off Ras Hebak, 5 April (with additional feeding flocks of up to 300 present offshore).

Apparently a regular and common passage migrant.

Saunders' Tern or Little Tern *Sterna saundersi* or *S. albifrons*
Not recorded during the survey.

Forbes-Watson noted a few pairs in late May 1964 near Eriosh that had just started to make nest scrapes (Ripley & Bond 1966). These seem more likely to have been Saunders' Tern than Little Tern. The former is known to breed from the southern half of the Red Sea to the Seychelles and possibly Madagascar, whereas Little Tern occurs much farther north.

Brown Noddy *Anous stolidus*
One caught by local fishermen near Di-Lishah, 4 April. In addition, a noddy, presumably *A. stolidus*, was recorded during a north coast pelagic transect, 2 April, with another observed from the shore near Ras Diblih, 4 April.

Two previous records: one close inshore near Jebel Bitzobur, 14 January 1899 (Ogilvie-Grant & Forbes 1903) and a single observed by Forbes-Watson on Ras Hebak in late May 1964 (Ripley & Bond 1966).

Lichtenstein's Sandgrouse *Pterocles lichtensteinii*
A minimum of 34 recorded at four localities in the north of the island: one on the Hamadiroh plateau, six at Rizeleh, two between Ras Momi and Shidadah and 25 at Di-Ishal.

A resident breeder. In addition, has also been recorded from Qaysuh, the Hadibu plain and near Kallansiya (Ripley & Bond 1966).

Laughing Dove *Streptopelia senegalensis*
A total of 982 recorded. Seen daily, the highest density occurring at Wadi Ayhaft where 100+, 5 April.

A common breeding resident on Socotra, occurring from sea-level to at least 850 m on Jabal Jaaf. Often recorded around habitation and in date palm *Phoenix dactylifera* groves and other well vegetated areas.

Namaqua Dove *Oena capensis*
Not recorded during the survey.

An adult male at Gollonsir (Hartlaub 1881) is the only record.

Bruce's Green Pigeon *Treron waalia*
A total of 28 recorded at five localities: Rizeleh (1), Hakari wells (4), Wadi Ayhaft (9), en-route to Di-Ishal (2) and at Di-Ishal (12).

A resident breeder, most commonly found in date palm *P. dactylifera* groves and other wooded areas.

White-browed Coucal *Centropus superciliosus sokotrae*
Not recorded during the survey.

The race *sokotrae* is endemic. A resident breeder, though nest and eggs have apparently never been found. Forbes-Watson in 1964 (Ripley & Bond 1966) considered it uncommon, being confined to water courses and their environs. Also found rarely in palm groves on the coastal plain, but more common in the Hajhir mountains. Ogilvie-Grant & Forbes (1903) also observed the species in the Hajhirs and recorded it as being nowhere common, but widespread in small numbers over all parts of the island visited. It is possible that the species has become more localised in response to increasing aridity.

African Scops Owl *Otus senegalensis* (subspecies?)
The population encountered on Socotra, and treated as *Otus senegalensis*, is presumably the same as that described by Ogilvie-Grant & Forbes (1903) and Ripley & Bond (1966), who assign it to *Otus scops socotranus*.
Heard or seen at five localities: eight on the Hamadiroh plateau, one at Jabal Jaaf, one at a pass south of Rookib, two or four at Di-Ishal, and four at Wadi Ayhaft.

Apparently a widespread breeding resident in wooded areas to at least 850 m on Jabal Jaaf.

Nubian Nightjar *Caprimulgus nubicus jonesi*
Not recorded during the survey.

A male obtained in the Dimichiro valley on the Garieh plain, east Socotra, 16 January 1899 (Ogilvie-Grant & Forbes 1903) was accorded subspecies status. This is the only record for Socotra.

Forbes-Watson's Swift *Apus berliozi berliozi*
Approximately 300 birds recorded. Seen almost daily, principally in small

flocks, along the coast and inland to 850 m on Jabal Jaaf, where one was trapped. The largest flocks observed were as follows: 40 at Fikhah, 2 April; 30 on Hamadiroh plateau, 3 April; 60 at Jabal Jaaf, 4 April and 54 at Ras Diblih, 4 April.

A fairly common breeder. Movements outside the breeding season are unclear. Occurs from sea-level to the Hajhir mountains. Forbes-Watson noted birds in May 1966 at the high cliffs in the Hajhirs and considered that they were almost certainly breeding in cracks in the cliffs (Ripley & Bond 1966). For further details see Porter *et al.* (1996).

Blue-cheeked Bee-eater *Merops superciliosus*
One at Erhina, 5 April was the first record for Socotra.

European Roller *Coracias garrulus*
Not recorded during the survey.

A vagrant with one record: a female collected by Forbes-Watson near Hadibu, 15 March 1964 (Ripley & Bond 1966)

Abyssinian Roller *Coracias abyssinicus*
Not recorded during the survey.

A vagrant. The only record is of a skeleton found on 'Abd al-Kuri in 1899 (Ogilvie-Grant & Forbes 1903).

Hoopoe *Upupa epops*
Not recorded during the survey.

A vagrant, the only record is one flying between Socotra and 'Abd al-Kuri in 1899 (Ogilvie-Grant & Forbes 1903).

Black-crowned Finch Lark *Eremopterix nigriceps forbeswatsoni*

A total of 284 recorded. Seen daily, especially numerous in arid coastal scrubland, often in the vicinity of habitation but also encountered up to 850 m on Jabal Jaaf. The largest concentration was 64 at Hakari wells.

The race *forbeswatsoni* is endemic to Socotra. A common breeding resident.

Short-toed Lark *Calandrella brachydactyla*
Not recorded during the survey.

No records from Socotra, but a specimen of one of the paler south-western forms, possibly the race *artemisiana*, was obtained on 'Abd al-Kuri, 21 March 1964 (Ripley & Bond 1966).

Sand Martin *Riparia riparia*
Not recorded during the survey.

A passage migrant (Dowsett & Dowsett-Lemaire 1993). Two males and a female collected by Forbes-Watson in May 1964 near Hadibu (Ripley & Bond 1966).

Rock Martin *Ptyonoprogne fuligula*
Not recorded during the survey.

Apparently breeds. A few pairs were seen (and three birds collected) in the Hajhir mountains (500-1,100 m) and around limestone cliffs at Homhil (800 m) in 1898-99 (Ogilvie-Grant & Forbes 1903). Forbes-Watson obtained two males and two females at Adho Dimellus in May 1964 (Ripley & Bond 1966).

Crag Martin *Ptyonoprogne rupestris*
One at Wadi Ayhaft, 5 April was the first record for Socotra.

A vagrant. The species is a scarce autumn passage migrant and winter visitor to Yemen (Brooks *et al.* 1987). There are no records from adjacent continental Africa (Dowsett & Dowsett-Lemaire 1993).

Barn Swallow *Hirundo rustica*
Not recorded during the survey.

A vagrant. A female collected by Forbes-Watson near Hadibu, 17 May 1964 (Ripley & Bond 1966).

House Martin *Delichon urbica*
Not recorded during the survey.

A passage migrant. Forbes-Watson observed the species on several occasions over Hadibu in mid-May 1964 (Ripley & Bond 1966).

Tawny Pipit *Anthus campestris*
Not recorded during the survey.

A vagrant. Two on 'Abd al-Kuri, 23 February 1899, one of which was collected (Ogilvie-Grant & Forbes 1903).

Long-billed Pipit *Anthus similis sokotrae*
A total of 284 recorded, principally from inland and montane areas. Observed from sea-level to 850 m (Jabal Jaaf), usually in poorly vegetated, rocky localities.

A common resident breeder. Ogilvie-Grant & Forbes (1903) found newly-fledged young in mid-December as well as fresh eggs, both in the same period in early February. Recorded up to at least 1,200 m. Apparently absent from 'Abd al-Kuri.

Yellow Wagtail *Motacilla flava*
Not recorded during the survey.

A passage migrant. Balfour collected three of the race *lutea*, in March 1880 near Ghor Gharrieh (Sclater & Hartlaub 1881; Keith, Urban & Fry 1992).

Grey Wagtail *Motacilla cinerea*
One at Wadi Ayhaft, 5 April is the first record for Socotra.

A vagrant. The species is a fairly common passage migrant and winter visitor to northern Yemen (Brooks *et al.* 1987). Uncommon on passage and in winter in Somalia (Ash & Miskell 1983).

White Wagtail *Motacilla alba*
Not recorded during the survey.

A winter visitor (Dowsett & Dowsett-Lemaire 1993). Balfour described it as common along the lower reaches of perennial streams (Sclater & Hartlaub 1881). Ogilvie-Grant & Forbes (1903) found it to be fairly common on the Hadibu plain, in the Dimichiro valley and on 'Abd al-Kuri. Forbes-Watson collected seven in March 1964 (Ripley & Bond 1966). All records apparently refer to *dukhunensis*, which breeds in Russia, east to central Siberia and south to northern Iran (Keith, Urban & Fry 1992).

Isabelline Wheatear *Oenanthe isabellina*
Two at Ras Momi, 2 April.

Status uncertain. Recorded twice previously; a specimen taken in March 1880 (Sclater & Hartlaub 1881) and a male collected on 'Abd al-Kuri, 23 February 1899 (Ogilvie-Grant & Forbes 1903)

Desert Wheatear *Oenanthe deserti*
Not recorded during the survey.

A winter visitor. Found commonly on the plains by Balfour in March 1880 (Sclater & Hartlaub 1881) and noted as numerous by Ogilvie-Grant & Forbes (1903) who recorded it up to 1,000 m in the Hajhir mountains, and up to 500 m on 'Abd al-Kuri. Nine females and a male on 'Abd al-Kuri in March 1964 (Ripley & Bond 1966) were considered, on wing measurements and the amount of white in the wing, to be the race *oreophila* which breeds in Tibet, Ladakh and the Kunlun Shan range and winters in southern Arabia and possibly southern Somalia (Keith, Urban & Fry 1992).

Socotra Warbler *Incana incana*
A total of 135 recorded at 11 sites, principally from localities between sea level and 150 m, but found up to 850 m on Jabal Jaaf (15, 4 April). Usually found in sparse, halophytic vegetation in both rocky and sandy areas, but also recorded from thickets and grassy uplands. Maximum was 20 in dunes at Fikhah (10 m), 2 April.

A resident breeder, endemic to Socotra. Recorded to approximately 1,400 m by Ogilvie-Grant & Forbes (1903) and Forbes-Watson (Ripley & Bond 1966). For further details of the species see Dymond (1996).

Socotra Cisticola (Island Cisticola) *Cisticola haesitata*
A total of 25 recorded at four localities: two on the coastal plain east of Ras Diblih (0-5 m), 11 at Hakari wells (0-5 m), ten 2 km west of Ras Diblih (0-5 m) and 15 in dunes west of airport (2-3 m). All observations were in areas where the dominant vegetation was low coastal scrub, typically tamarisk and/or halophytic scrub. Most records related to singing males, but no other indications of breeding were noted.

A resident breeder. Both Ogilvie-Grant & Forbes (1903) and Forbes-Watson (Ripley & Bond 1966) observed fledged young. In upland areas it is found in

grassland with scattered bushes. Probably local and uncommon, and considered globally vulnerable (Collar *et al.* 1994). For further details of the species see Dymond & Porter (1996).

Common Whitethroat *Sylvia communis*
Not recorded during the survey.

A vagrant (Dowsett & Dowsett-Lemaire 1993). One collected on 'Abd al-Kuri, 23 February 1899 (Ogilvie-Grant & Forbes 1903).

Chiffchaff *Phylloscopus collybita*
Not recorded during survey.

A vagrant (Dowsett & Dowsett-Lemaire 1993). One collected on 'Abd al-Kuri, 23 February 1899 (Ogilvie-Grant & Forbes 1903).

Socotra Sunbird *Nectarinia balfouri*
A total of 149 at 14 sites between 50 m (Ras Hebak) and 850 m (Jabal Jaaf), with maxima of 50 at Wadi Ayhaft, 16 at Shidadah, and 15 at Jabal Jaaf. All other observations involved 1-13 birds. A nest with three unfledged young at Ras Hebak, 30 March. Recorded in most well-vegetated areas.

A resident breeder. Widespread and fairly common, recorded from sea-level up to 1,500 m. For further details of this species see Showler & Davidson (1996).

White-breasted White-eye *Zosterops abyssinica socotrana*
A total of 149 recorded at 12 sites from sea-level to 850 m on Jabal Jaaf. Occurs in small numbers at lower altitudes, with largest concentrations of 50 in climax woodland on Jabal Jaaf and 25 in sub-montane woodland at Wadi Ayhaft. Elsewhere, usually found in mixed *Adenium obesum* and *Zizyphus* woodland, principally above 250 m. Two of three trapped at Jabal Jaaf, 4 April were in active wing-moult.

A resident breeder. Ogilvie-Grant & Forbes (1903) found newly fledged but still dependent young, 17 December 1898 and 1 January 1899, but Forbes-Watson found no evidence of breeding between March and June (Ripley & Bond 1966). Described as equally common at high and low altitudes (Ogilvie-Grant & Forbes 1903).

Great Grey Shrike *Lanius excubitor uncinatus*
A total of 139 recorded at 19 sites . Widespread and common in most areas with mature trees, from sea-level to 850 m. Maximum of 46 on the Hamadiroh plateau and 21 at Shidadah. Most other observations were of 1-6 individuals.

A resident breeder. Forbes-Watson made no mention of nesting (Ripley & Bond 1966), but Ogilvie-Grant & Forbes (1903) found fully fledged young being fed by adults on many occasions and a nest with small young at Homhil. Evidently common in suitable habitat, principally at lower to middle elevations. Ogilvie-Grant & Forbes (1903) found the species to be scarce above 1,000 m, although recorded up to 1,200 m by Forbes-Watson (Ripley & Bond 1966).

Brown-necked Raven *Corvus ruficollis*
A total of 54 recorded at 13 sites. Usually observed in pairs or small groups of up to eight individuals, except for 20 at the airport, 6 April. Most observations were from the coastal plain but recorded up to 460 m (Hamadiroh plateau). No instances of breeding noted.

Presumably a resident breeder but nesting never established. Riebeck shot a pair (Hartlaub 1881), Forbes-Watson shot a female (Ripley & Bond 1966) and Ogilvie-Grant & Forbes (1903) recorded it as comparatively rare, typically in pairs.

Socotra Starling *Onychognathus frater*
A total of 41 recorded at six sites, from near sea-level to 850 m on Jabal Jaaf. Maximum 16 on Hamadiroh plateau, where a nest site in a hole in a limestone cliff was discovered. More common in well wooded areas.

An endemic resident breeder, below 60 m in towns, around lagoons and on plains; 60-1,200 m in foothills, in valleys and thickets and grassy uplands; and on the high peaks of the Hajhir mountains between 1,200 and 1,500 m (Ripley & Bond 1966). For further details of this species see Porter & Martins (1996).

Somali Starling *Onychognathus blythii*
A total of 538 recorded from almost all sites visited. Common throughout (although apparently most common in higher, rocky areas), from sea-level to 850 m (Jabal Jaaf). Three counts exceeding 100 birds: 111 on Hamadiroh plateau, 110 at Shidadah, and 100 between Rookib and Ras Diblih.

A resident breeder on Socotra and 'Abd al-Kuri. For further details of this species see Porter & Martins (1996).

Socotra Sparrow *Passer insularis*
A total of 1,142 recorded from nearly all localities, from sea-level up to 850 m. Largest concentrations were: 231 at Hamadiroh plateau, 133 at Shidadah, at least 200 between Rookib and Ras Diblih, 121 at Di-Ishal. Most other observations involved 10-50 individuals.

An endemic resident breeder, widespread and common. Records suggest that nesting occurs throughout the year (Ripley & Bond 1966). Recorded up to at least 1,200 m. The sub-species *hemileucus* is found commonly on 'Abd al-Kuri (Ogilvie-Grant & Forbes 1903). Of four young birds trapped during the survey, one had fledged in 1993, one in late 1992 and the other two were judged to have almost certainly fledged in late 1992.

Golden-winged Grosbeak *Rhynchostruthus socotranus socotranus*
A total of 46 recorded at three sites: on rocky, scrub-covered hillsides at Rizeleh (100 m), in sub-montane woodland at Wadi Ayhaft (200 m) and in *Adenium* scrub at Di-Ishal (150 m). Most common at Wadi Ayhaft where 42 were counted.

A resident breeder. Ogilvie-Grant & Forbes (1903) obtained fully fledged young but no other evidence of breeding has been recorded. Apparently locally

common, principally in the Hajhir and Adho Dimellus mountains. Ogilvie-Grant & Forbes (1903) also found it to be fairly common in the Addah, east of Hadibu, while Forbes-Watson shot one near Kallansiya (Ripley & Bond 1966). Recorded from 60 to 1,200 m.

African Rock Bunting *Emberiza tahapisi insularis*

A total of 76 recorded at five sites between 100 and 850 m: 30 at a pass south of Rookib, 19 at Shidadah, 25 at Jabal Jaaf (850 m), one between Rookib and Jabal Jaaf and one between Di-Ishal and Hadibu. All were in rocky upland areas with sparse vegetation.

A common resident breeder. Ogilvie-Grant & Forbes (1903) found three nests with either eggs or young in January 1899 and adults with dependent young in February. Apparently common in all suitable open areas with scattered vegetation, principally at low to middle elevations; Ogilvie-Grant (1903) stated that it was replaced at high altitude by *E. socotrana*.

Socotra Bunting *Emberiza socotrana*

Two at the pass south of Rookib (500 m), 3 April were with 15 African Rock Buntings, on a dry, rocky hillside with scrub and a few scattered small trees.

An endemic resident. Ogilvie-Grant & Forbes (1903) collected a pair and three singing males on the slopes of Adho Dimellus between 6-15 February 1899, at over 1,200 m. Forbes-Watson obtained a total of 17 specimens in 1964 (Ripley & Bond 1966). Probably prefers upland thickets and scrub for nesting, but Collar & Stuart (1985) speculate that the species may descend to low altitudes during the non-breeding season. For further details see Morton (1996).

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Habitats and bird communities in southern Yemen and Socotra

PETER DAVIDSON

Whilst knowledge of the status and distribution of bird species in arid tropical environments has advanced, quantitative assessments of species' abundance are few. A major objective of the OSME survey of spring 1993, therefore, was to investigate, by means of standardised quantitative transects, the bird communities of different habitats, thus enabling broad comparisons between them and assessment of the relative abundance and densities of the species they support. Employing simple survey techniques, large areas were covered by survey teams in relatively short periods. This strategy is essential for the coverage of extensive areas in a climate where bird activity occurs primarily during the first two hours of daylight.

No comparison has been attempted between results presented here and those from surveys undertaken in the Tihamah of northern Yemen in autumn 1985 (Rands *et al.* 1987). Differences in the season of survey and methodology used prevented meaningful comparison.

METHODS

Habitat categorisation

The principal vegetation types and land-use characteristics encountered on each transect were recorded on standardised forms. This information was used to develop a series of broadly defined habitat and land-use categories. Comparisons of bird species' density and relative abundance could thus be made between the categories using techniques described below. Within southern Yemen, these habitat/land-use categories have been classified into three altitudinal bands: Tihamah and coastal lowlands (<500 m), Foothills (500-1,800 m) and Highlands (>1,800 m). For the Socotra data, three zones, mainly based on altitude, have been used.

Bird census techniques and data analysis

Two census techniques were employed: line transects and encounter rates. Line transects are particularly suitable for surveying extensive tracts of relatively uniform terrain, especially 'open' or sparsely vegetated habitats. Such a survey approach offers an efficient way of collecting a large volume of data per unit effort. The methodology followed for conducting the line transects was that detailed in Bibby *et al.* (1992). At each survey site up to ten transects were walked by different observers simultaneously, attempting to achieve a constant pace of one km per 20 minute period. Transects, which were a minimum of 400 m apart, were distributed in such a way as to ensure that no large areas of

habitat were left uncovered. During each transect, every individual bird contact was recorded and divided into those within 25 m of each observer, and those beyond. In instances where bird contacts involved individuals or groups flying over, this was noted separately, but these data were excluded from the density analyses. Transects were generally undertaken between 05.30 and 10.00 and 16.30 and 18.00 hours, the periods of maximum bird activity.

For each species, a density value (expressed as birds/km^2) was calculated according to the formula (from Bibby *et al.* 1992):

$$D = 10N((1-SQRT(I - N_1/N))/W)/L$$

where
- D = density in birds per ha (x100 for density per km)
- N = total number of birds recorded on transect
- N_1 = number of birds recorded within 50 m belt
- W = width of inner belt (i.e. 50 m)
- L = transect length (km)

Density estimates were summed and divided by the number of transects, generating a mean density for each species at each site. In cases where habitat categories were represented at more than one site, site means were summed and divided by the number of sites to give an overall mean for each habitat.

Using the above formula produces a density of zero in cases where no birds were recorded within the 50 m belt. Since data from all transects (including those with zero density) must be used when calculating site and habitat densities, the density of some species may have been slightly underestimated.

Point counts, based on the method described in Bibby *et al.* (1992) were also conducted at four sites where the structural complexity of the vegetation (e.g. densely wooded habitats) made line transects impracticable. No further analysis of the point count data was attempted because of its incompatability with line transect data. Fortunately though, sufficient line transect data were collected in three of the point count habitats (*Juniperus* woodland, Mahra woodland, and Socotra foothills) to enable calculation of a density estimate.

When insufficient time was available to organise full line transects, encounter rates (the number of individuals of each species encountered per kilometre walked) were calculated. Since observer effort was judged to be similar to that on full line transects, the data have been combined with that from the transects to derive a relative abundance index for each species in each habitat. This makes full use of all observations made during the bird surveys. The original data recording sheets are lodged in the OSME archives.

RESULTS AND DISCUSSION

During the survey, a combined total of 377 transects and encounter rate walks was conducted, covering 390 km at 45 different sites, including 52 transects on Socotra. Co-ordinates are given for most of these, but all can be located by

reference to Figures 1 and 2 in Porter *et al.* (1996). A total of 120 species was recorded (on both transects and encounter rate walks): 80 breeding species, and 40 passage migrants. Details of the habitats covered, together with a summary of species numbers recorded, are given in Table 1 (page 116). Densities and relative abundance indices are presented in Table 2 (breeding species page 118) and Table 3 (passage migrants page 126).

The following sections covering first southern Yemen and then Socotra discuss the characteristics of each habitat in turn, broadly identifying the relative importance of each to the bird species occurring, especially those endemic to south-west Arabia or for which the habitat holds high densities. Under *Breeding Species with highest density*, species are listed in descending order of abundance. Table 1 provides an appraisal of the relative importance of the habitats surveyed and gives details of the coverage achieved and census methods used. For full details of the species recorded in each habitat see Tables 2 and 3.

SOUTHERN YEMEN

Tihamah and Coastal Lowlands (<500 m)

Sabkha

Desiccated saline mud coastal plain, with scattered small dune systems (<3 m high) formed and maintained through an aggregation of sand around substantial shrubs and bushes. Scattered *Suaeda* bushes were present and the dominant grass was *Odyssea mucronota; Halopyrum mucronatum* also present. Ground cover generally <5%. An unidentified club rush was present at very low density on the landward side of this habitat strip.

Altitude: <10m.
Land use: Apparently undisturbed, except for limited low intensity grazing and occasional vehicle tracks.
Site: 13°02'N 45°04'E, c.25 km north-east of Aden on the Arabian Sea coast.

Breeding species with highest density: Hoopoe Lark* (the only species recorded).

Virtually birdless. No migrants were found in the habitat.

Subdesert plain

Fixed low sand dunes (c.3 m high), flats and vegetated sand hummocks comprising c.30% ground cover, comprising *Salvadora persica* (Arak) scrub and *Odyssea mucronota* and *Panicum turgidum* grass cover. Also widely scattered, unidentified *Acacia* spp. and a ridge of sand fringing beach covered with dense *Suaeda fruticosa* scrub and, in wet patches, *Avicennia marina.*

Altitude: <10m.
Land use: Apparently undisturbed. Scattered settlements at very low density.

* *Scientific names appear in tables 2 and 3 (pages 118-129)*

Site: Al-Jadid (13°04'N 43°20'E), on the Red Sea coast south of al-Mukha.

Breeding species with highest densities: Hoopoe Lark, Crested Lark, Yellow-vented Bulbul, African Collared Dove.

The most striking feature of this habitat was the high number of migrant species recorded (14) compared with a mere five breeding species. Although relatively well vegetated, plant diversity was limited (mostly halophytes and xerophytes). Due to close proximity to the coast the area provides a good staging post for migrants of which Pied Wheatear, Redstart and Willow Warbler were recorded at their highest density. It should be noted that although African Collared Dove was recorded at its highest relative abundance in this habitat, density was greatest in sandy wadis and cultivated plains inland.

Herbaceous grassland

Dry, flat or gently undulating sand and fine gravel plain. Dominant herbs include *Tribulus arabicus*, *Dipterygium glaucum* and *Heliotropium* sp. *Panicum turgidum* is the dominant grass; sward height 230 cm. Ground cover generally <30%. Scattered, unidentified shrubs and bushes c.1 m high.

Altitude: 80-150 m.
Land use: Extensive low to medium intensity grazing. Scattered semi-nomadic settlements.
Sites: 12°57'N 44°49'E, 20 km north-west of Aden; 12°9'N 44°38'E, 30 km north-west of Aden.

Breeding species with highest densities: Black-crowned Finch Lark, Hoopoe Lark, Crested Lark, Nile Valley Sunbird.

This habitat held a low number of breeding species (10) probably reflecting a lack of structural complexity (the vegetation is predominantly at ground level). The very high density of Black-crowned Finch Larks breeding (much higher than in other habitats) reflects the seasonal nature of optimal breeding conditions for this species, recent rain having promoted the profuse flowering of herbs and grasses in the rather fine sand and gravel substrate. Chestnut-bellied Sandgrouse also occurred but at very low density. Few migrants were recorded.

Acacia woodland

Gently undulating gravel plain supporting *Acacia tortilis*, the dominant tree species, at a density of 10-20 trees per ha, with rather sparse *Panicum turgidum* grass cover and a low shrub understorey, with *Zygophyllum* sp. in gravel areas. Slightly more species-rich along dry runnels where more annual herbs present. Some sandy grassland with patches of *Salvadora persica* along a narrow (0.5 km wide) coastal strip.

Altitude: 30-60 m.
Land use: Extensive light grazing and browsing of *Acacia* by camels. Scattered semi-nomadic settlements.
Site: Hiswat al-Hujaymah. This *Acacia* woodland belt (5-10 km in width) stretches for at least 80 km along the coastal plain of western southern Yemen from a few kilometres east of Bab al-Mandab to the herbaceous grassland north-west of Aden. It is one of the largest stands of *Acacia* woodland in Yemen.

Breeding species with highest densities: Great Grey Shrike, Black-crowned Finch Lark, Crested Lark, African Collared Dove.

This highly distinctive habitat, typical of the Sudan Savanna zone of continental Africa, held only eight breeding species, perhaps surprisingly as the vegetation structure is more complex in *Acacia* woodland than in many of the other lowland habitats studied. Great Grey Shrike occurred at its highest density which was considerably higher than in any other habitat on the mainland being comparable with its density in the Socotran Highlands. Chestnut-bellied Sandgrouse and Arabian Babblers occurred at low density. More importantly in conservation terms, Arabian Bustard was found to occur, although the species was not recorded during formal censusing. This extensive habitat tract may still support an important population of the species.

Perhaps surprisingly only four migrant species were recorded, all at low densities.

Alluvial coastal plain

Sparsely vegetated flat or gently undulating sand and gravel plains. Typical species include *Salvadora persica, Acacia* spp. (particularly *Acacia tortilis*), occasional *Adenium obesum, Zizyphus spina-christi* and *Calotropis procera,* generally comprising not more than 5% ground cover, mainly restricted to dry gullies.

Altitude: 50 m.
Land use: Mainly undisturbed, but perhaps with some seasonal light grazing.
Sites: Al-Suqayyah (12°40'N 43°37'E, just east of Bab al-Mandab; Wadi Irkhawt, 2 km east of Sayhut (both sites east of al-Mukalla); plain below Jabal Rub'ut (eastern southern Yemen).

Breeding species with highest densities: Sand Partridge, Yellow-vented Bulbul, Desert Lark, Orange-tufted Sunbird, Blackstart, Arabian Babbler.

Of 20 breeding species recorded, Sand Partridge was recorded at the highest density found in any habitat. This was the only lowland habitat where south-west Arabian endemics were encountered during transects: Arabian Partridge and South Arabian Wheatear (both were scarce). High densities of a number of

passage migrants were recorded, notably Rufous Bush Robin and Upcher's Warbler, both at considerably higher densities than in any other habitat.

Sandy wadis

Flat, open dry sandy wadis, often traversed by smaller gullies and bordered by agricultural land. Generally well vegetated; plant species include *Tamarix nilotica, Salvadora persica, Zizyphus spina-christi,* occasional *Acacia* spp. *Calotropis procera, Euphorbia* spp. in western southern Yemen, and the introduced *Prosopis juliflora* in eastern southern Yemen. Intermittent herb cover, commoner species including *Dipterygium glaucum* and *Tribulus arabicus*. Small, dense thickets of vegetation often encountered, particularly where *Prosopis juliflora* and *Tamarix nilotica* dominate. Percentage vegetation cover usually >30%, often much greater. Surface running water present at Wadi al-Masilah and Wadi Hajr (where apparently permanent).

Altitude: 20-460 m.

Land use: Sandy wadis often fringed by cultivation, generally comprising *sorghum* fields with occasional date palms. Some areas lightly grazed. Wadis mainly undisturbed.

Sites: South of Dar al-Qudaymi (13°05'N 44°20'E); Wadi al-Khabt (13°03'N 44°30'E) (both below Jabal Iraf); Wadi Hajr (14°06'N 44°10'E) west of al-Mukalla; Wadi al-Masilah (15°04'N 51°08'E) in eastern southern Yemen.

Breeding species with highest densities: Yellow-vented Bulbul, Black-crowned Finch Lark, African Collared Dove, Rüppell's Weaver, Arabian Babbler, Brown-necked Raven.

This habitat had the greatest species diversity among lowland habitats. A total of 53 species were recorded including 33 breeders. Although this may, in part, reflect the number of kilometres surveyed, the structural complexity of the vegetation and the presence of running water at two sites were clearly significant. Four breeding species were found at their highest relative densities in sandy wadis: Chestnut-bellied Sandgrouse, Little Swift, Nile Valley Sunbird and Brown-necked Raven. 20 species of passage migrants were recorded, the longest number in any single habitat. Barred Warblers were present in the highest density recorded for the species.

Degraded Coastal Plain

Relatively flat gravel plain with some small hillocks and sand dunes. Very sparse vegetation comprising grass tussocks, halophytes and patches of *Zygophyllum simplex*. Ground cover generally <2%, except for an area adjacent to a brackish creek which was fringed by *Tamarix* scrub and a few palms.

Altitude: 20-50 m.
Land use: Minimal cultivation (some *Sorghum* and fallow land), but much disturbance through the creation of foundations for residential development.
Site: Al-Shihr, east of al-Mukalla.

Breeding species with highest densities: Black-crowned Finch Lark, Great Grey Shrike, Nile Valley Sunbird, Graceful Prinia.

Despite the disturbed nature of the habitat, 23 species were recorded, of which 17 were breeding. This habitat was poor for migrants with only six species recorded; of these Spotted Flycatcher occurred at its highest density in any habitat.

Foothills (500-1,800 m)

Juniper woodland

Gently sloping rocky, species-rich plateau traversed by infrequent steep-sided wadis, dominated by Juniper woodland, dense in patches with occasional *Acacia* spp. and substantial trees (e.g. *Ficus* spp.); area interspersed with open grassland rich in herbs and patchy cultivation. Vegetation cover 60%-80%.

Altitude: 1,350-1,500 m.
Land use: Extensive low to medium intensity grazing with minimal browsing. Some cultivation (10%), primarily *Sorghum*, although many fallow fields. Some clearance for cultivation and lopping of Junipers for firewood.
Site: Jabal Iraf (13°07'N 44°15'E) at the summit of the foothill escarpment of western southern Yemen.

Breeding species with highest densities: Yellow-vented Bulbul, Laughing Dove, Arabian Waxbill, Long-billed Pipit, Graceful Prinia, Rüppell's Weaver, White-breasted White-eye, Arabian Serin.

This habitat has an exceptionally complex structure and is highly restricted in range, occurring only on the Jabal Iraf plateau. It held an important bird community with four south-west Arabian endemics recorded during formal surveys: Arabian Serin occurred at its highest density in any habitat; Arabian Partridge and Arabian Waxbill (at the second highest recorded densities) and Golden-winged Grosbeak. Six other species were also found at their highest densities: Dark Chanting Goshawk and African Grey Hornbill (not encountered in most other habitats), Little Rock Thrush, Brown Woodland Warbler (both fairly common), Gambaga Dusky Flycatcher (found at very low densities, but absent from most other habitats), and Tristram's Grackle, which probably utilises the rocky cliff faces fringing the habitat more than the Juniper woodland

itself. At the time of study (21-23 March), the bird community was composed of over 80% breeding species. Of the five migrants noted only Blackcap was encountered commonly and at a very high density. This was presumably because the habitat affords both shelter and feeding opportunities, and is prominently positioned at the summit of a south-facing escarpment.

Open Acacia woodland

Gently sloping rocky plateau traversed by infrequent steep-sided wadis. Sparsely vegetated with some *Acacia* including *A. tortilis* and *A. asak*. Sparse ground cover of succulents and flowering herbs interspersed with open rocky areas. Vegetation cover 10%.

Altitude: 1,200-1,350 m.
Land use: Light grazing, perhaps with some lopping for firewood.
Site: Jabal Iraf (13°07'N 44°15'E).

Breeding species with highest densities: African Rock Bunting, Long-billed Pipit, Blackstart, Laughing Dove.

Located adjacent to Juniper woodland, this habitat supported a similar number of breeding and passage migrant species, but there were some notable differences as may be seen by comparing the breeding species showing the highest densities. Five endemics were recorded during formal censusing, including Arabian Woodpecker and South Arabian Wheatear. Two species recorded at their highest densities in any habitat surveyed on the mainland of southern Yemen: African Rock Bunting and Long-billed Pipit. Arabian Warbler, Golden-winged Grosbeak and Arabian Serin also occurred but were not common.

Surprisingly, only four migrants were recorded, all at low densities. This may reflect the relatively early survey dates (20-23 March).

Uncultivated foothill wadis

Stony wadis (bordered by steep rocky slopes) up to 5 km wide, some dissected by dry sandy channels. Vegetation dominated by *Acacia* with some *Commiphora* spp., *Zizyphus spina-christi*, and *Tamarix* in sandy areas. Rather sparse, though quite diverse ground flora, the most common species being *Salvadora persica*, the herbs *Aerva javanica* and *Dipterygium glaucum* and the grass *Panicum turgidum*. Occasional patches of *Pandanus* scrub. Occasional standing water present with intermittent stretches of running water in some wadis. *Typha* beds in one large pool of standing water at Wadi Jahr.

Altitude: 600-900 m.
Land use: Mostly undisturbed although some areas influenced by light grazing. Habitat occasionally fringed by cultivation in more fertile areas with alluvial deposits.

Sites: Wadi al-Jahr (13°58'N 46°23'E); Wadi Himarah (14°03'N 46°53'E); Wadi al-Jiz' c.40 km west of al-Ghaydah; Wadi Sh'hout (16°20'N 50°43'E); al-Sawm (16°08'N 49°18'E); Wadi Ardah, just west of al-Sawm; 5 km west of al-Qatn (15°50'N 48°25'E); Shabwah (15°23'N 47°01'E).

Breeding species with highest densities: House Sparrow, Yellow-vented Bulbul, African Silverbill, Blackstart, Laughing Dove, Rock Dove, Nile Valley Sunbird.

The greatest observer effort occurred in this habitat, both in terms of kilometres walked and sites surveyed. It is perhaps not surprising, therefore, that the highest number of species was recorded on formal transects. A relatively high proportion (70%) were residents and included eight found at their highest densities in any habitat: Lichtenstein's Sandgrouse, Namaqua Dove, Little Green Bee-eater, Desert Lark, Blackstart, Scrub Warbler, African Silverbill and House Bunting. The three south-west Arabian endemics encountered (Arabian Partridge, Arabian Serin and Arabian Waxbill) were all scarce and found more commonly in other habitats. Four species, Hamerkop, Little Button Quail, Little Owl and Nubian Nightjar were not found in any other habitat during formal surveys. Passage migrants were recorded in very low numbers.

Cultivated foothill wadis

Intensively cultivated fertile wadis with agricultural terraces (many fallow) with a high human population density. Field margins marked by larger trees particularly *Acacia* spp. including *A. asak*, some *Zizyphus spina-christi* and *Ficus* spp. Crops include *sorghum* and vegetables (e.g. onions). Adjacent hillsides sparsely vegetated, often with *Euphorbia* spp. including *E. cactus* and *E. ammak*. Surface running water present in some wadis, including one well vegetated with *Tamarix* sp. and bordered by cultivation.

Altitude: 800-1,750 m.
Land use: Almost exclusively *sorghum* cultivation but with much fallow land; other crops include onions.
Sites: Wadi al-Sahi (two sites); Shawhat (13°14'N 44°02'E); al-Mihal, near Shawhat; Wadi Yashbum (14°20'N 46°59'E); al-Sawm (c. 16°08'N 49°18'E).

As only encounter rates were recorded when surveying this habitat (see Methods), species densities have not been calculated so comparisons with other habitats are liable to be misleading. A similar habitat to uncultivated wadis in terms of total number of species recorded. Again, the proportion of south-west Arabian endemics was low – only four species. Of these, South Arabian Wheatear and Arabian Waxbill were found to be common. Although six species were found at their highest relative abundance in cultivated wadis, they include

three seldom encountered raptors (Tawny Eagle, Long-legged Buzzard and Lanner), Red-eyed Dove (rarely encountered, but with a widespread distribution), Black Kite, and Amethyst Starling. In addition, both Egyptian Vulture and Bruce's Green Pigeon occurred at their highest mainland relative abundance (but were found more commonly on Socotra). Of the 15 species of passage migrant recorded none was found to be particularly common. Some interesting comparisons can be made between the two foothill wadi habitats, which probably cover a larger area than any other vegetation/land-use type in the foothills. The presence of more fruiting and flowering trees in cultivated wadis presumably accounts for the higher relative abundance of species such as Bruce's Green Pigeon and possibly Orange-tufted Sunbird, whereas the less disturbed wadis provide a more suitable haven for Desert Larks compared to cultivated tracts. These two habitats are perhaps the most diverse in terms of plant and tree species structure and composition and variety of land-use activities which may account for the high numbers of species recorded.

Drought deciduous woodland (The Mahrah)
Extensively wooded limestone escarpment with overlying lateritic clay. Dense *Commiphora habessinica/Anogeissus dhofarica/Acacia senegal* woodland, with abundant *Adenium obesum,* forming c. 5 m high canopy with occasional *Boscia arabica* and *Sterculia africana* trees. Wadis and ravines often floristically richer, with managed groves of *Tamarindis indica, Anogeissus* spp., *Acacia* spp., date palms and occasional *Ficus* spp. (e.g. *Ficus vasta* and *Ficus salicifolia*). Rich shrub and herb understorey with abundant climbers such as *Jasminium grandiflorum, Capparis cartilaginea* and *Cissus quadrangularis.* Herb layer absent in some areas through over-grazing and drought. The entire region was extremely dry, apparently following a severe drought.

Altitude: 300-700 m.
Land use: Limited woodland management: trees harvested for fruits, pollarded for firewood, used as building material and browsed by camels. Also subject to extensive grazing by goats at or near ground level and more limited browsing by camels.
Sites: Wadi Mararah (16°39'N 52°55'E); Shahrut, 20 km west of Wadi Mararah. Both sites are in the Mahrah in the extreme east of southern Yemen.

Breeding species with highest densities: Shining Sunbird, White-breasted White-eye, Yellow-vented Bulbul, Orange-tufted Sunbird, Laughing Dove, Golden-winged Grosbeak, Blackstart, Black-crowned Tchagra.

This is one of largest continuous tracts of woodland in southern Yemen, supporting eight species at their highest recorded densities in any habitat: Arabian Partridge, Arabian Warbler, African Paradise Flycatcher, Shining and Orange-tufted Sunbirds, White-breasted White-eye, Black-crowned Tchagra,

Fan-tailed Raven and Golden-winged Grosbeak. It is of particular importance in southern Yemen for Arabian Partridge and Golden-winged Grosbeak, found to be common and very common respectively (based on the relative abundance index). The Mahrah in late April was surprisingly poor for migrants, only Spotted Flycatchers occurring in notable numbers.

Intensively cultivated silt plain (Wadi Hadramawt)
Fertile agricultural region comprising the alluvial plain of Wadi Hadramawt. Extensive areas comprised agricultural fields, many fringed with palm groves and occasional fruiting trees. Many fields fallow with leguminous herbs and grasses, and scattered *Zizyphus spina-christi* bushes, or under preparation for the cultivation of sorghum, onions, tomatoes and potatoes. One site (al-Gubbah Hotel gardens) was a managed urban garden. Much of the region intensively irrigated and fertilisers and other chemicals (e.g. pesticides) apparently in use.

Altitude: 700-800 m.
Land use: Intensive agriculture.
Sites: All in Wadi Hadramawt: 10 km south-west of Tarim; al-Gubbah Hotel gardens in Tarim; 2 km west of Sayun; 1 km east of al-Mudhur (15°49'N 48°25'E).

Breeding species with highest densities: Rüppell's Weaver, Yellow-vented Bulbul, Rock Dove, House Sparrow, Laughing Dove, Graceful Prinia, Black Bush Robin.

This is the habitat most strongly influenced by man. Modern agricultural methods are used to exploit the fertile substrate. A very high proportion (89%) of the 27 species encountered during formal surveys were breeding, ten of these occurred at their highest recorded densities in any habitat: Rock Dove, Laughing Dove, Bruce's Green Pigeon, Grey-headed Kingfisher (scarce, and only found in this habitat), Yellow-vented Bulbul, Black Bush Robin, Graceful Prinia, House Sparrow, Rüppell's Weaver and the endemic Arabian Waxbill (the only endemic encountered in this habitat). In addition, it held relatively high densities of African Collared Dove, Bruce's Green Pigeon, Crested Lark, African Rock Martin and African Silverbill. Wadi Hadramawt provides a good example of a bird community adapting to change brought on by human activity. Although many of the species found are widespread, occurring in a variety of other habitats, Wadi Hadramawt is an important habitat simply because of the numbers of breeding birds it supports. However, it was poor for migrants, only Blackcap occurring in any numbers.

Highlands (>1,800 m)

Highland plateux
Undulating barren rocky plateaux (granitic in places) interspersed with shallow

flat wadis and cultivated outwash fans with scattered *Acacia* trees. Ground cover generally very light, excepting scattered agricultural areas, a few with irrigated fields.

Altitude: 2,000 m.
Land use: Undisturbed (barren, rocky) or cultivated ground. Some light grazing at periphery of cultivation.
Sites: All in the southern highlands of previous North Yemen: al-Mardam (14°03'N 45°34'E); Am Daqiq, north-west of al-Mardam; al-Khaw'ah, north-west of Am Daqiq.

Breeding species with highest densities: House Sparrow, Crested Lark, Desert Lark, South Arabian Wheatear.

This habitat is not widely represented in southern Yemen (where there is a relatively small proportion of ground above 1,800 m). It is most akin to the highlands of northern Yemen in land-use characteristics and bird communities. Two of the four species recorded at their highest densities of any habitat surveyed were south-west Arabian endemics: South Arabian Wheatear and Yemen Linnet. A relatively high proportion (33%) of the 43 species recorded were migrants, but all occurred at low densities.

SOCOTRA

Coastal plain (<100 m)
A relatively flat, barren, sandy coastal plain traversed by dry wadis. Very sparsely vegetated except for scattered *Adenium obesum*, *Zizyphus spina-christi*, an unidentified dominant low scrubby tree in wadis and a large date palm plantation at Hakari wells road. Plains surrounding wadis typically unvegetated except for scattered clumps of halophytes on low dunes and some *Tamarix* sp. on higher dunes. Evidence of at least two substantial fires at Ras Diblih. Area apparently occasionally inundated by sea-water.

Altitude: 40 m.
Land use: Extensive but very light grazing, some areas apparently undisturbed. One large date palm plantation.
Sites: Hakari wells road, 2 km west of Ras Diblih; wadi near Shibrhoh (12°22'N 53°48'E).

Breeding species with highest densities: Black-crowned Finch Lark, Long-billed Pipit, Socotra Cisticola, Socotra Warbler, Laughing Dove, Great Grey Shrike.

This was the least species-rich habitat on Socotra, only 13 species being recorded. However, this includes four of the six species endemic to the island: Socotra Warbler, Socotra Cisticola, Socotra Starling and Socotra Sparrow. In

addition, Forbes-Watson's Swift was only recorded in this habitat (during formal censusing), where it was abundant. Four species occured at their highest densities recorded in any habitat on Socotra: Black-crowned Finch Lark, Long-billed Pipit, Socotra Warbler, Socotra Cisticola. As with other habitats surveyed on Socotra, no migrants were recorded.

Foothills (100-400 m)
Undulating rocky or gravel hills and plains. Well vegetated, primarily with an unidentified low shrubby tree (2-3 m high), *Adenium obesum*, various succulents and a small number of Frankincense *Boswellia elongata* trees in higher areas. Occasionally interspersed with patches of open, rather stony, grassland.

Altitude: 100-200 m.
Land use: Extensive light grazing and browsing.
Sites: Shidadah (12°37'N 54°09'E); Di-Ishal (12°22'N 54°11'E).

Breeding species with highest densities: Socotra Sparrow, Somali Starling, Laughing Dove, Egyptian Vulture, Long-billed Pipit, Great Grey Shrike, African Rock Bunting.

Four endemic species were recorded in this habitat, three during formal surveys. Ten species were found at their highest densities recorded in any habitat on Socotra: Egyptian Vulture, Buzzard, Kestrel, Bruce's Green Pigeon, Socotra Sunbird, White-breasted White-eye, Somali Starling, Socotra Sparrow, Golden-winged Grosbeak and African Rock Bunting.

Perhaps of greatest importance, Socotra Bunting (not encountered during formal surveys) was found only in this vegetation zone.

Highlands (>450 m)
Predominantly rocky slopes and elevated plateaux, well vegetated with numerous limestone outcrops. Plateaux grassy with areas of open woodland and scattered Dragon's Blood Trees *Dracaena* sp., and abundant *Adenium obesum*. Vegetation on higher slopes stunted (<1.5 m high), interspersed with patches of grassland and substantial stands of Box *Buxus* sp. scrub.

Altitude: 470-1,100 m.
Land use: Extensive light grazing with some browsing. Cave settlements still exist in the Socotran highlands.
Sites: Hamadiroh Plateau (12°36'N 54°18'E); Jabal Jaaf (12°36'N 54°07'E). Both sites are in central eastern Socotra.

Breeding species with highest densities: Laughing Dove, Socotra Sparrow, Somali Starling, Great Grey Shrike.

The same species total (16) was found in this vegetation zone as in the foothills.

All were resident breeders including four endemic to the island, Socotra Warbler, Socotra Sunbird, Socotra Starling and Socotra Sparrow. The starling was found at a higher density here than in other habitats on Socotra. In addition, the highest densities of Laughing Dove, Great Grey Shrike and Somali Starling on Socotra were recorded.

ACKNOWLEDGEMENTS

Grateful thanks are due to Phil Atkinson (University of East Anglia) for generously allowing use of his computer for analysis, Dr Paul Dolman (University of East Anglia) for help with the data analysis, Dr Lennox Campbell (RSPB), Dr Colin Bibby (BirdLife International) and Duncan Brooks for comments on the draft paper, and Richard Porter and Rodney Martins for extensive discussion on the presentation of the results. Anthony Miller (Royal Botanic Garden, Edinburgh) provided invaluable information to help determine the habitat categories on which the analyses were based.

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Table 1: Summary of habitats covered, methods used and species recorded during censusing in southern Yemen and Socotra, spring 1993.

TABLE 1: ALTITUDINAL ZONE	TIHAMAH AND THE COASTAL LOWLANDS (<500m)						
HABITAT TYPE	**Sabkha**	**Sub-desert plain**	**Herba-ceous grassland**	**Acacia woodland**	**Alluvial coastal plain**	**Sandy wadis**	**Degraded coastal plain**
Total transect length (km)	7	9.5	38	13.5	23.4	44.2	11.25
No of sites censused	1	1	2	1	4	4	1
Census methods used	E.R.	T	T	T	T	T & E.R.	T
Total species recorded	1	19	13	12	32	53	23
Total breeding species	1	5	10	8	20	33	17
Total migrant species	0	14	3	4	17	20	6
% breeding species	100	26.3	76.9	66.7	62.5	62.3	73.9
Total endemic species	0	0	0	0	2	0	0

Tables 2 & 3 (pages 118-129): Relative abundance and density estimates for bird species recorded during formal censusing of different habitats in southern Yemen and Socotra, spring 1993. Table 2, breeding species; Table 3, passage migrants.

Densities are the number of individuals per square kilometre. The relative abundance index is based on the following, arbitrarily defined categories:

*	<0.19/km	scarce
**	0.2-0.49/km	uncommon
***	0.5-1.99/km	common
****	2-4.99/km	very common
*****	>5/km	abundant

FOOTHILLS (500-1,800m)						HIGH-LANDS	SOCOTRA		
Juniper wood-land	Open Acacia woodland	Un-cultivated wadis	Culti-vated wadis	Mahrah wood-land	Hadramawt (cultivated silt plain)	Highland plateaux >1,800m	Coastal plain (<100m)	Foothills (100-400m)	Highlands (>450m)
15.3	10	78.75	29	9	22.5	29.5	15.2	11	21
1	1	9	5	2	4	3	3	2	2
T + E.R.	T	T + E.R.	E.R.	T	T + E.R.	T + E.R.	T + E.R.	T	T + E.R.
29	26	60	59	23	27	43	13	16	16
24	22	42	44	20	24	29	13	16	16
5	4	18	15	3	3	14	0	0	0
82.8	84.6	70	74.5	87	88.9	67.4	100	100	100
3	4	3	4	1	1	4	1	3	3

Abbreviations (for Tables 1, 2 & 3):

T : transect census methods used

E.R. : encounter rate census methods used

(f) : most contacts during transects were of individuals flying over which have been ignored when calculating densities; they have nevertheless been included in the tables for completeness.

f/o : all contacts during transects were of individuals flying over, and are thus not included in the density analyses.

n.d : not recorded during line transects; only during encounter rate walks (enabling a relative abundance calculation), hence absence of density estimate.

TABLE 2:	TIHAMAH AND THE COASTAL LOWLANDS						
ALTITUDINAL ZONE				(<500m)			
HABITAT TYPE	Sabkha	Sub-desert plain	Herba-ceous grassland	Acacia woodland	Alluvial coastal plain	Sandy wadis	Degraded coastal plain
Total transect length (km)	7	9.5	38	13.5	23.4	44.2	11.25
No of sites censused	1	1	2	1	4	4	1
SPECIES							
Hamerkop							
Scopus umbretta							
Black Kite					*	**	***
Milvus migrans					f/o	f/o	f/o
Egyptian Vulture						*	
Neophron percnopterus						f/o	
Dark Chanting Goshawk						*	
Melierax metabates						f/o	
Tawny Eagle							
Aquila rapax							
Bonelli's Eagle							
Hieraaetus fasciatus							
Long-legged Buzzard							
Buteo rufinus							
Buzzard							
Buteo buteo							
Kestrel					*	*	*
Falco tinnunculus					0.8	n.d.	f/o
Lanner							
Falco biarmicus							
Barbary Falcon							
Falco pelegrinoides							
Arabian Partridge					*		
Alectoris melanocephala					0.61		
Sand Partridge					***	*	**
Ammoperdix heyi					21.4	n.d.	6.7
Little Button Quail							
Turnix sylvatica							
Lichtenstein's Sandgrouse					*	*	
Pterocles lichtensteinii					2.8	n.d.	
Chestnut-bellied Sandgrouse			*	***		*****	**
Pterocles exustus			3.3	2.2		7.1 (f)	2.2 (f)
Rock Dove						***	*
Columba livia						n.d.	2.2
African Collared Dove		****		***	*	***	
Streptopelia roseogrisea		14.6		12.4	1.4	32.1	
Red-eyed Dove							
Streptopelia semitorquata							
Laughing Dove			*			****	
Streptopelia senegalensis			0.6			15.1	

FOOTHILLS (500-1,800m)						HIGH-LANDS	SOCOTRA		
Juniper wood-land	Open Acacia woodland	Un-cultivated wadis	Culti-vated wadis	Mahrah wood-land	Hadramawt (cultivated silt plain)	Highland plateaux >1,800m	Coastal plain (<100m)	Foothills (100-400m)	Highlands (>450m)
15.3	10	78.75	29	9	22.5	29.5	15.2	11	21
1	1	9	5	2	4	3	3	2	2
		*							
		n.d.							
			***			*			
			n.d.			n.d.			
			*				***	****	***
			n.d.				f/o	41.0 (f)	17.0 (f)
*	*		*						
4.4	3.3		n.d.						
			*						
			n.d.						
				*					
				f/o					
			*						
			n.d.						
								**	*
								3	1.7
				**	*	*		*	**
				1.3	n.d.	1.5		1.7	0.8
			*						
			n.d.						
				*		*			*
				f/o		f/o			f/o
***	**	*	*	***					
8.8	6.7	n.d.	n.d.	11.7					
		*	*		*				
		3	n.d.		n.d.				
		*							
		n.d.							
		*			*			*	
		3.9			n.d.			1.7	
		**							
		n.d.							
		***	***		*****	***			
		27.1	n.d.		149.6	f/o			
		***	*		***				
		15.4	n.d.		26.5				
*			*						
n.d.			n.d						
****	***	****	****	****	*****	***	****	*****	*****
34	22.2	36.4	n.d.	41	126.3	7.5	25	128.3	206.3

TABLE 2 CONTINUED: ALTITUDINAL ZONE	TIHAMAH AND THE COASTAL LOWLANDS (<500m)						
HABITAT TYPE	Sabkha	Sub-desert plain	Herba-ceous grassland	Acacia woodland	Alluvial coastal plain	Sandy wadis	Degraded coastal plain
Total transect length (km)	7	9.5	38	13.5	23.4	44.2	11.25
No of sites censused	1	1	2	1	4	4	1
SPECIES							
Namaqua Dove						**	
Oena capensis						n.d.	
Bruce's Green Pigeon							
Treron waalia							
Didric Cuckoo							
Chrysococcyx caprius							
Little Owl							
Athene noctua							
Nubian Nightjar							
Caprimulgus nubicus							
Little Swift						****	
Apus affinis						f/o	
Forbes-Watson's Swift							
Apus berliozi							
Grey-headed Kingfisher							
Halcyon leucocephala							
White-throated Bee-eater					*		
Merops albicollis					f/o		
Little Green Bee-eater					*	***	*
Merops orientalis					1.1	n.d.	1.3
Hoopoe						*	
Upupa epops						8.6	
African Grey Hornbill							
Tockus nasutus							
Arabian Woodpecker							
Dendrocopos dorae							
Singing Bush Lark							
Mirafra cantillans							
Black-crowned Finch Lark		***	*****	****		****	****
Eremopterix nigriceps		f/o	222.6	42.9		42.6	29.7
Desert Lark					***	*	*
Ammomanes deserti					19.6	1.4	1.1
Hoopoe Lark	****	****	***	***	***		*
Alaemon alaudipes	14.8	34	17.1	3.7	5.9		1.3
Red-capped Lark							
Calandrella cinerea							
Crested Lark		****	***	****	**		
Galerida cristata		24.3	14.6	18.1	3.7		
African Rock Martin					***		
Ptyonoprogne fuligula					1.1 (f)		

		FOOTHILLS (500-1,800m)				HIGH-LANDS	SOCOTRA		
Juniper wood-land	Open Acacia woodland	Un-cultivated wadis	Culti-vated wadis	Mahrah wood-land	Hadramawt (cultivated silt plain)	Highland plateaux >1,800m	Coastal plain (<100m)	Foothills (100-400m)	Highlands (>450m)
15.3	10	78.75	29	9	22.5	29.5	15.2	11	21
1	1	9	5	2	4	3	3	2	2
		**	*		**				
		5.4	n.d		5.2				
*			***		**	*	**	***	
2.2			n.d.		8.9	f/o	n.d	11.4	
				*					
				n.d.					
		*							
		0.4							
		*							
		0.1							
		*							
		n.d.							
							*****		
							f/o		
					*				
					0.8				
		***	**		**	**			
		7.3	n.d.		6.4	n.d.			
*	***		*			**			
n.d.	7.2		n.d.			8.9			
**									
n.d.									
	*								
	3.3								
		*							
		n.d.							
		***					*****	***	*
		6.7					71.1	10.9	5
	*	***	*		*	***			
	1.9	28.2	n.d.		n.d.	14.1			
						**			
						11.4			
		**	*		***	****			
		4.2	n.d.		17.3	39			
		*	**	*	**	**			
		n.d.	n.d.	f/o	8.9	n.d.			

TABLE 2 CONTINUED: ALTITUDINAL ZONE	TIHAMAH AND THE COASTAL LOWLANDS (<500m)						
HABITAT TYPE	Sabkha	Sub-desert plain	Herba-ceous grassland	Acacia woodland	Alluvial coastal plain	Sandy wadis	Degraded coastal plain
Total transect length (km)	7	9.5	38	13.5	23.4	44.2	11.25
No of sites censused	1	1	2	1	4	4	1
SPECIES							
Long-billed Pipit *Anthus similis*		****	*	***	***	****	*
Yellow-vented Bulbul *Pycnonotus xanthopygos*		24.1	3.1	7.5	19.6	64.9	3.5
Black Bush Robin *Cercotrichas podobe*			* 0.6			**** 16	
Blackstart *Cercomela melanura*					*** 12.2	*** 4.3	* 2.2
Red-breasted Wheatear *Oenanthe bottae*							
South Arabian Wheatear *Oenanthe lugentoides*					* 1.9		
Little Rock Thrush *Monticola rufocinerea*							
Graceful Prinia *Prinia gracilis*						*** n.d.	*** 9
Socotra Warbler *Incana incana*							
Socotra Cisticola *Cisticola haesitata*							
Scrub Warbler *Scotocerca inquieta*						* n.d.	
Arabian Warbler *Sylvia leucomelaena*							
Brown Woodland Warbler *Phylloscopus umbrovirens*							
Gambaga Flycatcher *Muscicapa gambagae*							
African Paradise Flycatcher *Terpsiphone viridis*							
Arabian Babbler *Turdoides squamiceps*				*** 6.7	*** 10.2	** 17.1	** 6.7
Nile Valley Sunbird *Anthreptes metallicus*			** 7.6			**** 43	*** 11.4
Shining Sunbird *Nectarinia habessinica*					* 3.7	*** n.d.	
Orange-tufted Sunbird *Nectarinia osea*					*** 18.3		
Socotra Sunbird *Nectarinia balfouri*							

		FOOTHILLS (500-1,800m)				HIGH-LANDS	SOCOTRA		
Juniper wood-land	Open Acacia woodland	Un-cultivated wadis	Culti-vated wadis	Mahrah wood-land	Hadramawt (cultivated silt plain)	Highland plateaux >1,800m	Coastal plain (<100m)	Foothills (100-400m)	Highlands (>450m)
15.3	10	78.75	29	9	22.5	29.5	15.2	11	21
1	1	9	5	2	4	3	3	2	2
****	****		**	*		*	****	****	***
24.6	30.9		n.d.	4		n.d.	57.3	26.4	13.9
*****	***	****	****	****	*****	***			
67.8	13.1	47.1	n.d.	62.2	225.5	5.5			
		**	***		****	*			
		2.8	n.d.		80.5	2.2			
***	****	***	***	***	*	**			
6.6	29.1	37	n.d.	23.7	n.d.	n.d.			
						*			
						n.d.			
	*		***			***			
	3.3		n.d.			12.6			
***	**								
16.4	2.6								
****	***	***	***	***	****	***			
20.9	5.6	10.6	n.d.	18.3	104.8	9.3			
							***	*	**
							27.5	3.9	n.d.
							***		
							36.5		
		*							
		3.6							
	**	**	**	**		*			
	6.7	3.3	n.d.	10		n.d.			
***									
9.3									
*			*			*			
2.2			n.d.			n.d.			
				***					
				10					
		**							
		6.2							
		***	***						
		26.9	n.d.						
**	**	*	***	*****					
5.6	8.6	0.7	n.d.	93.3					
**	*	**		****	*	***			
6.1	3.3	n.d.		47.6	n.d.	n.d.			
								***	***
								12.2	6.6

TABLE 2 CONTINUED: ALTITUDINAL ZONE	TIHAMAH AND THE COASTAL LOWLANDS (<500m)						
HABITAT TYPE	Sabkha	Sub-desert plain	Herba-ceous grassland	Acacia woodland	Alluvial coastal plain	Sandy wadis	Degraded coastal plain
Total transect length (km)	7	9.5	38	13.5	23.4	44.2	11.25
No of sites censused	1	1	2	1	4	4	1
SPECIES							
White-breasted White-eye *Zosterops abyssinica*						*	
Black-crowned Tchagra *Tchagra senegala*						5.2	
Great Grey Shrike *Lanius excubitor*				****		*	***
				49		1.4	13.3
Brown-necked Raven *Corvus ruficollis*			*			***	*
			f/o			15.1	3
Fan-tailed Raven *Corvus rhipidurus*					**	*	
					f/o	n.d.	
Tristram's Starling *Onychognathus tristramii*					***	***	
					2.1 (f)	f/o	
Somali Starling *Onychognathus blythii*							
Socotra Starling *Onychognathus frater*							
Amethyst Starling *Cinnyricinclus leucogaster*						*	
						0.8	
House Sparrow *Passer domesticus*						***	
						4.3	
Socotra Sparrow *Passer insularis*							
Rüppell's Weaver *Ploceus galbula*			*			*****	
			f/o			32.1	
Arabian Waxbill *Estrilda rufibarba*							
Zebra Waxbill *Amandava subflava*							
African Silverbill *Euodice cantans*						**	**
						1.4	3.8
Arabian Serin *Serinus rothschildi*							
Golden-winged Grosbeak *Rhynchostruthus socotranus*							
Yemen Linnet *Carduelis cannabina*							
House Bunting *Emberiza striolata*							
African Rock Bunting *Emberiza tahapisi*							

		FOOTHILLS (500-1,800m)				HIGH-LANDS	SOCOTRA		
Juniper wood-land	Open Acacia woodland	Un-cultivated wadis	Culti-vated wadis	Mahrah wood-land	Hadramawt (cultivated silt plain)	Highland plateaux >1,800m	Coastal plain (<100m)	Foothills (100-400m)	Highlands (>450m)
15.3	10	78.75	29	9	22.5	29.5	15.2	11	21
1	1	9	5	2	4	3	3	2	2
***	**		**	****			**	***	****
18.2	2.6		n.d.	66.7			n.d.	15.3	n.d.
		*	*	***					
		n.d.	n.d.	20.7					
		*	*		**	**	***	***	***
		1.2	n.d.		3.7	1.5	20	25.4	49.1
		*	**			*			**
		n.d.	n.d.			f/o			f/o
***	**		***	****	***				
f/o	f/o		n.d.	f/o	f/o				
***	**		**	***					
8.9 (f)	f/o		n.d.	7.2 (f)					
							***	*****	*****
							10	198.3	66.4
							*		***
							n.d.		23
**		*	***			*			
3.3		n.d.	n.d.			n.d.			
		***	***		*****	****			
		57.1	n.d.		129.4	94.7			
							*****	*****	*****
							5	232.4	178
***	**	***	*****		*****	****			
19.1	10	24	n.d.		353.6	n.d.			
***		*	***		***				
27.6		n.d.	n.d.		31.9				
			*						
			n.d.						
		***	***		***				
		41.8	n.d.		22.2				
***	***	*	**			**			
18.7	10.2	n.d.	n.d.			n.d.			
*	**			****				*	
4.4	5			40.2				2.7	
						*			
						1.5			
		***	*		**				
		13.5	n.d		n.d.				
***	****	*	***	**				***	*
5.6	34.2	n.d.	n.d.	5.3				19.4	1

TABLE 3: ALTITUDINAL ZONE	TIHAMAH AND THE COASTAL LOWLANDS (<500m)						
HABITAT TYPE	Sabkha	Sub-desert plain	Herba-ceous grassland	Acacia woodland	Alluvial coastal plain	Sandy wadis	Degraded coastal plain
Total transect length (km)	7	9.5	38	13.5	23.4	44.2	11.25
No of sites censused	1	1	2	1	4	4	1
SPECIES							
Montagu's Harrier						*	
Circus pygargus						f/o	
Steppe Eagle							
Aquila nipalensis							
Booted Eagle							
Hieraaetus pennatus							
Lesser Kestrel						*	
Falco naumanni						f/o	
Quail							
Coturnix coturnix							
Turtle Dove							
Streptopelia turtur							
Cuckoo							
Cuculus canorus							
Alpine Swift						**	
Apus melba						f/o	
Pallid Swift					***		***
Apus pallidus					f/o		f/o
Blue-cheeked Bee-eater					****	***	
Merops superciliosus					f/o	f/o	
European Bee-eater							
Merops apiaster							
Roller						*	
Coracias garrulus						n.d.	
Barn Swallow						***	
Hirundo rustica						f/o	
Red-rumped Swallow							
Hirundo daurica							
Tawny Pipit						**	
Anthus campestris						4.3	
Red-throated Pipit							
Anthus cervinus							
Tree Pipit		*					
Anthus trivialis		3.3					
Yellow Wagtail					*		
Motacilla flava					f/o		
Rufous Bush Robin		*		*	***	**	*
Cercotrichas galactotes		1.3		3.7	35	2.9	2.2
White-throated Robin		*				*	
Irania gutturalis		2.7				n.d.	

		FOOTHILLS (500-1,800m)				HIGH-LANDS	SOCOTRA		
Juniper wood-land	Open Acacia woodland	Un-cultivated wadis	Culti-vated wadis	Mahrah wood-land	Hadramawt (cultivated silt plain)	Highland plateaux >1,800m	Coastal plain (<100m)	Foothills (100-400m)	Highlands (>450m)
15.3	10	78.75	29	9	22.5	29.5	15.2	11	21
1	1	9	5	2	4	3	3	2	2
			*						
			n.d.						
			*						
			n.d.						
*	*	*							
n.d.	n.d.	n.d.							
		*							
		3.7							
		*							
		0.5							
		*	**						
		n.d.	n.d.						
				***					
				f/o					
						**			
						n.d.			
		*				***			
		f/o				f/o			
			**			*			
			n.d.			f/o			
			*						
			n.d.						
						**			
						4.4			
*									
f/o									
		*	*						
		0.7	n.d.						

TABLE 3 CONTINUED: ALTITUDINAL ZONE	TIHAMAH AND THE COASTAL LOWLANDS (<500m)						
HABITAT TYPE	Sabkha	Sub-desert plain	Herba-ceous grassland	Acacia woodland	Alluvial coastal plain	Sandy wadis	Degraded coastal plain
Total transect length (km)	7	9.5	38	13.5	23.4	44.2	11.25
No of sites censused	1	1	2	1	4	4	1
SPECIES							
Black Redstart *Phoenicurus ochruros*		**					
Redstart *Phoenicurus phoenicurus*		8.9					
Isabelline Wheatear *Oenanthe isabellina*		***	*			**	
Pied Wheatear *Oenanthe pleschanka*		19.1	0.3			4.3	
Rock Thrush *Monticola saxatilis*		*					
		2.7					
Marsh Warbler *Acrocephalus palustris*						*	
						n.d.	
Olivaceous Warbler *Hippolais pallida*		**			*	**	
		6.7			3.7	n.d.	
Upcher's Warbler *Hippolais languida*					***	**	
					33.2	n.d.	
Barred Warbler *Sylvia nisoria*		***	*	*	**	***	*
		11.3	2.2	2.2	4.1	27.1	2.2
Lesser Whitethroat *Sylvia curruca*							
Common Whitethroat *Sylvia communis*		**			**	*	
		5			8.9	n.d.	
Blackcap *Sylvia atricapilla*		**	*		*	****	*
		3	1.1		0.6	41.4	2.2
Willow Warbler *Phylloscopus trochilus*		***		***	*	*	*
		20.8		15.6	1.6	n.d.	2.2
Chiffchaff *Phylloscopus collybita*		*				*	
		1.7				n.d.	
Spotted Flycatcher *Muscicapa striata*		*		*	**	*	***
		1.3		2.2	5.2	n.d.	12
Golden Oriole *Oriolus oriolus*							
Isabelline Shrike *Lanius isabellinus*		**				**	
		6				3.8	
Red-backed Shrike *Lanius collurio*					*		
					0.4		
Lesser Grey Shrike *Lanius minor*							
Ortolan Bunting *Emberiza hortulana*							

FOOTHILLS (500-1,800m)						HIGH-LANDS	SOCOTRA		
Juniper wood-land	Open Acacia woodland	Un-cultivated wadis	Culti-vated wadis	Mahrah wood-land	Hadramawt (cultivated silt plain)	Highland plateaux >1,800m	Coastal plain (<100m)	Foothills (100-400m)	Highlands (>450m)
15.3	10	78.75	29	9	22.5	29.5	15.2	11	21
1	1	9	5	2	4	3	3	2	2
	*								
	1.9								
*			*			*			
n.d.			n.d.			n.d.			
						**			
						2.2			
	*		*						
	f/o		n.d.						
		**	*		*	*			
		5.3	n.d.		n.d.	2.6			
		*		*		*			
		2.7		2		n.d.			
		*	*			***			
		1.3	n.d.			n.d.			
			*			*			
			n.d.			n.d.			
		*	*		*	*			
		4.7	n.d.		n.d.	n.d.			
*****	**	*	**		**	**			
131.8	3.6	0.3	n.d.		8.9	n.d.			
		*				**			
		0.8				2.2			
*			*						
2.7			n.d.						
		*		***		*			
		1.7		11.3		n.d.			
		*							
		0.5							
		*	*						
		0.5	n.d.						
		*							
		0.3							
		*							
		0.9							
		**							
		n.d.							

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Ostrich *Struthio camelus* eggshell fragments in Yemen

J. W. SPENCER

Fragments of Ostrich *Struthio camelus* eggshells were found on two occasions during the 1993 OSME survey: in the vicinity of Marib and, in association with human artefacts and other archaeological material, in the Ramlat al-Saba'tayn between Marib and Shabwa. Both sites are described in detail below. The Ostrich is known to have been widely distributed across the Arabian peninsula in the past, with records and sightings occurring up until the early decades of the twentieth century (Gallagher 1988; Walker 1981; Jennings 1986). Wilfred Thesiger reports the reminiscences of Bedu tribesmen in the Empty Quarter recalling the presence of Ostriches in the days of their grandfathers (Thesiger 1959).

Whilst the eggshell fragments were clearly associated with signs of human activity at Ramlat al-Saba'tayn, at the Marib site they were far more abundant, scattered over a wider area and not obviously associated with any human artefacts. In neither case could their importation by human agency be completely discounted. Ostrich eggs can be transported long distances by hunter gatherers, both as food and in their use as water carriers (Van der Post & Taylor 1984). It does seem likely, given the evident antiquity of the Ramlat al-Saba'tayn fragments, that these at least are of the Arabian race of Ostrich *S. c. syriacus*.

SITE DESCRIPTIONS

Marib-Sana'a Road (15°31'N 45°16'E)

Large numbers of fragments were found strewn amongst lava blocks and small lava bombs in the volcanic lava fields south-west of Marib, on the Marib-Sana'a road. The volcanic fields of nearby Marib are relatively recent and the lava flows in this area are known to have flowed over alluvial terraces formed behind the Marib dams. These flows are possibly as recent as post-600 BC when the dams were constructed, and the eggshell fragments certainly post-date the flows. Given the intensity of settlement in the area for much of the ancient period, it seems quite possible that the eggshells may have been carried and discarded by nomadic people travelling between settlements.

Ramlat al-Saba'tayn (Rub al-Khali) (15°55'N 46°46'E)

A number of small fragments of Ostrich eggshell were found in an ablated hollow in extensive sand dunes in the area known as Ramlat al-Saba'tayn, some ten kilometres north-west of the two small, conspicuous hills known as Turbaq and 'Arayn. The fragments were in clear association with an assortment of

artefacts including chert arrowheads, obsidian points, stone knives and stone flakes. Also present was the partial headless skeleton of a gazelle (or just possibly a young ibex). Both the eggshell fragments and the artefacts rested on a grey, dusty soil horizon below the yellow siliceous sand, believed to be the surface of an ancient lake bed. The artefacts have been examined and tentatively dated to the early holocene, some 9,000 BP, during one of the more humid climatic periods in Arabia's history.

The collection of artefacts probably represents a temporary, though possibly regularly used, camp site. Though the Ostrich eggshell fragments appeared to be contemporary and associated with the campsite, it is nevertheless possible that they arrived at the site at a later date.

ACKNOWLEDGEMENTS

I would like to thank Dr Martin Menzies of the Yemen Geological Research Group (Royal Holloway College, London) and Ms M. L. Inizian of the CNRS (Centre National des Recherches Scientifiques) in Paris, for their help in the preparation of this paper.

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Sandgrouse (1996) 17: 132-133

The Plain Nightjar *Caprimulgus inornatus* in Yemen

J. N. DYMOND

The Plain Nightjar *Caprimulgus inornatus* occurs widely across sub-Saharan Africa north of the Equator, where its status and distribution is reasonably well understood. Knowledge of the species' status in the Arabian peninsula, however, is poor. The species forms a super-species with Star-spotted Nightjar *C. stellatus*, which has a more restricted range: regular occurrence is apparently restricted to parts of Ethiopia and northern Kenya.

STATUS AND DISTRIBUTION IN AFRICA

The species is resident in north-west Somalia, but elsewhere in Africa is apparently a rainy season breeding visitor to arid steppe habitats from southern Mauritania in the west to Ethiopia and north-west Kenya in the east. Some birds do breed farther south in the Guinea savanna zone and forest-edge habitats, with nesting data recorded in Liberia and southern Nigeria. With the exception of the Somali resident population, the species is thought to migrate southwards during October to December to wintering areas mainly in northern Zaire, Uganda, Kenya and northern Tanzania, perhaps also westwards towards the Gulf of Guinea. Northward return migration occurs mainly during April to June.

STATUS AND DISTRIBUTION IN THE ARABIAN PENINSULA

In Saudi Arabia there are records from four half-degree squares, all in the south-west highlands where it is considered to be local, with all records in the period March to August (M. C. Jennings *pers. comm.*). They occur in barren habitats, either rocky outcrops and plateaux inland of the Asir mountains or in the foothills at the edge of the escarpment (Symens *et al.* 1992).

In Yemen, prior to the OSME survey in 1993, there are a total of 11 records from the following collecting trips: August to October 1899, June 1907 and May 1934 (F. E. Warr *in litt.*) and one record of a female/immature found dead 13 km north of Ta'izz (1,200 m), 25 April 1985.

The survey recorded up to three birds singing on the nights of 21 March and 22 March at Jabal Iraf (1,400 m), of which one was mist-netted; two at al-Sawm (820 m), 3 May, three seen/heard near al-Ghuraf, near Tarim (800 m), 3 May and five seen/heard at al-Qatn (780 m), 4 May. The last three sites are all in the Wadi Hadramawt region and suggest that there may be a good population of the species in that area.

Present data suggest that Arabian birds are breeding summer visitors from Africa, though non-calling birds would be very hard to detect during the winter months.

YEMEN CAPTURE

During the survey, one male bird was mist-netted during darkness, 22 March at Jabal Iraf. Under torchlight the bird was examined critically in the hand and its plumage features were compared directly with the description given in Fry *et al.* (1988). The sole slight discrepancy was that the captured bird did not show any pale or whitish patch in the centre of the throat; otherwise it matched perfectly.

Biometric data of the trapped bird (lengths in mm, weight in grammes):

Age	Sex	Wing	Tail	Maximum tarsus	Bill to feathers	Weight	Primary moult score
Full-grown	Male	167	116	20.6	11.5	48.2	0

VOICE

The song is a prolonged churr very similar to that of European Nightjar *C. europaeus*, though perhaps more directional and less ventriloquial. Song in Yemen commenced just prior to dusk and continued for spells of 20-60 seconds at intervals of 2-20 minutes. The intervals between churring increased during the evening, with song ceasing around 22.30 hours. The male that was caught at Jabal Iraf had earlier been observed singing from a perch on a side branch of a Juniper tree, about two metres from the ground.

HABITAT AND CONSERVATION

Jabal Iraf is an elevated plateau with scattered *Acacia* spp. and *Euphorbia* sp., grading at higher elevation into scrubby woodland dominated by *Juniperus* sp., with more densely vegetated shallow rocky gullies. The habitat at al-Sawm, al-Ghuraf and al-Qatn was bare or sparsely vegetated rocky hillsides with more vegetated wadi bottoms. *Acacia* scrub was extensive at al-Qatn.

This species seems to need quite remote dry rocky hillsides with neighbouring vegetated areas of native woodland or agriculture. Therefore it would not appear to require any active conservation measures and is unlikely to be influenced by the activities of man.

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Sandgrouse (1996) 17: 134-137

The *Buteo* population in Socotra

R. P. MARTINS AND R. F. PORTER

The systematic position of the highly isolated, resident, endemic population of buzzards on Socotra is unclear and requires further study. Ripley & Bond (1966) imply that the population may merit treatment as a sub-species but, because of the scarcity of available material, it is difficult to resolve this issue (Frost & Siegfried 1970). Past authors have variously linked its origins to the Steppe Buzzard *Buteo buteo vulpinus* or have included it under Mountain Buzzard *B. oreophilus* (e.g. Brown *et al.* 1982) although without supporting evidence.

The taxonomic and evolutionery context in which the Socotra *Buteo* should be considered is helpfully informed by recent work on analogous non-migratory populations, such as that on the Cape Verde islands (Hazevoet 1995).

This paper presents details of field observations made in Socotra during the OSME survey in April 1993, against the background of previous studies.

DESCRIPTION

Between 31 March and 7 April 1993, the survey made a total of 31 sightings, including several pairs, one accompanied by three flying juveniles and another which was attending a nest with young. Individuals seen closely were studied carefully and notes taken on shape, structure, plumage and moult. Photographs were taken including that depicted in Plate 23. The main field characters are shown in Figure 1.

General points emerging from the observations are:

a) Shape and structure differ noticably from migratory *Buteo buteo vulpinus* that migrates through Arabia; Socotran birds being broader-winged and shorter-tailed, with a proportionally shorter 'arm' and less pointed wing-tips, thus more closely resembling *Buteo buteo buteo.* In addition to the photograph presented here, another of a bird in flight is presented in Ripley & Bond (1966).

b) Little plumage variation was noted between individuals, except for differences in the extent of streaking on the underparts (see Figure 2). Streaking generally extended well towards the rear-flanks, but was not obvious across the centre of the upper-breast, which appeared unmarked in most individuals.

The main plumage characters of the Socotran birds were:
Underparts: pale throughout with variable blackish-brown streaking on flanks extending to rear flanks, prominent brown carpal-patches, light brown mottling on underwing-coverts and extensive white undersides to most primaries forming a conspicuous pale patch recalling Long-legged Buzzard *B. rufinus.* Tail

greyish or off-white, regularly and lightly barred throughout, with an inconspicuous narrow dark terminal-band.

Upperparts and head: mainly mid-brown; upperside to tail appeared either greyish-white or gingery-brown, narrowly barred brown throughout excepting broader brown terminal-band; a small pale patch is formed by whitish bases to the inner-primaries. Head generally paler than rest of upperparts with an obvious off-white supercilium.

Soft parts: bill and irides appeared dark; legs and feet yellow.

Figure 1. Socotra *Buteo* from below showing the main field characters.

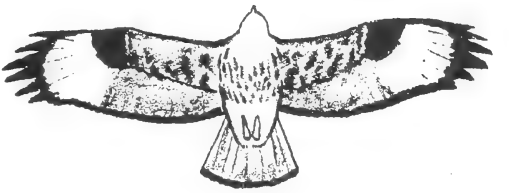

Figure 2. Socotra *Buteo* showing variation in extent of markings on underbody, observed in April 1993.

MOULT

The bird depicted in Plate 23 showing moult of the inner primaries, secondaries and tail is an adult photographed on 1 April. This does not conform to the moult sequence typical of *B. b. buteo*, which does not commence primary and tail moult until late April/early May (Cramp & Simmons 1980), or *B. b. vulpinus* which commences moult of both primaries and tail in early May.

STATUS, DISTRIBUTION AND BREEDING

The buzzards on Socotra appear to be widely distributed and not uncommon residents (Ogilvie-Grant & Forbes 1903, Ripley & Bond 1966 and survey observations). Breeding has been shown to occur in November, January (nest with one month old young, Clouet *et al.* 1994) and 'winter' (many pairs with young, Ogilvie-Grant & Forbes 1903).

Apparent breeding was also recorded by Forbes-Watson (Ripley & Bond 1966), who observed a pair carrying sticks to a nest between 10 April and 13 May (dates deduced from itinerary quoted). During the 1993 survey a nest was discovered on 5 April on a rocky cliff, above a wadi at Di-Ishal (150 m), where adults were carrying food to an unknown number of unfledged young. A pair with three fledged young were seen nearby on the same date. These

observations, supported by those of Forbes-Watson, demonstrate that the breeding season extends much later than the period implied by Ogilvie-Grant & Forbes (1903) and Clouet *et al.* (1994).

It would appear that the duration of breeding can extend from October to at least April (and possibly May), thus differing markedly from that of the migratory *vulpinus*. Indeed it would be important for Socotra *Buteos* to have completed their breeding before the onset of the monsoon winds which could hamper the ability to hunt. This difference in breeding seasons may constitute an additional isolating mechanism for the Socotra population.

ACTIVITY

Often soaring, either alone or with Egyptian Vultures *Neophron percnopterus*. On several occasions seen standing erect on rocks or trees.

SYSTEMATIC POSITION

The existence of an apparently sedentary, insular population of buzzards over 2,600 km south of the southern limits of the range of *B. b. vulpinus* in northern Iran and over 1,700 km from the nearest population of the Mountain Buzzard *B. oreophilus* of Africa is zoo-geographically intriguing, considering the systematic link that has been made with these two species in the past. Past authors have been unable to form a clear opinion regarding the most appropriate and meaningful systematic treatment of buzzards on Socotra because only five specimens indisputably from the Socotran population (and not migrant *vulpinus*) are available for study (see Frost & Siegfried, 1970) and because the systematics of old world *Buteo* populations present a problem which is challenging in its complexity.

Ripley and Bond (who did not visit Socotra) did not adopt any formal systematic treatment, simply listing the population as *Buteo buteo* sub-species? Similar difficulties are presented by sedentary buzzard populations in Macronesia - the Atlantic islands including the Cape Verdes. Such populations are apparently shorter-winged, more clearly resembling nominate *B. b. buteo* in structure than the highly migratory *vulpinus* and markedly less variable in plumage characters than trans-Eurasian *Buteo* populations.

The suggestion that such populations could be derived from colonists originating from extensively distributed more northern migrant populations has been made in the past, despite a lack of supporting evidence.

Discussion of the systematic position of any group of species or sub-species must reflect their respective evolutionary histories if it is to be meaningful. Ideas advanced by Naurois (1987) and comprehensively developed by Hazevoet (1995) to explain the origin of the Cape Verde Buzzard *Buteo bannermani* on the Cape Verdes may usefully inform discussion of the origins of the Socotran population. Naurois suggested that the Cape Verde and Socotran buzzard populations have comparable and analogous origins, perhaps representing relic derivatives of a now extinguished African population that existed during or

before the Pleistocene. According to this hypothesis Eurasian Buzzard taxa would be derived from an ancestral 'proto-Buzzard' population, the range of which has presumably shifted north into Eurasia as climatic conditions ameliorated after the Pleistocene and as speciation progressed.

Populations on the Cape Verdes and Socotra are perhaps therefore derived from early colonists from this, more ancient, population. If this is true, such populations are derived through an evolutionary history which is less related to that of Eurasian *Buteo* taxa than has been thought previously, representing a separate evolutionary lineage which has proceeded independently on these oceanic islands.

Under the Phylogenetic species concept, such a population, if 'consistently diagnosable' from related forms according to morphological or other criteria, constitutes a 'basal evolutionary unit' and is therefore most appropriately treated as a species. As indicated above, this approach is adopted by Hazevoet who treats the Cape Verde populations as *Buteo bannermani*. It would seem appropriate to consider this same approach for the buzzards on Socotra. Further study of the ecology of the Socotran birds and detailed field and museum comparison with the Eurasian *Buteo buteo* and African *B. oreophilus* is therefore planned.

ACKNOWLEDGEMENTS

We are most grateful to C. J. Hazevoet for helpful comments on the draft of this paper and to M. J. Everett for the illustrations in Figures 1 and 2 which were based on the authors' field sketches and photographs.

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Forbes-Watson's Swift *Apus berliozi* in Socotra

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Forbes-Watson's Swift forms a super-species with Pallid Swift *A. pallidus*, African Black Swift *A. barbatus* and Bradfield's Swift *A. bradfieldi* (Fry *et al.* 1988, Chantler & Driessens 1995). Two sub-species are recognised, nominate *A. b. berliozi* apparently breeding exclusively in Socotra and *A. b. bensoni* breeding in Somalia and wintering along the Kenyan coast (Chantler & Driessens 1995). There is some evidence to suggest the Socotran population is migratory. During the OSME survey of spring 1993 over 300 were recorded.

DESCRIPTIONS

The following descriptions are based upon observations made during the survey. For clarity of presentation descriptions in the field and in the hand are given separately. All references to primaries are numbered ascendantly.

In the field:

Typical *Apus* shape. Flight typical of the genus, with long, sweeping, tilting glides with limited or no wing-beats, interspersed by occasional short bursts of rapid wing-beats. Plumage colouration dark blackish-brown with distinct white chin and throat patch and less obvious white forehead; both these features were variable.
Upperparts: crown and nape grey-brown; mantle, back and rump darker blackish-brown with pale fringes to tips of feathers sometimes visible at close range in good light. Upperside of tail much paler brown than upper body.
Underparts: dark earth-brown, paler than mantle, back and rump. Undertail coverts, especially at sides, obviously pale. Pale fringes to feathers were not apparent in the field.
Upperwing: dark brown with iridescent sheen, appearing oily, occasionally discernible on median and primary coverts; blackish outer primaries.
Underwing: coverts brown, paler than underbody.
Underwing: medium greyish-brown with paler, almost translucent, secondaries and inner primaries and darker outer primaries.

In the hand:

This description is based upon a single individual trapped (by flick-netting) at 1,450 m on Jabal Jaaf on 3 April. The bird is illustrated in Plates 25 and 26.
Upperparts: forehead pale grey-brown with very fine whitish fringes. Crown, nape, mantle, back, rump and uppertail coverts grey-brown, also with very narrow pale fringes becoming more obvious on mantle and back and most prominent on rump and uppertail-coverts. Tail grey-brown with a bronzy-green sheen in some lights. Tips of uppertail coverts fell 8 mm short of tips of

central tail feathers.

Underparts: chin and throat white with very fine, blackish shaft-streaks to feathers at sides of chin and throat (in malar area). Lores sooty-black. Rictal bristles prominent, short and black. White of throat extended to upper breast, level with carpal bend of closed wing, this colouration merging into earth-brown on breast. Lower breast, belly, flanks and undertail coverts earth-brown with prominent narrow whitish fringes to feathers. Tips of undertail-coverts fell 2 mm short of tips of central tail feathers.

Upperwing: primaries and primary coverts dull earth-brown with bronzy-green sheen, most noticeable on five outer primaries. Secondaries and greater coverts as primaries but paler. Median and primary coverts slightly darker than greater coverts with an oily green sheen and very narrow pale fringes to inner and lesser median coverts. Pale fringes to leading row of lesser coverts, producing pale leading edge to inner wing.

Underwing: coverts grey-brown, paler than base colour of underbody with broadest fringes (up to 2 mm in width) on greater coverts. Prominent silvery cast to underside of tertials and secondaries, diminishing towards inner primaries.

Soft parts: bill black; iris dark chocolate-brown; legs and toes blackish, soles of feet pinkish grey, claws black.

Measurements (length in millimetres, weight in grammes):

Wing	Head & bill	Tail	Tail cleft depth	Weight
172	33.7	69.5	26.2	39.5

When compared with details of 18 male and 11 female *A. b. berliozi*, for which details are given in Fry *et al.* (1988), these measurements suggest the trapped individual was a male.

A detailed description of Forbes-Watson's Swift (Chantler & Driessens 1995) concurs with the characters of this bird.

THE PROBLEM OF IDENTIFICATION

There is no doubt that Forbes-Watson's Swift is difficult to identify. Examination of the species in the field and hand and subsequent comparison of skins at the BMNH with an extensive series of *Apus apus pekenensis* (the race of Common Swift that migrates through eastern Arabia) and *Apus pallidus* suggested the following to assist with identification:

Differences from *Apus a. pekenensis:*

pale fringes to feathers on upperparts
larger, whiter throat
oily sheen to secondary and median coverts on upperwing
slightly paler overall colouration
slight dark saddle effect on mantle
10th primary longest (9th longest in *pekenensis*)
voice

Differences from *Apus pallidus*:

less noticable saddle on mantle
slightly darker plumage
oily sheen to primaries and secondary and median upperwing coverts
voice

However, much caution is needed. A bird trapped on mainland Yemen, on 25 April (which was not seen in the hand by the authors) and identified as Pallid Swift was later considered to possibly have been Forbes-Watson's Swift upon examination of the slides. However there was insufficient detail in the photographs or measurements taken for a confident identification to be made.

VOICE

The call is a rather flat, screeching 'schweee', not as high-pitched or loud as that of *A. apus*. A trisyllabic 'schweee-weee-eee' was also noted.

TAXONOMIC HISTORY

The population of *Apus* swifts breeding on Socotra were first named *Apus pallidus berliozi* (Ripley 1965) after examination of birds collected by A. D. Forbes-Watson in 1964. Ripley treated this population as a race of *pallidus* based upon size, colouration and measurements which were judged to best fit this species. The history of the taxonomic treatment since then has been complicated. A useful account appears in Brooke (1969), who also examined the position of other closely related taxa in what is now regarded as the *pallidus* super-species. In this group Sibley & Monroe (1990) recognise *pallidus* (Pallid Swift), *barbatus* (African Black Swift), *berliozi* (Forbes-Watson's Swift), *bradfieldi* (Bradfield's Swift), as well as *balstoni* in Madagascar. Few other authors support Sibley & Monroe's specific recognition of *balstoni* and Chantler & Driessens (1995) do not treat it as specifically distinct. All agree that the *pallidus* super-species presents particular difficulties within *Apus* and, from a field identification perspective and from the limited information available to us, we concur with this view.

It is now recognised that Forbes-Watson's Swift comprises two sub-species, *A. b. berliozi* (breeding in Socotra) and *A. b. bensoni* (breeding in Somalia).

STATUS AND DISTRIBUTION

The species was recorded throughout the survey (31 March - 7 April). Birds were often seen in pairs or groups of less than five, although on one occasion a loose flock of 45 was observed; in total about 300 were recorded and the species was judged to be fairly common and quite widely distributed. During the 1898-9 (December to February) expedition to Socotra the only swifts observed were several on 12 December (Ogilvie Grant & Forbes 1903). Although these birds were not positively identified, assuming they were Forbes-Watson's Swift, this observation suggests that the species is rare or absent during winter.

HABITAT AND BREEDING

Most common in the interior of the island e.g. in the Hajhir mountains around Jabal Jaaf, although small numbers were recorded over the coastal plains. No evidence of breeding was observed. Forbes-Watson collected 32 individuals, nearly all in breeding condition, 14 to 9 May 1964, and suggested the breeding season was largely complete by mid-May (Ripley 1965). He found the species most often in mountain areas above 600m and thought it bred in cracks in cliffs.

No display was observed during the survey but Forbes-Watson in 1964 found that most birds in the flocks encountered were in pairs with the female leading the male (discovered by collecting). On a few occasions birds were seen to cling onto their partner and then drop with flexed wings to near the ground. In addition to much screaming, 'whip-crack' noises emanated from the pair, probably made by the wings.

FOOD

Birds were observed catching flying insects. Stomach contents examined by Forbes-Watson included beetles, flying ants and grasshoppers. He also saw them catching flying termites at sea level after rain (Ripley 1965).

CONSERVATION AND INFLUENCE OF MAN

The species is apparently neither threatened nor influenced by human activities.

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Sandgrouse (1996) 17: 142-144

The Socotra Warbler *Incana incana*

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Formerly placed in the genus *Cisticola*, Socotra Warbler *Incana incana*, endemic to Socotra, has more recently been treated as a monospecific genus, though not by Sibley & Monroe (1990). Plumage and wing-formula show close similarities to Piping Cisticola (or Neddicky) *C. fulvicapillus* of eastern and southern Africa, but it is longer-billed and certain aspects of its behaviour and appearance recall some *Sylvia* warblers, notably Desert Warbler *S. nana*. The species has a reddish orbital-ring, a feature not present in any species of the genus *Cisticola* but often present in *Sylvia*.

The observations of the OSME survey of spring 1993 are presented here.

DESCRIPTION

Sexes apparently alike. In general impression, a fairly small sandy warbler resembling both Desert Warbler and a *Cisticola*, but with a noticeably long, prominent bill. The tail is sometimes held slightly cocked. One of the individuals observed during the survey is illustrated in Plates 30 and 31.

The following description applies to adults. Juvenile plumage is apparently undescribed.

Plumage

Crown and nape sandy-grey with a distinct rufous tinge. Upperparts uniform sandy-brown. Ear-coverts and sides of neck greyish-white. Upperside of tail slightly darker than upperparts with greyish tinge to central pair of tail feathers. Extensive white tips and blackish subterminal bands present on underside of tail feathers. Occasional narrow white tips present on upperside also, although these are absent from some birds having apparently been lost through wear. The prominence of these features is accentuated by the graduated tail structure. Excluding blackish centres to tertials and black alulas, general colouration of all coverts and flight-feathers on closed wing sandy-brown, concolorous with mantle. Entire underparts pure 'silky' white to greyish-white, excepting a greyish cast to rear flanks. Plumage soft and loose (from examination of skins).

Soft Parts Bill: upper mandible dark grey; lower mandible straw-yellow or pinkish-yellow with a dark tip. Legs and feet orange-yellow or pink, faintly tinged orange. Irides reddish-brown or tawny-orange.

Measurements Forbes-Watson collected 22 birds in 1964: wing-lengths were 49-53 mm (mean 50.8) in 12 males and 46-51 mm (mean 48.5) in 10 females, with tail-lengths of 43-48 mm (mean 45.2) and 41-47 mm (mean 43.1) respectively; the weight range was 9-12 g (Ripley & Bond 1966).

VOICE

The quiet song is a slightly hesitant, unmusical trill or a spluttering series of identical notes lasting 1-1.5 seconds. Ogilvie-Grant & Forbes (1903) considered the song similar to that of Stonechat *Saxicola torquata*, but not often heard. A harsh, chattering call-note was occasionally heard during the survey. This was described by Ogilvie-Forbes & Grant (1903) as a scolding "'chip, chip, chip, chip-it, chip-it, chip-it' which can be reproduced by striking a flint and steel together quickly."

STATUS AND DISTRIBUTION

About 88 were recorded at ten sites during the survey at altitudes from sea-level to 800 m. The species was encountered at most well-vegetated sites visited. The more arid west of the island was not visited but in 1964 Forbes-Watson found the species in extensively vegetated plains at Kallansiya in the west and up to 1,400 m in the Haggier mountains (Ripley & Bond 1966). From December to February the species was common in almost all bushy areas on the island up to 1,100 m (Ogilvie-Grant & Forbes 1903).

HABITAT

The species was found in three habitat types: (1) Dense tamarisk *Tamarix* with dwarf halophytic vegetation on coastal sand-dunes, at two sites on the southern coastal plain (Hakari wells and 2 km west of Ras Diblih) and just west of Fikhah on the north coast where tamarisk thickets and associated *Croton socotranus/Jatropha unicostata* shrubland is sustained by a freshwater spring emerging from windblown dunes at the base of cliffs. (2) Lowland hill slopes (near Rizeleh) and the sides of wadis at Wadi Ayhaft, near Shibrhoh and Wadi Shidahah supporting moderately dense cover. (3) Higher mountain slopes (e.g. on Jabal Jaaf at up to 800 m) in patchy climax woodland interspersed with dense low shrub cover. Balfour encountered the species on high grassy plains (Ogilvie-Grant & Forbes 1903).

BREEDING

No evidence of breeding was observed in April. Ripley & Bond (1966) do not refer to breeding during the period March to June but Ogilvie-Grant & Forbes (1903) found a pair with three young on 7 January. At the end of January they observed many birds with nesting material and females about to lay eggs (deduced from collected birds). On 12 February they found a nest: a dome-shaped structure with a side entrance constructed from grass and lichen and situated in a bush one metre above the ground.

ACTIVITY

Unobtrusive, favouring lower levels in scrub but not shy, responding well to 'pishing'. Two were seen to make flights for distances of up to 200 m at a height of 1.5-2 m. It is unclear whether such activity was related to a territorial dispute, courtship or some other purpose. Foraging on the ground was observed, individuals often carrying the tail slightly raised at such times.

CONSERVATION AND INFLUENCE OF MAN

The Socotra Warbler, although endemic to Socotra, is not considered endangered. While it was not possible to conduct an accurate assessment of the population during the brief survey period, the species is widespread in suitable habitat, perhaps suggesting a total population exceeding 5,000 individuals.

Although pressures from grazing and wood-cutting for firewood may be locally intense, such activities do not appear to effect the habitats typically used by this species.

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Sandgrouse (1996) 17: 145-147

The Socotra Cisticola *Cisticola haesitata*

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Formerly considered to be an endemic sub-species of Fan-tailed Warbler (Zitting Cisticola) *Cisticola juncidis* by Ripley & Bond (1966), the Socotra Cisticola *C. haesitata* is treated by Sibley & Monroe (1990) as a full species - as indeed it was by Ogilvie-Grant & Forbes (1903). Forbes-Watson found the species in only two localities during his expedition in 1964 (Ripley & Bond 1996), one close to sea-level and the other at an altitude of 870 m, and there were apparently no further observations until those by the OSME survey of spring 1993, the results of which are presented here.

DESCRIPTION

Socotran birds differ from populations of *juncidis* chiefly in the distinct greyish cast to the upperparts, notably the crown, nape, mantle and scapulars, which contrast with the distinctly rufous uppertail and uppertail-coverts. The fringes to the secondaries are pale grey rather than buff, as in *juncidis*. The supercilium of *haesitata* is perhaps less prominent and greyer (reducing the impression of the 'bare-faced' appearance typical of *juncidis*) and the sides of the face lack the warm buffy tones of *juncidis*. The tail pattern and colouration, and entire colouration of the underparts show no obvious differences from *juncidis*.

Soft Parts (from Ripley & Bond 1966): iris tawny; bill blackish with cutting edge of upper and lower mandible yellowish to pale yellowish-horn; feet pale flesh. Males have inside of mouth bluish-black while in females this is flesh-coloured.

Measurements No birds were trapped, but Ripley & Bond (1966) give measurements for six birds caught in 1964: five males had a wing length of 45-50 mm (mean 47.6) and a female a wing length of 43 mm; weight 6-8 g. The species had the same wing-formula as *juncidis*.

VOICE

The characteristic song consists of an emphatic, loud 'chip' or 'chit' repeated monotonously during undulating display-flights over the breeding territory, but sometimes given from a prominent perch on a bush. The notes become shorter and quicker as the song progresses, a fact also noted by Ogilvie-Grant & Forbes (1903). Some observers thought this note was slightly different from that of *juncidis*, being likened to two stones being clicked together, and this was borne out when a recording made near Socotra airport was compared with a recording made by K. Mild at Jericho, Palestine. The individual notes of the Socotra bird are shorter and harsher, more metallic or drier, and the pause between notes is shorter. However, recordings of *juncidis* in various parts of its range show that the frequency of notes can vary (Cramp 1992).

Another note, possibly an alarm call, delivered when perched before or after song-flight, was transcribed as 'phut'. It has a spitting or spluttering quality and is audible at close range only. Forbes-Watson also mentions a quiet and subdued 'tititi...', uttered after alighting or at the end of a song delivered from a bush. (Ripley & Bond 1966).

STATUS AND DISTRIBUTION

Survey records of 1993 and those of Ogilvie-Grant & Forbes (1903) and Forbes-Watson in 1964 (Ripley & Bond 1966) do not suggest that the species is widespread. The survey found it fairly common at three sites: Ras Diblih, Hakari wells and the dunes west of the airport. Large areas of the island, including much coastal habitat, have never been visited by ornithologists and may be suitable for the species. However, in several apparently suitable areas it seemed to be absent, notably the coastal halophytic scrub near Ras Momi where the Socotra Warbler *Incana incana* was a common – indeed the only – bird species. It is possible that the distributions of the cisticola and warbler are mutually exclusive, though, if so, the reasons are not clear.

Forbes-Watson found an unspecified number of birds in light scrub below the foothills of Ras Hebak, some 2 km west of Hadibu, and he also found a family group of two adults and three juveniles on an upland meadow near Adho Dimellus, at an altitude of 870 m, on 16 and 17 April 1964. Our survey recorded the species on three dates at three sites: 11 birds were seen at Hakari wells on the southern coastal plain, 3 April, 10 were seen at Ras Diblih on the southern coastal plain, 4 April, and 15 were found on the northern coastal plain just west of Socotra airport, 6 April. At these localities it was the commonest passerine.

Ogilvie-Grant & Forbes (1903) found Socotra Cisticola only on the southern part of the Hadibu plain between the Hanetu river and base of the Haggier mountains.

HABITAT

All the survey observations were made in similar habitats: low sandy dunes and flats with sparse, dwarf halophytic vegetation and scattered tamarisk *Tamarix* sp., mostly on the dune hummocks. All sites were less than 5 m above sea-level. Forbes-Watson (Ripley & Bond 1966) described the habitat of his upland observation as 'short grass meadow with clumps and scattered bushes, with a stream flowing through', and mentioned that the birds also 'foraged over the edge of this plateau where the bush was thicker'. Ogilvie-Grant & Forbes (1903) found the species on stony ground covered with thick, bush-like grass 60 cm high, interspersed with larger bushes.

BREEDING

No evidence of breeding, other than song-flight, was observed during the survey but, as noted above, Forbes-Watson found a family group of two adults

and three juveniles, 16-17 April 1964. Ogilvie-Grant & Forbes (1903) found no evidence of breeding in December and January.

ACTIVITY

At all sites where the species occurred it was readily encountered, even at mid-day, undertaking active song-flights and singing from exposed perches. This bird was very similar in its behaviour to *C. juncidis*. Forbes-Watson (Ripley & Bond 1966) noted foraging in bushes, but at a lower level than Socotra Warbler and thought it doubtful that the two species compete.

CONSERVATION AND THE INFLUENCE OF MAN

With a total of some 36 birds at three sites the survey helped to establish the cisticola as a species threatened on a global scale, with a status classified as vulnerable (IUCN Category D). This is afforded to those species that have a world population of fewer than 1,000 mature individuals (Collar *et al.* 1994). Even though many potential sites for the species were not visited, it is our best judgement that the population would satisfy this criterion. Two other Socotran species, the Socotra Starling and Socotra Bunting, also fall into this category. The most urgent conservation requirement is a full survey of all coastal and lowland habitats to establish the full range (and population) of the species. These habitats are likely to be the most threatened if developments, including those to support tourism, start to take place on the island. It is essential that such developments avoid areas where this globally threatened bird occurs.

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Sandgrouse (1996) 17: 148-150

The Socotra Sunbird *Nectarinia balfouri*

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The Socotra Sunbird *Nectarinia balfouri*, previously *Cyanomitra balfouri* (Sclater and Hartlaub 1881) is endemic to Socotra. It is the most common of the endemic bird species, being widely distributed from sea-level to at least 1,370m (Ripley & Bond 1966). It is found in areas with a scattering of trees and bushes, but is most abundant in areas of more substantial vegetation. It is unusual but not unique amongst the Nectariniidae in that it exhibits no obvious sexual dimorphism. The observations made by the OSME survey of spring 1993 are presented here.

DESCRIPTION

The sexes are similar and usually inseparable in the field, except on occasions when males are singing and displaying their yellow pectoral-tufts. A relatively large, deep-chested, robust sunbird, with a stout bill and thick legs. An adult near a nest is shown in Plates 28 and 29.

Plumage: crown dull brown (perhaps somewhat darker in presumed male) streaked greyish-white, extending through nape onto mantle. Ear-coverts darker than crown, streaked greyish-white. Lores sooty black, with this colouration extending around eye. Thin greyish-white supercilium extending behind eye to rear of ear-coverts. Narrow sooty black moustachial and striking white sub-moustachial stripe broadening markedly towards cheeks. Sooty black malar stripe bordering dark grey, somewhat mottled throat. Sooty black centres to upper-breast feathers broadly fringed white, creating a scaly pattern recalling Cyprus Warbler *Sylvia melanothorax*. Rear-flanks pale greyish-brown. Belly and undertail-coverts white. Mantle brown to grey-brown. Coverts dull brown with paler, greyer tips to lesser and median coverts, fringes to greater coverts greyish-tan. Tertials dark grey-brown, fringed pale grey-brown. Secondaries dull brown with pale greyish-white fringes, some with an olive sheen, forming pale wing-panel. Primaries dark brown; primary-projection beyond tips of tertials, very short. Tail notched, blackish-brown with pale tips to two outer-feathers and white webs to outer tail-feathers.

Soft parts: iris reddish-brown. Bill black, moderately decurved and thick-based around nostrils. Legs and feet black. Juvenile similar to adult but iris brown (not reddish-brown), lower mandible pale yellowish. Feet dark grey with pale soles (Ripley & Bond 1966).

Measurements: Biometric data from one adult netted on Jabal Jaaf, 4 April 1993 is as follows: (lengths are in mm, weight in grammes):

Wing	Tail	Max. tarsus	Bill to feathers	Bill and head	Weight
59.0	45.0	21.5	19.1	36.5	10.5

VOICE

The frequently delivered call note is a squeaky, strident 'zii' or 'zee'. An apparent alarm or territorial dispute call is a repeated harsh, grating 'tchee-up' or 'tchee'. The song, which may either be delivered in short bursts or be of a longer duration, is usually delivered from a prominent perch. It comprises a series of quick jangling notes fairly typical of sunbirds. The Socotra Sunbird has also been noted by Ogilvie-Grant & Forbes (1903) to mimic the calls of other birds, especially that of Socotra Warbler *Incana incana*.

STATUS AND DISTRIBUTION

Common and widespread in most areas with scattered trees. Not present on the bare limestone plateaux (Ripley & Bond 1966) and probably absent from the sparsely vegetated southern Noged plain. Occurs from sea-level up to at least 1,370m (Ripley & Bond 1966).

HABITAT

This species is most abundant in densely wooded areas, e.g. Wadi Ayhaft, where the dominant tree species include *Rhus thyrsiflora, Buxus hildebrandtii, Carphalea obovata* and *Sterculia* spp. (A. Miller *pers. comm.*) It is also common on more open, sparsely wooded rocky hillsides where *Adenium obesum socotranum* and *Euphorbia arbuscula* trees are often present. In some montane areas it occurs in box scrub.

FOOD

From stomach contents of collected birds and field observations by Forbes-Watson (Ripley & Bond 1966) it was noted that the diet consists predominantly of arthropods, mainly insects but also small spiders. Vegetable material is apparently also an important constituent of the diet and includes small fruit and seeds. Forbes-Watson also recorded an immature bird feeding on fruit from a *Euphorbia* bush, but did not see any visiting flowers. During the survey an observation of apparent nectar feeding was made, one bird visiting the flowers of *Calotropis procera*. Given the other information available, nectar is perhaps a less important constituent of the diet than might be expected, but this remains speculative and further information is needed.

BREEDING

Eggs undescribed. Nesting probably occurs from January to May and perhaps beyond.

A nest examined, 30 March 1993 at Ras Hebak, was sited at a height of approximately 2.5 m in a *Euphorbia arbuscula* tree, on a rocky hillslope at 100 m altitude. This nest contained three pulli approximately four days old. Two juveniles were observed on the Hamadiroh plateau, 31 March, indicating that eggs had been laid at the beginning of March, perhaps earlier. Ogilvie-Grant & Forbes (1903) observed a family party, including two or three well-grown fledged young, 5 February, indicating a laying date in early January. Ogilvie-Grant & Forbes found a used nest from which the young had flown, 10 February. Forbes-Watson in 1964 (Ripley & Bond 1966) found a nest with young as late as 1 May.

The nest is dome-shaped, about 8cm high and 6cm wide, with a large oval entrance, usually concealed in the stems or branches of a tree. The entrance is 4-6 cm high and 2-4 cm wide. The nest is constructed from fine, loosely woven grasses and cobwebs, which is extensively lined with woolly white plant material and possibly goat hair.

During 1¼ hours of observation at the nest, 30 March, five nest visits were noted. Adults were seen removing faecal sacs on two occasions. Both birds frequented an area within a radius of about 80 m from the nest. Calling was frequent, the male occasionally singing.

ACTIVITY

Most commonly seen singly or in pairs. Noisy territorial chases observed. Often actively foraged for food in trees and shrubs.

CONSERVATION AND INFLUENCE OF MAN

Overgrazing and browsing by introduced livestock may have diminished the extent of primary habitat available to this species, which is most common in more wooded localities. However, it persists in areas with fairly sparse vegetation, so there would appear to be no immediate threat to the species.

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Sandgrouse (1996) 17: 151-154

The Socotra Starling *Onychognathus frater* and Somali Starling *O. blythii*

R. F. PORTER AND R. P. MARTINS

Two resident species of starling occur on Socotra, the endemic Socotra Starling *Onychognathus frater* (also called Socotra Chestnut-winged Starling) and the Somali Starling *Onychognathus blythii* (also called Somali Chestnut-winged or Brown-winged Starling), which also occurs in northern Somalia, northern Ethiopia and Eritrea (Dowset & Forbes-Watson 1993; Hall & Moreau 1970). The Socotra Starling is local and uncommon and is, from a conservation perspective, most appropriately classified as 'vulnerable', while the Somali Starling is common and widespread throughout the island.

Ripley & Bond (1966) suggest that as Socotra Starling is endemic to the island, it evolved from a common ancestor that arrived from the African mainland a considerable time before Somali Starling. During this time-period biological mechanisms would have developed in the pioneer species to prevent random mating with Somali Starling, when it colonised the island.

The observations of the OSME survey of spring 1993 are presented here.

DESCRIPTION

Both species are large with fairly broad wings. Structurally, their relatively long necks, slim bodies and long tails combine to produce a rather attenuated appearance. The plumage of both species is predominantly glossy and iridescent blue-black, excepting pale chestnut, or dull orange primaries which are conspicuous in flight. The two species are illustrated in Plates 33 and 34.

Socotra Starling

Sexes alike. The smaller species, contrasting with its congener in having a much shorter, square-ended tail (although corners sometimes slightly rounded) and a longer, thinner bill with culmen slightly down-curved at the tip.

Plumage: blue-black with iridescent bottle-green sheen to head, mantle and wing-coverts, although in certain light conditions shows a sooty-brown cast to entire plumage. Predominantly chestnut primaries not usually visible in closed wing. Juvenile similar to adult but with slightly shorter tail, greyish-black bill and duller primaries.
Soft parts: bill, legs and feet black; irides dark brown with a reddish tone.

Somali Starling

Sexes differ. Slightly larger than Socotra Starling with longer, narrower-based and markedly graduated tail and shorter, stouter bill-shape, recalling Magpie *Pica pica*.

Plumage: iridescent blue-black plumage of male similar to Socotra Starling, although more glossy. The chestnut in primaries also extends onto outer secondaries and is always visible as a thin panel on the closed wing (unlike in Socotra Starling). No difference between the two species in the richness, tone or extent of chestnut in the spread primaries was detectable in the field, but in skins the Socotra Starling is slightly darker. Adult female differs from male in uniform light grey head, chin, throat and upper-breast, forming a sharply defined pectoral band. At close range shows a diffuse whitish ring around eye. Juveniles noticeably shorter-tailed and sooty brown (but with dull orange primaries). In 'young' females the head and neck is black as in the males. (Ogilvie-Grant & Forbes 1903).
Soft parts: bill, legs and feet black; colour of irides not precisely noted but appeared dark.

Measurements: Neither species was trapped, but the following measurements of birds caught in 1964 by Forbes-Watson are presented in Ripley & Bond (1966). All measurements are in millimetres.

Socotra Starling (weight 100 g)

		Wing	Tail	Culmen from feathers
Male	Range	157-163	139-146	28-32
(N=7)	Mean	159.5	141.8	29.2
Female	Range	148-156	127-136	27-29
(N=9)	Mean	151.5	131.2	27.8

Somali Starling (weight 100 g)

		Wing	Tail	Culmen from feathers
Male	Range	165-175	172-190	23-25
(N=10)	Mean	171.0	177.0	24.3
Female	Range	155-164	155-169	22-24
(N=7)	Mean	159.2	163.2	22.6

VOICE

Both species are very vocal, the calls of Socotra Starling tending to be louder. At times Somali Starling was exceptionally vocal, especially when flying in flocks.

Socotra Starling: the most frequent call was a pure, far-carrying whistle 'tyooo' (or 'pseeeoo' or 'psoo') recalling the calls of Golden Plover *Pluvialis apricaria* or Bullfinch *Pyrrhula pyrrhula* to the ears of some observers. A harsh 'scraich' alarm note was also heard.

Somali Starling: the most frequent call, often delivered in flight, was a musical high-pitched 'tleep' (or 'chuit'). Other calls included a soft 'chee-wee' or 'chwee' and a harsh alarm note similar to that of Socotra Starling. Oglivie-Grant & Forbes (1903) transcribe the call note as 'chee-chee-chee-che-whoup'.

STATUS AND DISTRIBUTION

Both species appear widespread and resident on Socotra, occurring up to 1,100 m with Somali Starling, the more common (by 13:1 from survey observations).

HABITAT

Both species occur throughout the island, usually where trees are present, though these may only be isolated groups on otherwise open plains or rocky hillsides. Trees are apparently more important for Socotra Starling, which was most common in the wooded habitats at Wadi Ayhaft. However, the species was also seen in gardens in the town of Hadibu. The presence of water did not appear to influence the distribution of either species.

FOOD

Socotra Starling was seen feeding on *Zizyphus* berries, the fruit of a *Ficus* sp., small red berries probably from a Dragon's Blood Tree *Dracaena cinnabari* (also fed to accompanying juveniles) and the white pea-like seeds from an unidentified legume which were obtained by splitting pods open. A pair feeding actively on *Ficus* consumed two fruits per minute during a five minute period. Forbes-Watson observed the species feeding on insects, and grasshoppers have been found in stomach contents (Ripley & Bond 1966).

Somali Starling was seen feeding on fruit-bearing trees. Ogilvie-Grant & Forbes (1903) recorded the species feeding on a variety of fruits, especially figs and the berry of Dragon's Blood Tree, grasshoppers and other insects. Beetles and large black seeds have been recorded in stomach contents (Ripley & Bond 1966). Unlike Socotra Starling, the species often appears remarkably closely associated with cattle, often foraging on them, presumably for ticks or other parasites. The highly mobile and flocking habits of the species and the frequency of its occurrence in areas lacking substantial cover perhaps suggest greater adaptability to man-managed environments.

The foraging behaviour of Socotra Starling is methodical, recalling the behaviour of a thrush *Turdus* sp. Birds in groups of up to five individuals were observed feeding within the canopy (or leaf-cover) of trees for up to 20 minutes.

BREEDING

In the first week of April 1993 many Socotra Starlings were feeding fledglings or recently-fledged young. Several nests were located in natural cavities in the roof and walls of a limestone cave at 550 m on rocky slopes above the Hamadiroh plateau. Nests, which were only partially visible, were untidy, recalling those of Starling *Sturnus vulgaris* in construction, containing much grass and small sticks.

Two pairs were giving alarm calls. These observations suggest that the species may be a colonial breeder. No evidence of breeding of Somali Starling was recorded in April, and Forbes-Watson did not mention nesting activity in spring 1964 (Ripley & Bond 1966). Furthermore, Ogilvie-Grant & Forbes (1903) suggest the breeding season was over by December. The breeding season of the two starlings would therefore seem to be quite separate.

ACTIVITY

Both species were encountered in pairs and small groups, Somali Starling not infrequently in flocks of at least 20 individuals. The flight of this species often appeared buoyant and masterful, but is also direct and undulating when covering substantial distances: brief bursts of wing-beats are interspersed by long glides and occasional abrupt changes in direction.

The Socotra Starling is shyer, more closely associated with trees and seldom forages on the ground, a fact also noted by Forbes-Watson (Ripley & Bond 1966); but Ogilvie-Grant & Forbes (1903) found the Socotra Starling to be the tamer species. No evidence of competition between the two species was observed.

CONSERVATION AND INFLUENCE BY MAN

The endemic Socotra Starling merits the category 'vulnerable' when considering its world status. This category is applied to those species where less than 1,000 mature individuals exist (Collar *et al.* 1994). During the survey, 41 individuals were counted, including an unknown number of juveniles. Though many potential sites where the species could occur were not visited, the judgement made during the survey was that the population satisfies this criterion. There is apparently no threat to nesting sites, but woodland with fruit-bearing trees must be preserved for the population to persist. Conversely, the Somali Starling is a common species which has undoubtedly benefited from pastoralism.

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Sandgrouse (1996) 17: 155-157

The Socotra Bunting *Emberiza socotrana*

K. M. MORTON

The Socotra Bunting *Emberiza socotrana* is one of two resident bunting species on Socotra (the other being African Rock Bunting *E. tahapisi* of the supposed endemic sub-species *insularis*). The 1993 OSME survey (30 March to 6 April) recorded only two individuals at one site, indicating that this is apparently the rarest Socotran endemic. The survey observations are presented here.

DESCRIPTION

The following description relates to the species in general but is substantially informed by a female seen by all observers. The bird is shown in Plate 35.

Sexes similar, although females are generally duller, as are first-year birds (Byers *et. al. 1995*). A small bunting with markedly pale underparts, brown upperparts with uniform rich russet coverts (i.e. lacking the pale fringes typical of many *Emberiza* species) and a complex black-and-white head pattern. Size, shape and structure recall Rustic Bunting *E. rustica*, while general plumage pattern most closely resembles Cape Bunting *E. capensis*, which is extensively distributed through (mainly southern) Africa.

Head: very thin almost white central crown-stripe, often indistinct, originating on the crown or forehead and extending to junction of crown and nape. Broad white supercilium, broadening substantially behind eye, extending down side of nape behind ear-coverts; distinct black eye-stripe broadening behind the eye and curving down behind ear-coverts; black moustachial and white sub-moustachial stripe bordering lower edge of ear-coverts, the former meeting eye-stripe and thus forming part of a complete black surround to ear-coverts; thin black malar-stripe broadening slightly at sides of throat; ear-coverts brownish buff.

Upperparts: mantle and scapulars warm brown with moderately distinct darker brown streaking on mantle; lower mantle and uppertail-coverts greyer, merging with extensive unstreaked whitish upper rump and lower mantle/back (prominent in flight). Lesser, median and greater coverts uniform rich chestnut brown, excepting paler, greyish fringes and blackish subterminal spots on three innermost greater coverts; alula dark and distinct; secondaries dark brown with pale fringes to outer webs; primaries dark brown to black with thin pale tips; four primary tips visible in primary projection; tertials brownish black with broad fulvous fringes; tail dark brown to black with pale fringes to entire length of feathers, but lacking white outer webs to the outer pairs of tail feathers typical of many *Emberiza* species.

Underparts: chin, throat and upper breast creamy buff with pinkish or rufous wash extending across upper breast as indistinct streaking; rest of underparts uniform creamy white.

Soft parts: legs and feet pale flesh; upper mandible dark, lower mandible yellowish-buff with blackish tip. Irides brown; indistinct whitish orbital ring.

VOICE

No vocalisations were heard during the survey. Forbes-Watson noted the call as a high thin whistle (sometimes repeated two or three times) followed by a soft gurgle. This he expressed as 'tseep.....guruguruguru' (Ripley & Bond 1966). Ogilvie-Grant and Forbes (1903) described the song as a ringing and metallic whistled 'hue-he, hu-hey', recalling Golden-winged Grosbeak *Rhynchostruthus socotranus*.

STATUS AND DISTRIBUTION

Endemic to Socotra. In 1964 Forbes-Watson found the species to be less common than *E. tahapisi*. He also noted a preference for higher altitudes than those typically frequented by *tahapisi*, a factor which perhaps limits the species distribution. However, Forbes-Watson also recorded non-breeding flocks at low altitudes. The survey encountered only two individuals at a single site, although coverage of high altitude locations was rather limited.

HABITAT

The two individuals observed frequented a grassy boulder-strewn plateau with scattered patches of low shrubs at about 500 metres. The birds were loosely associated with a small flock of *E. tahapisi*. Forbes-Watson, comparing the habitat of *socotrana* with that typically frequented by *tahapisi*, recorded that the species preferred open hillsides, whereas *tahapisi* favoured rocky gullies and dry water-courses. He found *socotrana* feeding within 'thickets' but did not observe such behaviour in *tahapisi*. Forbes-Watson did not record *socotrana* and *tahapisi* together at any time during 15 weeks.

FOOD

Forbes-Watson noted the stomach contents of 17 birds collected in 1964 as small seeds and grit.

BREEDING

No breeding activity was observed. Forbes-Watson did not record any information on breeding when on Socotra from early March to mid-June. This period is apparently late in, or after, the breeding season, as Forbes heard birds singing on 6th and 15th February (and before the first date). There is no other information on the breeding biology of this species and the nest and eggs remain undescribed.

ACTIVITY

Forbes-Watson recorded that the species perches more readily than *tahapisi*, is more approachable and less prone to long escape flights when flushed.

CONSERVATION AND INFLUENCE OF MAN

With only two birds recorded, the very limited survey observations concur with the view that this is a threatened species with a vulnerable status (IUCN Category D). This status is defined by the existence of less than 1,000 mature individuals (Collar *et. al.* 1994). Although many areas potentially suitable for the species were not visited, it seems likely that it satisfies this criterion. Further work is needed to establish a full understanding of the distribution and population of this species.

ACKNOWLEDGEMENTS

I would like to express my thanks to Guy Kirwan and Rod Martins for helpful comments on the description and for information contained in Byers *et al. (1995)* when still in press.

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Sandgrouse (1996) 17: 158-164

Biometric data of birds in southern Yemen and Socotra, spring 1993

J. N. DYMOND

During the OSME survey of southern Yemen and Socotra in spring 1993, mist netting was undertaken on 12 dates at six sites in southern Yemen and three sites on Socotra. Biometric data were collected for 114 individuals of 30 species. The purpose of this paper is to present this data. Biometric data for an additional six species are presented in separate papers in this issue of *Sandgrouse*.

In the following tables EURING age codes are used as follows : 3 = hatched during year of capture (i.e. 1993); 4 = hatched before year of capture but exact year unknown; 5 = hatched during previous calendar year (i.e. 1992). All measurements are given in millimetres or grammes. Fat scores on a 0–5 scale are given for migrant passerines; 'n/r' denotes 'not recorded' and * indicates suspended moult. Primaries are numbered ascendantly.

Common Sandpiper *Actitis hypoleucos*

One first-winter bird west of Fikhah (north coast of Socotra), 2 April.

Age	Wing	Weight
5	117.0	65.5

Laughing Dove *Streptopelia senegalensis*

Two individuals of the small, endemic sub-species *socotrae* at Wadi Ayhaft (Socotra), 5 April. One of nominate *senegalensis* at Wadi Mararah (extreme eastern Yemen), 28 April.

	Age	Sex	Wing	Weight	Primary moult score
socotrae	4	?	126.0	66.5	29
socotrae	4	?	128.0	67.0	44
senegalensis	4	?	141.0	91.8	n/r

African Scops Owl *Otus senegalensis*

One at Wadi Habban (Yemen), 27 March.

Age	Sex	Wing	Bill to base of culmen	Max. tarsus	Tail	Weight
4	fem?	141.0	16.1	34.7	63.5	63.5

Primaries	1st	2nd	3rd	4th	5th	6th	7th	8th
	-23	-4	L	L	-5	-13	-19.5	-27.5

Slight emargination was present on 2nd, 3rd and 4th primaries.

Plain Nightjar *Caprimulgus inornatus*
One at Jabal Iraf (Yemen), 22 March. See Dymond (1996).

Forbes-Watson's Swift *Apus berliozi*
One at Jabal Jaaf (Socotra), 3 April. See Porter, *et al.* (1996).

Yellow-vented Bulbul *Pycnonotus xanthopygos*
Eighteen at three sites in Yemen: Jabal Iraf, 22 March, Wadi Himarah, 8 April and Wadi Mararah, 28, 29 April.

Age	Wing	Weight	Primary moult score
4(all)	88-100 (mean 93.4)	28.9-35.8 (mean 32.2)	0 (all)

Wing measurements match those given in Cramp (1988), but weights are markedly lower than a series from Israel, 35–46 (mean 44, sample 56).

Black Bush Robin *Cercotrichas podobe*
One at Wadi al Khabt (Yemen), 24 March and one at Wadi Himarah (Yemen), 8 April. Arabian breeders are sub-species *melanoptera*.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	89.0	39.4	30.7	104.0	22.5	0	full
4	?	89.0	38.9	30.7	104.5	22.7	0	full

Blackstart *Cercomela melanura*
Two at Wadi Mararah (Yemen), 28 April.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	male	82.0	36.1	27.1	60.5	17.0	0	none
4	fem.	76.0	37.1	24.6	54.0	15.1	0	full

Sexed in the hand by cloacal examination: Cramp (1988) gives wing lengths of 81–86 for males and 76–82 for females.

Little Rock Thrush *Monticola rufocinerea*
Three at Jabal Iraf (Yemen), 22 March. Arabian breeders are sub-species *sclateri*.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	85.0	43.2	28.2	59.0	25.0	0	none
4	?	84.0	42.7	29.0	60.5	25.0	0	small
4	?	85.0	41.5	28.2	58.0	24.4	0	small

Graceful Prinia *Prinia gracilis*
One at Wadi Himarah (Yemen), 8 April.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	47.0	26.8	19.7	60.5	6.8	0	n/r

Arabian Warbler *Sylvia leucomelaena*
One at Wadi Habban (Yemen), 27 March.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	male	71.0	35.7	24.4	69.5	14.3	0	slight

Barred Warbler *Sylvia nisoria*
One at Wadi Himarah (Yemen), 8 April.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	91.0	37.5	27.7	80.0	29.9	0	4

With a fat score of 4 it is not surprising that this bird's weight was toward the upper end of the range given in Cramp (1992) for March–April (21.0–34.2); onward migration was clearly imminent.

Blackcap *Sylvia atricapilla*
Ten at three sites in Yemen: Jabal Iraf, 22 March, Wadi al Khabt, 24 March and Wadi Himarah, 8 April. Weights varied from 15.4 to 21.4 g and five individuals had fat deposits, with scores of 1, 3, 3, 4 & 4.

Brown Woodland Warbler *Phylloscopus umbrovirens*
Five at Jabal Iraf (Yemen), 22–23 March.

Age	Sex	Wing	Head +bill	Bill to skull	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	56.0	29.0	12.6	21.8	40.5	6.8	0	n/r
4	?	54.0	28.4	12.5	20.8	44.0	8.1	0	n/r
4	?	54.0	27.8	12.1	21.1	43.0	7.5	0	n/r
4	male	58.0	28.6	12.6	21.6	45.0	8.1	0	n/r
4	?	54.0	28.3	12.3	21.1	42.5	7.5	0	n/r

The male was in full song adjacent to the net. Wing formulae (primaries numbered ascendantly) were as follows:

Primaries	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Emargination
A	pc+11	8	2	L	L	L	1	4	5	6	3rd 6th
B	pc+11	7.5	2	L	L	L	0.5	3	5	7	3rd 6th
C	pc+9	8	2	L	L	L	2	3.5	n/r	n/r	3rd 6th
D	pc+10	10	3	L	L	L	1	4	n/r	n/r	3rd 6th
E	pc+11	8	2	L	L	L	1	2	n/r	n/r	3rd 6th

Willow Warbler *Phylloscopus trochilus*
One at Wadi Himarah (Yemen), 8 April, was sexed as a male on wing length.

Age	Sex	Wing	Weight	Primary moult score	Brood patch
4	male	69.0	11.5	0	3

African Paradise Flycatcher *Terpsiphone viridis*
Four at Wadi Mararah (Yemen), 28–29 April. Arabian breeders are sub-species *harterti*.

Age	Sex	Wing	Head +bill	Bill width at base	Bill width at nostril	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	fem.	72.0	35.5	n/r	6.2	18.0	75.5	12.2	0	n/r
4	fem.	74.0	35.6	8.3	6.1	18.0	76.5	12.4	0	n/r
4	male	81.0	36.7	8.4	6.3	19.2	95.0	11.9	0	n/r
4	male	80.0	35.6	7.9	6.1	18.8	116.5	13.2	0	n/r

Spotted Flycatcher *Muscicapa striata*
One at Wadi Mararah (Yemen), 28 April.

Age	Sex	Wing	Weight	Primary moult score	Fat score
4	?	89.0	14.7	0	2

Nile Valley Sunbird *Anthreptes metallicus*
Three at Wadi Himarah (Yemen), 8 April.

Age	Sex	Wing	Head +bill	Max tarsus	Tail excl. central pair	Central tail ff	Weight	Primary moult score	Brood patch
4	fem.	53.0	25.4	16.3	34.0	34.0	7.1	0	full
4	male	55.0	26.3	16.7	40.0	61.5	7.5	0	none
4	male	56.0	26.5	17.0	38.5	growing	7.5	0	none

Shining Sunbird *Nectarinia habessinica*
Four at Wadi Mararah (Yemen), 28 April.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	male	73.0	38.4	18.4	49.5	10.6	0	n/r
5	male	70.0	37.8	n/r	47.0	12.0	0	n/r
4	fem.	64.0	36.1	18.8	41.0	10.0	0	n/r
4	fem.	64.0	37.0	17.6	41.5	9.5	0	n/r

Orange-tufted Sunbird *Nectarinia osea*
Two at Wadi Mararah (Yemen), 28 29 April.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	male	54.0	32.6	17.4	37.0	7.2	0	n/r
4	male	54.0	33.3	17.6	38.5	5.1	0	n/r

Socotra Sunbird *Nectarinia balfouri*
One at Jabal Jaaf (Socotra), 4 April. See Showler & Davidson (1996).

White-breasted White-eye *Zosterops abyssinica*
Fifteen, twelve in Yemen (at Jabal Iraf, 22–23 March and at Wadi Mararah, 28–29 April) and three at Jabal Jaaf, Socotra, 4 April. Yemen birds are sub-species *arabs*; those on Socotra are the endemic sub-species *socotrana*.
Z. a. arabs (Yemen)
(n = 12)

Age	Wing	Head +bill	Max. tarsus	Tail	Weight
4(all)	55-59	27.1-28.9	19.1-20.1	37-44	8.5-10.4
mean	57.0	28.2	19.5	40.4	9.6

Z. a. socotrana (Socotra)

Age	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score
5	52.0	28.5	20.2	42.0	10.8	14
4	58.0	29.4	20.0	44.0	10.7	0
4	57.0	28.3	19.2	lost	12.0	0

Socotra Sparrow *Passer insularis*
Twelve (eight adults and four juveniles: at least two considered to have fledged recently - probably early in 1993) on Socotra, one near Fikhah, 2 April; all others at Wadi Ayhaft, 5 April. Two of the females had brood patches.

	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score
Unknown sex, age 3(5); n = 3						
	73-77	33.6-34.5	23.7-25.1	51.5-58.5	23.9-28.0	0
mean	75	34.1	24.3	55.3	25.7	
Male, age 4; n = 4						
	75-79	33.5-35.8	23.7-25.5	53.5-61.0	25.0-29.2	5-19
mean	77	34.8	24.6	58.6	27.5	
Male, age 5; n = 1						
	74.0	35.0	21.0	57.0	27.5	0
Female, age 4; n = 4						
	72-76	34.1-36.0	23.6-24.1	58.0-60.5	26.0-29.1	0-23
mean	74.7	34.8	23.8	59.2	27.1	

Rüppell's Weaver *Ploceus galbula*
Ten in Yemen: five at Jabal Iraf, 22 23 March, one at Wadi al Khabt, 24 March and four at Wadi Himarah, 8 April.

Age	Sex	Sample	Wing	Weight
4	male	3	75-77	24.3-26.8
		mean	76.3	25.5
5	male	1	68.0	20.7
4	fem.	5	71-75	21.6-27.0
		mean	73.2	23.4
3/5	fem.	1	72.0	23.0

Arabian Waxbill *Estrilda rufibarba*
One on Jabal Iraf (Yemen), 22 March.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	47.0	22.2	16.2	48.5	8.5	0	full

Arabian Serin *Serinus rothschildi*
One at Jabal Iraf (Yemen), 22 March.

Age	Sex	Wing	Head +bill	Bill depth	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	66.0	26.3	7.2	17.6	54.0	14.0	0	full

Golden-winged Grosbeak *Rhynchostruthus socotranus*
Four, two at Wadi Ayhaft (Socotra), 5 April and two at Wadi Mararah (Yemen), 28, 29 April. Socotran birds are nominate *socotranus*; those in Yemen are percivali.

R. s. percivali (Yemen)

Age	Sex	Wing	Head +bill	Bill depth at base	Max. tarsus	Tail	Weight	Primary moult score
4	?	85.0	33.2	11.7	22.0	56.3	29.6	13
4	male	89.0	36.3	12.8	22.5	61.0	33.4	12

R. s. socotrana (Socotra)

Age	Sex	Wing	Head +bill	Bill depth at base	Max. tarsus	Tail	Weight
4	?	91.0	35.1	12.1	20.9	52.0	29.0 *
4	?	93.0	32.9	11.2	22.2	51.0	29.5

* this bird appeared to be in suspended moult: primaries 3,4,5 and 7 fresh; secondary 5 fresh; innermost tertials and greater coverts fresh.

African Rock Bunting *Emberiza tahapisi*
Three at Wadi Mararah (Yemen), 28 29 April.

Age	Sex	Wing	Head +bill	Max. tarsus	Tail	Weight	Primary moult score	Brood patch
4	?	72.0	25.3	17.6	58.0	13.2	30*	n/r
n/r	?	68.0	24.5	18.0	52.0	12.2	0	n/r
4	?	69.0	26.1	19.3	53.0	11.6	0	n/r

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Sandgrouse (1996) 17: 165-169

Mammal observations in Yemen* and Socotra, spring 1993

D. A. SHOWLER

Mammal records collected by the OSME survey during the period 16 March to 10 May 1993 are presented below. On occasions eight small mammal live-traps (baited) were set in the environs of overnight camps but trapping success was limited. A total of 20 species, 14 terrestrial mammal species and six cetacean species, were recorded.

TERRESTRIAL MAMMALS

Ethiopian Hedgehog *Paraechinus aethiopicus*

1 4 May, al-Qatn, 15°50'N 48°25'E, 780 m. One spot-lighted after dark, moving quickly across dry sandy/stony terrain. Curled into a typical hedgehog 'ball' when approached.

2 6 May, 3 km west of Shabwah, 15°23'N 47°01'E, 800 m. One long dead in dry wadi.

Distribution and comments: In Arabia it is widespread throughout the arid deserts and steppes, known in Yemen from near Aden and the Hadramawt. The two records above are from this latter region.

House Shrew *Suncus murinus*

1 16 April, Bajil, 15°04'N 43°17'E, 250 m. One foraging after dark amongst household rubbish alongside buildings.

Distribution and comments: In Arabia previously recorded in vicinity of sea ports and in Yemen only from Aden and Hodeidah. The survey record is of interest as the locality is approximately 50 km inland, to the east of Hodeidah, from which it was doubtless imported.

Trident Leaf-nosed Bat *Asellia tridens*

1 4 May, 5 km west of Tarim, 16°03'N 48°57'E, 830 m. A dead road casualty. The skull of this specimen is now in the Harrison Zoological Museum, Kent.

Distribution and comments: Widespread in Arabia but virtually absent from deserts of the interior. In Yemen previously recorded from Zabid, Lahej, Aden, Nuqub and al-Qatn.

Note: Many bats were seen throughout the survey (including Socotra) which could not be identified.

Hamadryas or Sacred Baboon *Papio hamadryas arabicus*

1 18 March, observed near Ibb, 14°05'N 43°10'E, 2,000 m.

2 23 March, Jabal Iraf, 13°07'N 44°15'E, 1,450 m. 70 on escarpment ridge, very wary as apparently shot by locals to discourage crop damage.

3 28 March, Yashbum/Wadi Habban, 14°20'N 46°59'E, 1,200 m. 56 (including 10

** NB. this paper includes records from the entire Republic of Yemen and not just southern Yemen*

small juveniles) on steep rocky slope.
4 16 April, Wadi Shabdh, 15°11'N 43°25'E, 300 m. 12 high up on rocky hillside.
Distribution and comments: Locally distributed in hills and mountains up to 2,000 m in south-west Saudi Arabia and Yemen. Also occurs in north-east Africa, Somalia, Sudan and Ethiopia.

Red Fox *Vulpes vulpes arabica*
13 observations from sea-level to 2,900 m. Most sightings reflect its previously known range but the record from Wadi al-Masilah, 15°14'N 51°08'E, is a significant, but not unexpected, extension in south-east Yemen.
Distribution and comments: Common and widespread in Arabia, although absent from much of the Rub' al-Khali.

Rüppell's Sand Fox *Vulpes rueppelli sabaea*
1 28 March, Yashbum/Wadi Habban. One at dawn along stony wadi bed with dense patches of *Salvadora persica* scrub.
2 29 March, Wadi Hajr, 14°06'N 48°42'E, 30 m. One at dawn.
3 26 April, Ras Fartak hills, 15°52'N 51°57'E, 600 m. One at dawn on rocky slope.
Distribution and comments: Widespread in Arabia but absent from most of western Saudi Arabia. The two previous Yemen records are from locations approximately 16°N and 45°-48°E. The three survey records extend the known range in Yemen to the south and east.

Hyrax *Procavia capensis jayakari*
1 23 March, c. 10 km north-west of Jabal Iraf, 13°09'N 44°12'E, 1,000 m. One seen.
2 23 March, Jabal Iraf. One seen on escarpment ridge.
3 29 April, Wadi Mararah, 16°39'N 52°55'E, 360 m. One seen, one heard.
4 9 May, Kawkaban, 15°31'N 43°52'E, 2,800 m. One seen.
Distribution and comments: This sub-species is found in mountainous areas in the west Yemen highlands, Dhofar, southern Oman and western Saudi Arabia. All survey records fall within the known range. *P. capensis* also occurs north to Syria and in north-east and east Africa southwards to Kenya.

Cape Hare *Lepus capensis*
17 records from sea-level to 2,400 m, the most easterly observation being at Wadi Sh'hout, 16°20'N 50°43'E, where a three-quarter grown leveret was observed, on 1 May. Almost all other records were from western Yemen in the highlands and the coastal Tihamah plain.
Distribution and comments: In Yemen this species has been recorded mainly from the western highlands and the Tihamah but is also known from Dhofar.

The survey record from Wadi Sh'hout lies within a large area from which there are no previous records of this species, presumably due to the paucity of naturalists visiting this region. Occurs throughout most of Arabia and is also widespread throughout North Africa, Asia Minor and eastwards to the Indian sub-continent.

Indian Crested Porcupine *Hystrix indica*

1 7 May, Marib dam, 15°28'N 45°20'E, 1,150 m. One quill found in marshy area behind dam.

Distribution and comments: Scattered records mostly from the periphery of the peninsula but very few records from Yemen. This species occurs eastwards to the Indian sub-continent.

Rock Rat *Praomys fumatus*

1 18 March, Najd Lah Mar, 13°51'N 44°11'E, 1,850 m. Desiccated corpse found.

Distribution and comments: Endemic to uplands of south-west Saudi Arabia and north-west Yemen. The record falls within the known range.

Egyptian Spiny Mouse *Acomys cahirinus*

1 29 April, Shahrut hills west of Damqawt, 16°40'N 52°50'E, 680 m. Two spot-lighted soon after dark running along branches (up to 3 m high) of *Acacia totilis*. One on ground was seen eating large black ants. A male was caught in a live-trap positioned on a horizontal bough 40 cm above ground; the following measurements were noted: snout-vent 100 mm, tail length 105 mm.

Distribution and comments: Widespread in Arabia and Yemen although few records from the east. Recorded from Omani Dhofar, therefore the survey record from the Mahrah is not unexpected.

Golden Spiny Mouse *Acomys russatus*

1 27 April, 2 km east of al-Fatk, 16°31'N 52°43'E, 40 m. Two observed at 12.00 hours foraging in rock crevices and on boulder scree; very active and fast-moving.

Distribution and comments: Known from Sinai, a few scattered localities in Saudi Arabia, Omani Dhofar and Bayhan in south-west Yemen. The survey record is the first for the Mahrah region.

Cheesman's Gerbil *Gerbillus cheesmani*

1 23 March, Wadi al-Khabt, 13°04'N 44°24'E, 460 m. Six plus spot-lighted after dark.
2 16 April, al-Qutay', 14°53'N 43°13'E, 200 m. One road casualty; over 50 *Gerbillus* spot-lighted from vehicle at night were assumed to be of this species.

Distribution and comments: Widespread in Arabia, though absent from much of the desert interior. Widespread in west and central Yemen eastwards to the Hadramawt. The survey records fall within the known range.

King Jird *Meriones rex*

Numerous records of this usually diurnal, burrowing rodent in the west Yemen highlands. At one locality some burrows appeared to be utilised by Red-breasted Wheatears *Oenanthe bottae* as nest sites and there appeared to be a close association between these two species.

Distribution and comments: Endemic to south-west Arabia. In Yemen it is

considered common in the south-west highlands. The survey records are within the known range.

Arabian Gazelle *Gazella gazella cora*
Local tribespeople in the Ras al-'Arah area (approximately 100 km west of Aden) reported having seen gazelle in the foothills to the north in recent months. These were perhaps Arabian (Mountain) Gazelle, a species that may now be close to extinction in Yemen.

Nubian Ibex *Capra ibex*
A local hunter claimed to have shot about 70 ibex in the last year or so in the general vicinity of the hills north of Ras Fartak, south-east Yemen. In the Hadramawt area ibex skulls with horns or just the horns themselves are traditionally placed on the corners of house roofs to ward off evil spirits. This practice is unfortunately still common and could lead to the extinction of this species in Yemen.

CETACEANS

Sperm Whale *Physter catodon*
1 2 April, two observed breaching during a pelagic transect north of Ras Momi, Socotra, 12°04'N 54°20'E.

Distribution and comments: Mating and calving areas include the Arabian Sea region of the Indian Ocean around the Arabian Peninsula.

Indo-Pacific Humpback Dolphin *Sousa chinensis*
Six sightings, mostly of small groups (up to 20 individuals), swimming close inshore. There appeared to be an easterly movement of these dolphins along the coast. The most westerly observation was off Aden, 12°48'N 45°02'E, and the most easterly was off Wadi Mararah, 16°35'N 52°50'E.

Distribution and comments: Widely distributed in inshore waters of the Indian Ocean, including along the south Arabian coastline.

Short-finned Pilot Whale *Globicephala macrorhynchus*
1 2 April, during a pelagic transect off Ras Momi, Socotra. A pod of at least 20 individuals was assumed to be of this species. The Long-finned Pilot Whale *G. malaena* tends to occur in more temperate waters but cannot be ruled out.

Distribution and comments: Occurs in the Indian Ocean from Gulf of Aden eastwards to Sri Lanka and south to South Africa and Australia. The survey record is therefore within the known range.

Spinner Dolphin *Stenella longirostris*
1 31 March, offshore west of Hadibu, Socotra, 12°22'N 53°58'E. At least 40 leaping out of the water and twisting, approximately 400 m offshore.

Distribution and comments: A common species, occurring in Arabian waters of the southern Red Sea and the Arabian Sea.

Bottlenose Dolphin *Tursiops truncatus*

1 24 March, Aden Beach, 12°48'N 45°03'E, one dead on beach.
2 29 March, al-Mukalla, 14°35'N 49°15'E. School of 10 or more, 100 m offshore.
3 30 March, al-Mukalla. School of 23 or more, 100 m offshore.
4 2 April, during a pelagic transect off Ras Momi, Socotra. School of at least 30.
5 22 April, 10 km east of al-Mukalla, 14°35'N 49°17'E. Two together, 500 m offshore.

Distribution and comments: A common species in Arabian waters, both offshore and close to the coast.

Bryde's/Fin/Sei Whale *Balenoptera* sp.

1 23 April, during a pelagic transect off Sayhut, 15°14'N 51°17'E. One seen from boat 5 km offshore. Breached fully above water, landing on back. A vertical spout was briefly observed. It was not seen well enough to identify, but was clearly very large.

Distribution and comments: The Fin Whale *B. physalus* is considered rare in the northern half of the Indian Ocean. The Sei Whale *B. borealis* apparently has a similar distribution, but its latitudinal movements are thought to be less extensive. Bryde's Whale *B. edeni* is resident in the tropical to cool temperate Indian Ocean.

ACKNOWLEDGEMENTS

Many thanks to Dr Martin Perrow, ECON, University of East Anglia, Norwich, for the loan of several small mammal live-traps over the period of the survey and to Dr David L. Harrison, Harrison Zoological Museum, Sevenoaks, Kent, for his identification of the hipposiderid bat found near Tarim.

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Reptile observations in Yemen*, spring 1993

D. A. SHOWLER

Yemen has a rich reptilian fauna comprising about 80 terrestrial species (excluding those occurring on the Socotra archipelago), five species of marine turtle and one sea-snake. Many of the terrestrial species are endemic to the Arabian peninsula and arid regions immediately to the north. Several species are endemic within this region to southern Arabia which encompasses the highlands of south-west Saudi Arabia, Yemen northwards to the southern edge of the Rub' al-Khali and the Mahrah region of eastern Yemen and Dhofar, Oman.

The terrestrial reptile fauna of Yemen may be broadly summarised as follows: (numbers in parentheses refer to the number of species endemic to the Arabian peninsula/number of species endemic to southern Arabia i.e. Yemen, south-west Saudi Arabia and Dhofar.)

Testudinidae:	Tortoises: 1 species	(0/0)
Pelomedusidae:	Side-necked terrapins: 1 species	(0/0)
Agamidae:	Agamid lizards: 9 species	(7/3)
Chamaeleonidae:	Chameleons: 3 species	(2/2)
Gekkonidae:	Geckos: 25 species	(15/8)
Lacertidae:	Lacertid lizards: 11 species	(9/6)
Scincidae:	Skinks: 7 Species	(4/0)
Varanidae:	Monitors: 3 species	(1/1)
Trogonophidae:	Amphisbaenians: 1 species	(1/1)
Serpentes:	Snakes: 20 (up to 28) species	(7/4)

During the OSME survey of spring 1993 a total of 42 species of reptile was recorded: one terrapin, three marine turtles, six agamid lizards, two chameleons, 15 geckos, four lacertid lizards, five skinks, one monitor and five species of snake. Details are presented below.

Species endemic or near-endemic to Arabia are indicated with a single asterisk; those endemic to Yemen are indicated with two asterisks.

ORDER CHELONIA Terrapins, marine turtles and tortoises

One species of freshwater terrapin *Pelomedusa subrufa* occurs in Yemen. The status of the tortoise *Geochelone sulcata*, an African species, is uncertain in Yemen.

Five species of marine turtle: *Caretta caretta, Chelonia mydas, Eretmochelys imbricata, Lepidochelys olivacea* and *Dermochelys coriacea* have been recorded around the Yemeni coast and *C. mydas* is known to breed.

** N.B. this paper includes records from the entire Republic of Yemen and not just southern Yemen.*

Family Pelomedusidae Side-necked terrapins

Helmeted Terrapin *Pelomedusa subrufa*
1 19 March, Ta' izz lagoons, 13°34'N 44°01'E, 1,150 m. Two, one basking on floating mat of dead vegetation, another resting just below water surface with only the nostrils protruding.
2 27 March, Wadi al-Jahr, 13°58' N 46°23' E, 600 m. Two basking on boulders in flowing wadi.

Distribution and comments: In Arabia, this species is confined to the extreme south-west in south-west Saudi Arabia and western Yemen. The survey record from Wadi al-Jahr may represent an eastward range extension in Yemen. *P. subrufa* also occurs over much of sub-Saharan Africa and in Madagascar. This species is able to aestivate in drought conditions.

Family Cheloniidae Marine turtles

Loggerhead Turtle *Caretta caretta gigas*
1 16 April, al-Mukha (Red Sea Coast), 13°18'N 43°15'E. At least four adults observed close inshore, some holding their heads vertically above the water surface for several seconds.
2 23 April, Sayhut, 15°14'N 51°17'E. At least four offshore, with several more in vicinity and along the coast to the east.

Distribution and comments: This species is widely distributed in tropical and sub-tropical waters in the Indian Ocean (and also the Mediterranean, Pacific and Atlantic). There are some major nesting beaches on islands off the Arabian coast.

Green Turtle *Chelonia mydas japonica*
Encountered frequently from al-Mukha on the Red Sea coast eastwards along the southern Yemen coastline almost to the Omani border. In the vicinity of al-Fatk, 16°31'N 52°42'E, approximately 400 recent nests, probably of this species, were counted on beaches.

Distribution and comments: Widespread in tropical and sub-tropical waters of the Indian Ocean (and also the Mediterranean, Pacific and Atlantic). Known to nest on the southern Yemen coast in significant numbers.

Hawksbill Turtle *Eretomochelys imbricata bissa*
1 16 April, al-Mukha. Small dead specimen on beach, carapace 30 cm; cause of death not apparent.
2 22 April, al-Hami, 14°49'N 49°50'E. At least two 50 m offshore.
3 23 April, Sayhut. Two close inshore.

Distribution and comments: Widespread in tropical and sub-tropical waters of the Indian Ocean (and also in the Pacific and Atlantic).

ORDER SQUAMATA Lizards and snakes

Sub-order Sauria Lizards

About 58 species of lizard and 1 amphisbaenian have been recorded on mainland Yemen although the taxonomic status of some is uncertain. During the survey 33 species were recorded. Two species whose identification was not positively ascertained are indicated with a question mark.

Family Agamidae Agamid lizards

**Pseudotrapelus adramitanus*

Recorded at many localities in the west Yemen highlands but in many cases individuals were not differentiated from *P. yemenensis*. Also observed at Wadi Mararah (the Mahrah), 16°39'N 52°55'E, 360 m.

Distribution and comments: Endemic to western and southern Arabia from Taif (Saudi Arabia) to Aden (Yemen) and east to Dhofar (Oman). Usually occurs below 2,000 m.

***Yemen Agama** *Pseudotrapelus yemenensis*

Several observations in the vicinity of Sana'a and also at the Central Highland Research Station near Dhamar, at an altitude of 2,400 m.

Distribution and comments: Endemic to the highlands of western Yemen and south-west Saudi Arabia where it usually occurs above 2,000 m.

Pseudotrapelus sinaitus

1 19 April, four observed at Wadi Harim near Am Nabiyah, approximately 12°48'N 43°41'E, 100 m.

2 20 April, Ras al-'Arah, 12°40'N 43°53'E, 50 m. One observed lying flat on stony ground in 'camouflage posture'. When handled, head colouration turned from a buffy-brown to blue.

3 1-2 May, numerous observations on the desert crossing between al-Ghaydah 16°13'N 52°11'E westwards to the vicinity of Fughmah 16°10'N 49°27'E, up to 875 m.

Distribution and comments: Widespread in Arabia (absent from the Rub' al-Khali) north to Palestine and Jordan, also Egypt and south-east Libya. During the survey this species was observed from almost the southern tip of the Arabian Peninsula near Wadi Harim eastwards to al-Ghaydah. Probably widespread throughout the country in the lowlands below 1,000 m. In sandy desert areas restricted to localities with at least some outcrops of rock and scattered boulders, providing look-out points and refuges.

***Arabian Toad-headed Agama** *Phrynocephalus arabicus*

1 5 May, al-Mudhur, 15°49'N 48°25'E, 790 m. Two observed in abandoned fallow sandy fields with some patches of low xerophytic vegetation.

2 6 May, 10 km north-west of 'Arayn and Turbaq hills, 15°44'N 46°36'E, 1,000 m. Three, including one tail-signaling male, on mobile sand dunes with fresh growth of feather-grass *Stipa* sp.

Distribution and comments: Endemic to the Arabian peninsula where it is widespread except in the west. The survey record from al-Mudhur is close to the type locality on the Plateau of the Hadramawt.

***Small-grain or Desert Spiny-tailed Lizard** *Uromastyx aegyptius microlepis*
1 2 May, 230 km W of al-Ghaydah, 790 m. One taking refuge in burrow on almost flat limestone rubble in hamada desert with very sparse vegetation cover, mostly of low mats of xerophytic shrubs but with a few small *Acacia* trees. (*Uromastyx* sp. was seen retreating down its burrow on 1 May 61-84 km west of al-Ghaydah, 16°13'N 51°35'E. The habitat would suggest that this was *U. aegyptius microlepis*).

Distribution and comments: This species is widespread in Arabia north to Jordan and Iraq and east to Iran. The tail of *Uromastyx* is used for fat storage; they are sometimes caught and eaten as a traditional delicacy by local people.

****Yemen Spiny-tailed Lizard** *Uromastyx benti*
1 24 April, Ras 'Uqab (12 km east of Sayhut), 15°15'N 51°20'E. One basking on rock about 50 m from shoreline.
2 30 April, Shahrut (west of Damqawt), 16°33'N 52°46'E, 10 m. One basking on large boulder pile; took refuge in rock crevice when approached.
3 2 May, 5 km east of Fughmah, 16°10'N 49°27'E, 70 m. Piece of desiccated tail found among rocks on edge of steep-sided rocky wadi.
4 3 May, al-Ghurfah, 15°50'N 48°45'E, 780 m. One immature 'wedged' in crevice in boulder in rocky wadi bed.

Distribution and comments: Known only from eastern Yemen. Survey records suggest that this species inhabits very rocky arid areas in both coastal and inland localities.

Family Chamaeleonidae Chameleons

***Arabian Chameleon** *Chamaeleo arabicus*
1 25 April, Saqr, 15°32'N 51°56'E, 5 m. One in scrub in irrigated agricultural strip along the coast with *Sorghum* fields and small date palm *Phoenix dactylifera* groves.
2 28 April, Wadi Mararah. Desiccated head found.

Distribution and comments: Endemic to southern Yemen and Dhofar. The survey record from Saqr is from a new but not unexpected locality.

***Yemen or Duméril's Chameleon** *Chamaeleo calyptratus calyptratus*
1 9 March, Ta' izz lagoons. One male climbing into dense cover.

Distribution and comments: Endemic to the south-west Arabia. The subspecies *C. c. calyptratus* is restricted to west Yemen; the survey record falls within the known range.

Family Gekkonidae Geckos

**Bunopus spatularus spatularus*
1 27 March, Yashbum/Wadi Habban, 14°19.63'N 46°59.04'E, 1,200 m. One spot-lighted at night (21.00 hrs) on bare rocks in dry wadi bed.

Distribution and comments: Endemic to Arabia where known from Yemen, Oman, UAE and central Saudi Arabia.

Bunopus tuberculatus
1 5 May, 3 km west of Shabwah, 15°23'N 47°01'E, 800 m. One spot-lighted at night (20.00 hrs) on loose sand/gravel substrate with small scattered hummocks of xerophytic vegetation and occasional *Acacia* trees.

Distribution and comments: Widespread in Arabia north to Syria and east to Pakistan.

Yellow-bellied House Gecko *Hemidactylus flaviviridis*
1 16 April, Bajil, 15°04'N 43°17'E, 250 m. One on house wall at night.

Distribution and comments: In Arabia found mainly in coastal areas. It also occurs in coastal north-east Africa and east to northern India. Considered a house gecko in the western part of range.

Hemidactylus turcicus
Identified from photographs taken in the vicinity of Sana'a.

Distribution and comments: Widespread in peripheral Arabia east to Pakistan, in coastal areas fringing the Mediterranean and Red Sea and north-east Africa south to Somalia.

Hemidactylus yerburii
1 27 April, Wadi Mararah. Two at night on boulders by small flowing stream with some marginal herbaceous vegetation.

Distribution and comments: Occurs in southern Arabia from south-western Saudi Arabia ('Asir) and Yemen east to southern Oman, also Somalia.

****Collared Semaphore Gecko** *Pristurus collaris*
Recorded at 10 localities, the most westerly at al-Shihr, 14°46'N 49°36'E to as far east as 10 km west of Wadi Mararah, at altitudes from just above sea-level up to 760 m in the hills inland from Qishn 15°25'N 51°41'E.

Distribution and comments: A Yemen endemic previously known from Bal Haf to Ras Fartak and inland to the Hadramawt. The survey record from near Wadi Mararah extends the known range, being about 150 km north-east of Ras Fartak. This species appeared abundant in these localities and was observed to be both diurnal and nocturnal.

Semaphore Gecko *Pristurus crucifer*
1 20 April, Ras al-'Arah. Several observed running across gravel substrate with

sparse vegetation cover of low xerophytic plants in *Acacia* savanna. Sympatric with *P. ornithocephalus* and the mainly arboreal *P. flavipunctatus*.

Distribution and comments: In Arabia restricted to the west and south-west coasts of Yemen. Elsewhere occurs in Somalia and extreme northern Kenya. The survey record falls within known range.

Semaphore Gecko *Pristurus flavipunctatus*

1 22 March, Jabal Iraf, 13°07.02'N 44°15.31'E, 1,400 m. Two seen on a *Juniperus* sp. trunk in open Juniper woodland with some *Acacia* and other tree species.

2 20 April, Ras al-'Arah. Two in the small branches of an *Acacia* 2 m from the ground and one at the base of a small *Acacia* tree in *Acacia* savanna with a gravel/stone substrate.

Distribution and comments: In Arabia occurs in the coastal Tihamah of south-west Saudi Arabia and Yemen. Also occurs in north-east Africa. The survey records fall within known range. Unlike most other semaphore geckos, this is usually an arboreal species.

***Small Semaphore Gecko** *Pristurus minimus*

1 26 April, al-Faydami plain, 16°25'N 52°28'E, 10 m. At least 10 at dusk on loose sand and especially among or near to small hummocks of woody, xerophytic vegetation.

Distribution and comments: The first record for Yemen. Also known from Oman and recently recorded in south-west Saudi Arabia.

****Bird-headed Semaphore Gecko** *Pristurus ornithocephalus*

1 28 March, Bir 'Ali, 14°0.50'N 48°19.50'E, 20 m. One on basaltic rocks approximately 300 m from coastline. 'Played dead' for almost one minute when caught and handled (such behaviour may be stress induced) before swiftly running off.

2 29 March, Wadi Hajr, 14°05.66'N 44°41.33'E. One on an arid plain with both sandy and rocky areas and scattered tussocks of xerophytic vegetation.

3 19 April, Ras al-'Arah. One female at dusk (18.15 hrs) on a gravel plain in *Acacia* savanna.

Distribution and comments: Endemic to coastal south-west Yemen. The survey records fall within the known range.

***Common Semaphore Gecko** *Pristurus rupestris*

Recorded through the west Yemen highlands at altitudes up to 2,400 m near Dhamar 14°39'N 44°21'E, down to 600 m at Wadi al-Jahr. The most easterly record was from Yashbum/Wadi Habban.

Distribution and comments: Found around the periphery of Arabia and in Djibouti, northern Somalia and Ethiopia and coastal Iran, possibly also in Pakistan. A common species of rocky areas in the Yemen highlands.

Ptyodactylus hasselquistii

Recorded at nine localities from Jabal Iraf in the west and al-Ghurfah (15 km

south-east of Tarim) in the east; from 600 m to 2,000 m. Often heard calling at dusk.

Distribution and comments: Widespread in Arabia, probably north to Palestine, Syria and Iraq and south-west Iran; also in North Africa. A common species in rocky areas; also observed on the walls of buildings (at Tarim).

**Stenodactylus doriae*

Recorded at up to seven localities; along the coast between Wadi Hajr eastwards to Saqr and inland to Wadi Sh'hout 16°20'N 50°43'E and Shabwah 15°23'N 47°01'E, at altitudes from just above sea-level to 800 m.

Distribution and comments: Widespread in Arabia east to south-west Iran. All survey observations were in areas of loose sand except at Wadi Sh'hout where the substrate was compacted limestone dust. At this locality a positive identification was not made and the species observed could have been *S. doriae*, *S. slevini* or *S. leptocosymbotes*.

**Stenodactylus yemenensis*

1 Wadi al-Khabt (Tihamah), 13°03.47'N 44°23.80'E, 460 m. One spot-lighted at night walking across bare, loose sand.

Distribution and comments: Endemic to south-west Arabia, occurring in coastal western Yemen and south-western Saudi Arabia.

**Tropiocolotes scorteccii*

1 24 April, hills inland from Ras Sharwayn, 15°24'N 51°35'E, 700 m. One under a loose rock on the summit of a bare hill covered in fragmented slabs of limestone.

Distribution and comments: Known only from the Hadramawt region and Dhofar. This is a remarkably tiny species, not exceeding 40 mm in length (from snout to vent).

Family Lacertidae Lacertid lizards

****Yemen Spiny-footed Lizard** *Acanthodactylus arabicus*

Observed at several localities from Wadi al-Khabt, 13°04.62'N 44°21.85'E, in the west, eastwards to al-Shihr, 14°44'N 49°35'E, at altitudes from just above sea-level to 460 m.

Distribution and comments: Endemic to the Red Sea coast of western Yemen eastwards along the south coast to Qishn. Immatures have a bright green tail which is constantly wriggled when at rest, this is perhaps a distraction display to potential predators.

Spiny-footed Lizard *Acanthodactylus boskianus*

1 8 April, Wadi Himarah, 14°03'N 46°53'E, 625 m.

2 27 April, al-Faydami plain, 16°25'N 52°28'E, 10 m.

3 3 May, al-Sawm, 16°08'N 49°14'E, 800 m. One caught, length: snout-vent = 79

mm, tail = 165 mm; 10 ventrals, 26 dorsals (12 large dorsals, 7 smaller laterals on either flank).
4 4 May, Sayun, 15°56'N 48°50'E, 830 m.
5 5 May, al-Mudhur (Hadramawt).

Distribution and comments: Widespread in Arabia north to south-east Turkey; also in North Africa. Survey observations suggest this is a common and widespread species at low to moderate altitudes. It inhabits sandy/gravelly areas with at least some vegetation, sometimes occurring in cultivated fields with sparse crop cover. Undoubtedly encountered at more localities than indicated above but possible confusion with *A. felicis/yemenicus* could not be eliminated on many occasions.

***Spiny-footed Lizard** *Acanthodactylus opheodurus*
1 5 May, al-Mudhur (Hadramawt). At least ten immatures and three adults.

Distribution and comments: Widespread in Arabia north to Palestine, Jordan and Iraq. Immatures of this species are characterised by a reddish tail,which as with *A. arabicus* is almost constantly wriggled when at rest.

**Mesalina adramitana ?*
1 2 May, 250 km west of al-Ghaydah, 16°15'N 51°08'E, 670 m. Three *Mesalina* lizards observed on the ground in areas of palmetto (dwarf fan palm) were probably this species.

Distribution and comments: Known from eastern Yemen, Oman, UAE, Qatar and south-east Saudi Arabia. The type locality is in the Hadramawt and the survey record falls within the known range.

Family Scincidae Skinks

Ocellated Skink *Chalcides ocellatus*
1 29 March, Wadi Hajr. One in *Acacia* undergrowth; retreated down burrow when disturbed.
2 7 April, Wadi Hajr (4 km north of road), 14°07'N 48°42'E, 30 m. One on an embankment alongside an irrigation ditch and *Sorghum* field; retreated down burrow when disturbed.

Distribution and comments: Occurs in North Africa, parts of Mediterranean Europe and Asia Minor east to Pakistan. In Arabia found mainly at coastal localities, especially in cultivated areas where the ground is often damp. This was the habitat at Wadi Hajr.

Skink *Mabuya brevicollis*
1 28-29 April, Wadi Mararah. Several amongst leaf-litter in dry scrub and one basking on a rock at 07.00 hrs.

Distribution and comments: Occurs in north-east Africa and peripheral Arabia from Taif (Saudi Arabia) to Dhofar, eastern UAE and coastal Pakistan.

***Skink** *Mabuya tessellata*
1 23 March, Jabal Iraf. Two skinks approximately 15-20 cm in total length with bronzy-buff dorsum, slightly more rufous tail and dark line running from nostril through eye, ending above forelimb, observed on boulders. A positive identification was not made but it was probably this species.
2 2 May, 5 km east of Fughmah, 16°10'N 49°27'E, 670 m. One immature found dead under rock.

Distribution and comments: Endemic to southern Arabia, occurring in Yemen, Dhofar and northern Oman.

***Sand Skink** *Scincus mitranus*
1 28 March, Wadi Hajr. Desiccated head and left forefoot found on sand dune.
2 29 March, Wadi Hajr. Desiccated body (with tail missing) found on sand dune.

Distribution and comments: Widespread in south and east Saudi Arabia, eastern Yemen, Oman and the Gulf States.

***Sand Skink** *Scincus scincus?*
1 22 April, Wadi al-Masilah, 15°14'N 51°08'E, approximately 50 m. One moving across loose sand. An attempt to catch it caused it to dive rapidly beneath the surface of the sand. It could not be re-located. Pale buff dorsum, orange flanks and an apparent rounded snout were noted. A positive identification was not made.

Distribution and comments: *S. scincus* occurs throughout most of the Arabian Peninsular and in Iraq and south-west Iran. In Yemen the sub-species *S. s. conirostris* is known from the Hadramawt.

Family Varanidae Monitor lizards

Desert Monitor *Varanus griseus*
1 20 April, near Qa'wah, 12°42'N 44°25'E, 50 m. One immature approximately 60cm in length running off swiftly across sand and taking refuge in a burrow when disturbed.
2 22 April, Wadi al-Masilah. One on sand dunes with scattered stands of *Calotropis procera.*
3 1 May, 61 km west of al-Ghaydah, 16°13'N 51°35'E, 260 m. One adult observed retreating down a burrow when approached.
4 5 May, 2 km east of al-Mudhur (Hadramawt). One immature in habitat consisting of flat, sandy, dry fields with scattered low xerophytic shrubs.
5 6 May, 10 km south-west of wadi at Shabwah, 15°22'N 47°E, 800 m. One adult running rapidly across sand dunes.

Distribution and comments: Widespread in Arabia; also occurs in north Africa and south-west Asia. In Yemen they are sometimes caught locally by Bedu tribes-people for food.

All localities were arid, fairly flat, sandy and sparsely vegetated.

Sub-order Serpentes Snakes

Twenty-eight species of snake have been recorded on mainland Yemen (plus one species of sea-snake). However, the validity of the occurrence of seven of these needs confirmation as specimens may have been wrongly identified or localities where they were collected may be erroneous.

During the survey five species were identified. Several other snakes were also observed but poor views prevented a positive identification being made.

Family Colubridae Typical snakes

Jan's Desert Racer, Jan's Cliff Racer *Coluber rhodorachis rhodorachis*

1 26 March, Wadi al-Jahr. One immature found trapped in an empty oil drum sunk into the ground (presumably an old fire-place/oven).

Range and comments: Widespread in Arabia in montane rocky areas. Also occurs from Libya east to Pakistan and northern India. A diurnal or crepuscular species; very fast moving.

***Thomas's Snake** *Coluber thomasi*

1 28 April, Wadi Mararah. One at about mid-day in a small *Acacia nilotica* approximately 4 m in height where it sought refuge in a hollow in the trunk.

Range and comments: Endemic to the coastal plains and mountains of the Dhofar (in Yemen and Oman). The record falls within the known range but is only the second for Yemen. Little is known about this diurnal micro-colubrid and there are very few records.

Sand Snake, Tree Snake *Psammophis schokari schokari*

1 14 April, al-Mahwit, 15°33'N 43°36'E, 700 m. One dead by path (killed by local villagers) near valley bottom.

2 29 April, base of Wadi Mararah. One observed crossing road.

Range and comments: A widespread species in Arabia also occurring throughout North Africa east to north-west India. The survey record from Wadi Mararah represents a substantial (although not unexpected) eastward extension to the known range in Yemen. It has a mildly toxic bite.

Cat Snake *Telescopus dhara dhara*

1 22 March, Jabal Iraf, 1,400 m. One spot-lighted at night on the ground in open *Juniperus*-dominated woodland.

Range and comments: Widespread in the Arabian peninsula but distributed mostly in the montane periphery north to about 29°N. Occurs throughout most of Yemen. A separate sub-species *T. d. obtusus* occurs throughout much of north and north-east Africa. A nocturnal, back-fanged snake with mildly toxic venom.

Family Viperidae Vipers

***Saw-scaled Viper, Carpet Viper** *Echis coloratus*

1 28 March, Bir 'Ali. A single dark individual, found in a small burial chamber within basaltic rock at the archaeological site of Qama, approximately 200 m from coastline.

2 1 May, Wadi Sh'hout, 16°20'N 50°43'E, 800 m. One spot-lighted at night (20.30 hrs) side-winding across loose sand.

Range and comments: Occurs outside Arabia only in north-east Egypt. The survey record from Wadi Sh'hout represents an unexpected easterly range extension in Yemen. Moves almost entirely by side-winding; extremely venomous.

ACKNOWLEDGEMENTS

Many thanks to Dr E. N. Arnold (British Museum, Natural History) for confirming the identification of some species from slides and to Peter W. Hopkins (Estacion Biologica de Doñana) for useful information on reference sources.

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Sandgrouse (1996) 17: 181-184

Amphibian observations in Yemen*, spring 1993

D. A. SHOWLER

The amphibian fauna of the Arabian peninsula comprises nine anuran (frog and toad) species. Six of these, *Bufo arabicus, Bufo dhufarensis, Bufo hadramautinus, Bufo scorteccii, Bufo tihamicus* and *Euphlyctis ehrenbergii* are endemic to Arabia and occur in Yemen. The other three species, *Bufo viridis, Rana ridibunda* and *Hyla savignyi* are essentially Palearctic. The latter is the only one known to occur in Yemen, where it is restricted to the western highlands.

During the OSME survey of spring 1993 five species of amphibian, including four endemic to Arabia (indicated below with an asterisk), were observed. As there is little information on the distribution and habitats of these species, details from each site are given.

***Arabian Toad** *Bufo arabicus*

1 17 March, Kawkaban, 15°31'N 43°52'E, 2,500 m. Approximately 200 newly hatched *Bufo* tadpoles still retaining external gills were observed in a shallow drying pool. These were assumed to be *B. arabicus* but a positive identification was not made.

2 22 March, Jabal Iraf, 13°07.02'N 44°15.31'E, 1,400 m. Four spot-lighted at night (22.00hrs) in a livestock watering pool, where *Bufo dhufarensis* was also present.

3 26 March, Wadi al-Jahr, 13°58.20'N 46°23.50'E, 600 m. Over 200 calling at night in flowing water of wadi bed with *Euphlyctis ehrenbergii.*

4 28 March, Yashbum/Wadi Habban, 13°58.20'N 46°23.50'E, 600 m. At least 300 fully grown tadpoles in slow flowing sections of a stream. Approximately 25% had developed hindlimbs and some had forelimbs. Ten recently metamorphosed toadlets were found.

5 9 April, al-Mardam, 14°03'N 45°34'E, 2,000 m. One male in sandy area with *Lavendula* and *Tamarix* scrub, close to small arable fields.

6 13 April, lush wadi E of al-Mahwit, 15°33'N 43°36'E, 750 m. One male in permanent pool amongst emergent *Juncus*. Found in association with *E. ehrenbergii* and *Hyla savignyi.*

7 15 April, Salah al-Din, 14°40'N 44°12'E, 2,000 m. Two pairs in amplexus, at least 30 others calling from flooded qat *Catha edulis* field in late-morning during heavy rain. Found in association with *H. savignyi.*

Distribution and comments: *B. arabicus* is endemic to Arabia south of 28°N with many populations in the 'Asir of south-west Saudi Arabia and the Yemen highlands. This species occupies a wide range of habitats, although it is generally most common in areas with some annual precipitation providing breeding pools. *B. arabicus* will aestivate, sometimes for up to two years or more during drought. The seven survey records fall within the known range,

** N.B. this paper includes records from the entire Republic of Yemen and not just southern Yemen.*

except the locality at Yashbum which represents a slight easterly range extension and is perhaps the most easterly known site in Yemen.

***Dhofar Toad** *Bufo dhufarensis*

1 22 March, Jabal Iraf. Two spot-lighted at night (22.00hrs) in a permanent livestock watering pool (approximately 5 m x 5 m, 0.6 m deep) on a steep hillside in association with *B. arabicus*. No aquatic vegetation was present; numerous large water-scorpions (*Fam:* Nepidae) were noted. The pool was semi-man-made, part of one side being built-up with rocks and concrete. One female toad was observed rapidly walking up an almost vertical rock face and entering a fissure used as a daytime refuge. Surrounding vegetation consisted of low open *Juniperus* and *Acacia* woodland with a herbaceous understorey.

2 28 March, Wadi Hajr, 14°41.33'N 48°41.33'E, 30 m. Over 20 spot-lighted at night (19.00hrs), amongst boulders in water of flowing wadi, in association with *E. ehrenbergii*. Habitat in the surrounding area comprised sand dunes with dense stands of introduced *Prosopis juliflora* with *Tamarix nilotica* and *Salvadora persica* scrub.

3 7 April, Wadi Himarah, 14°03'N 46°53'E, 625 m. 30 males calling after dark (20.00hrs), from a temporary shallow pool (max. depth 30 cm) in a sand hollow filled with floodwater. Calls were audible up to a distance of at least 1 km. During daylight hours almost all toads retreated to daytime refuges, either burrows in the sand or in nearby *Tamarix/Palmetto* scrub. The surrounding terrain consisted of gently undulating bare sand and gravel with sparsely distributed cushions of xerophytic vegetation.

4 3 May, Tarim (grounds of al-Gubbah Hotel), 16°03'N 49°00'E, 790 m. Four at night in well-irrigated hotel gardens and one inside the hotel itself.

5 4 May, 5 km west of Tarim, 16°03'N 48°57'E, 830 m. 15 or more calling at mid-morning from a pool created by a recent wadi flood. Most were hidden in dense marginal vegetation of *Juncus* and various grasses. The call was a rapidly repeated guttural croaking 'chur-chur-chur...'

6 4 May, 5 km east of Sayun, 15°56'N 48°50'E, 830 m. One under a date palm *Phoenix dactylifera* log at the edge of a small onion field, with numerous other small, dry arable fields with scattered date palms in the vicinity.

Distribution and comments: *B. dhufarensis* is endemic to the Arabian peninsula south of 27°N and has a wide altitudinal range, occurring from just above sea-level to at least 1,900 m. It inhabits arid environments and aestivates during periods of drought, often emerging for only short periods to breed after rain. The six survey records fall within the known geographical range but most are from new localities in Yemen.

***Tihamah Toad** *Bufo tihamicus*

1 23 March, Wadi al-Khabt, 13°03.47'N 44°23.80'E, 460 m. One spot-lighted at night (21.00hrs) moving rapidly across bare, loose sand. This individual actively buried itself by shuffling backwards and downwards into the substrate. The surrounding habitat was a plain of gently undulating sand with approximately

20% vegetation cover, comprising patches of *Tamarix nilotica, Salvadora persica* and *Lycium shorei* scrub interspersed with smaller xerophytes including *Tribulus arabicus, Heliotropium* sp., *Euphorbia* sp. and spiny grasses. Occasional *Acacia* and *Zizyphus spina-christi* trees were also present.

Distribution and comments: *B. tihamicus* is endemic to south-west Arabia. The species is distributed along the coastal littoral from 20°N south along the Tihamah coastal plain to the southern tip of the Arabian peninsula and eastwards to the vicinity of Aden. The survey record lies within the known range but represents a new upper limit to the altitudinal range. Previously the highest known locality was at al-Sukhnah (14°47'N 43°26'E) in north-west Yemen, where the holotype was collected at an altitude of 350 m.

Savigny's Tree Frog *Hyla savignyi*

1 13-14 April, in lush wadi east of al-Mahwit. Two calling (13.00-14.00hrs), 13 April during intermittent rain. One seen, 14 April in a well-vegetated water-filled ditch in association with *B. arabicus* and *E. ehrenbergii*. Habitat well vegetated with permanent flowing water and several still pools. Aquatic vegetation included *Potamogeton pussillus* and *P. nodosus* and much emergent *Juncus* and other marginal herbaceous vegetation. Trees provided partial shade.
2 15 April, Salal al-Din, 14°40'N 44°12'E, 2,000 m. Three or more calling from flooded qat *Catha edulis* field in the late morning during heavy rain. Found in association with *B. arabicus*.

Distribution and comments: *H. savignyi* is considered to be a Palearctic relict species occurring in south-west Arabia from about 22°N south to 14°N in the Yemen highlands. In Arabia it has a fairly restricted distribution, usually above 1,400 m in relatively well-vegetated areas with permanent or semi-permanent water. The two survey records are new localities for the species in the vicinity of previously recorded sites. The first represents a slight westward extension and the second a southward extension to the known range in Yemen. Elsewhere, it occurs in Syria, southern Turkey, western and northern Iran, southern Armenia and Azerbaijan.

***Ehrenberg's Frog** *Euphlyctis ehrenbergii*

1 19 March, Ta' izz sewage lagoons, 13°34'N 44°01'E, 1,150 m. Two in water-filled ditch in *Juncus*-dominated rough grazing meadow.
2 19 March, Ta' izz marsh, 13°34'N 44°01'E, 1,150 m. Over 10 in pool under date palms *P. dactylifera*, 10 in well (water-level approximately 3 m below ground surface), one in another well in a wet, cattle-grazed meadow.
3 26 March, Wadi al-Jahr. Over 50 spot-lighted at night in a flowing wadi; calling intermittently and in association with *B. arabicus*.
4 28 March, Wadi Hajr (1 km north of road), 14°05.66'N 48°41.33'E, 30 m. Five or more spot-lighted at night amongst boulders in a flowing wadi.
5 7 April, Wadi Hajr (4 km north of road), 14°07'N 48°42'E, 30 m. Ten in slow-flowing irrigation ditches in an area of small arable fields.

6 13 April, lush wadi E of al-Mahwit. Five in small pools in association with *B. arabicus* and *H. savignyi*. (For habitat see *H. savignyi* locality (1) above).
7 22 April, Wadi al-Masilah, 15°14'N 51°08'E, 95 m. Three adults in flowing wadi.
8 3 May, al-Sawm, 16°08'N 49°18'E, 800 m. Ten in flowing wadi.
9 3 May, west of al-Sawm, approximately 16°08'N 49°14'E, 800 m. One observed in pool and at least two calling.
10 6 May, Marib Dam, 15°28'N 45°20'E, approximately 1,150 m. Large numbers calling, one recently metamorphosed froglet and one tadpole with hind limbs in marsh habitat behind dam with dense stands of *Phragmites australis*, *Typha* sp. and *Juncus* spp.

Distribution and comments: *E. ehrenbergii* is endemic to south-west Arabia, with an introduced population in the vicinity of Riyadh, central Saudi Arabia. It has a wide altitudinal range and is most common around permanent water although it is capable of aestivating for periods of about two years during drought. The record from close to the mouth of Wadi al-Masilah represents an eastward range extension, although it is known from about 150 km to the north-west in the same wadi system.

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Sandgrouse (1996) 17: 185-187

Reptile observations in Socotra, spring 1993

D. A. SHOWLER

Socotra is perhaps best known to naturalists for the high degree of endemism exhibited by the flora of the island, however it also supports many endemic reptiles. It is probable that the reptile fauna of Socotra has changed substantially over historical time. In the account of Ptolemy's 2nd century AD voyage in the Arabian Sea, '*Periplus of the Erythrean Sea*', it was noted that rivers flowed on Socotra and at this time there were numerous crocodiles, many snakes and large lizards. Rivers on Socotra are now largely, or completely, ephemeral and only three species of snake (excluding one or two species of worm snake) and no large lizards or crocodiles occur. It is likely that the larger reptiles underwent a decline, as is mirrored by many insular populations, following the introduction of mammalian predators (such as the Civet Cat *Viverra civetta*) and the larger species may also have been hunted by humans. In 1899 Forbes observed natives from the nearby island of 'Abd al-Kuri trading lizards for rice and this may have been a more widespread practice in earlier times.

Of the 13 genera or so of reptiles surviving on Socotra, virtually nothing is known about their ecology or the effects on their populations of continuing degradation of habitat resulting from overgrazing, collection of wood for fuel and the increasing aridity of the island.

During the OSME survey of Socotra, from 30 March to 6 April, 10 species of terrestrial reptile (including eight endemics indicated below by an asterisk) and two species of marine turtle were observed.

Socotra Chameleon **Chameleo monachus*

One seen in woodland at Wadi Ayhaft, one of the best-vegetated areas on the island. It may be that this species is restricted to areas with good vegetation cover with patches of soft substrate suitable for egg-laying. If this is so, it may be confined to relatively few localities and would be vulnerable to further destruction of natural woodland. However, the numerous small date palm *Phoenix dactylifera* plantations and scrubland on the island might support this species. More field work is required to assess its status.

Gecko *Hemidactylus homoeolepis*

Three observations from sea-level to 850 m in a variety of habitats. One seen at dusk was remarkably well camouflaged against the bark of a Dragon's Blood Tree *Dracaena cinnabari*. Also found in southern Yemen and Oman.

Yellow-bellied House Gecko *Hemidactylus flaviviridis*

Observed twice on house walls in Hadibu at night. Widespread, occurring in Egypt south to Somalia and eastwards through Arabia to eastern India.

Socotra Leaf-toed Gecko **Phyllodactylus trachyrhinus*
One observation at night at an altitude of 200 m. Spot-lighted on a granitic boulder at the edge of a dry, gravel-bottomed wadi with small date palms and *xerophytic* shrubs nearby. This endemic gecko is extremely poorly known.

Slender Semaphore Gecko **Pristurus insignis*
Several individuals observed on rocks at two localities between 200-350 m. It is known to occur at higher altitudes, generally being considered a montane species. This diurnal gecko is a long-legged, actively foraging species. Two individuals were infested with trombiculid mite larvae; such mites are also frequently found on mainland species of *Pristurus*.

Socotra Semaphore Gecko **Pristurus socotranus*
A widespread and abundant species in rocky areas and occasionally seen on tree trunks. Observed up to 850 m. Mostly diurnal, although one was observed to be active at night. Foraging strategy is perhaps more passive (more inclined to 'sit and wait') than that adopted by *P. insignis*. One individual was seen to eat many small black ants. Several were found to host trombiculid mite larvae.

Socotra Lizard **Mesalina balfouri*
Observed just above sea-level at Erhina lagoon on a gently undulating sand and gravel substrate with low xerophytic vegetation, and in markedly different habitat at 460 m, on rocks in a cattle-grazed pasture on the Hamadiroh plateau. Adults superficially resemble *Lacerta vivipera*, whilst juveniles have a pair of bold cream-yellow, dorso-lateral stripes along each flank.

Socotra Skink **Mabuya socotranus*
Widespread and fairly common. Observed at altitudes from 40 to 500 m in rocky terrain with patches of dense vegetation.

Socotra Whip Snake **Coluber socotrae*
One observed taking refuge under a boulder in a wadi bed with a few small pools of standing water and some scrub cover, at an altitude of 100 m. The site, just to the south of the Hadibu plain, is in the vicinity of the type locality. Old records are from the lowlands of the north and west. Also known from Hakari islet and The Brothers (al-Ikhwan).

Socotra Orange Snake **Ditypophis vivax*
One observed at dusk at 460 m on the Hamadiroh plateau. Despite being harmless (there are probably no poisonous snakes on Socotra) this small snake, and undoubtedly *C. socotrae*, is killed by local people. This is probably because local mythology holds that snakes suckle cattle and goats for milk, thereby poisoning the animals.

Cheloniidae

Numerous Green Turtles *Chelonia mydas* and several Hawksbill Turtles *Eretmochelys imbricata* were seen offshore. Five or six carapaces were noted on the beaches of the south coast, perhaps resulting from turtles being killed for food.

The nesting status of turtles on the island is unknown.

ACKNOWLEDGEMENTS

I thank Dr E. N. Arnold (British Museum, Natural History) for advice and assistance in reptile identification.

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Sandgrouse (1996) 17: 188

Odonata observations in Yemen*, spring 1993

C. G. BRADSHAW

One of the secondary objectives of the OSME survey of southern Yemen was to collect data on the non-ornithological elements of the Yemen fauna. During the second half of the survey from 13 April to 9 May, casual observations were made on Odonata. Opportunities to study Odonata were few, but significant numbers of dragonflies and damselflies were recorded at four sites: Wadi Mararah, 29 April; Mar'ayt springs, 1 May; Tarim, 4 May; and Marib Dam, 7 May, the last site in northern Yemen. Wherever possible Odonata were trapped using a sweep net and photographs were taken of all those caught.

Firm identifications were made of eleven species at two sites: Wadi Mararah and Marib Dam. Many dragonflies at each site evaded attempts to catch them, and therefore had to remain unidentified.

The following species were recorded:

Ischnura elegans	Common at Marib Dam
Erythromma najas	Small numbers at Wadi Mararah and Marib Dam
Anax imperator	Several were seen at Marib Dam
Orthetrum cancellatum	Small numbers at Marib Dam
Orthetrum brunneum	Fairly common at Wadi Mararah
Crocothemis erythraea	Small numbers at Marib Dam
Diplacodes lefebvrii	Fairly common at Marib Dam
Brachythemis leucosticta	Recorded at Marib Dam
Trithemis annulata	Recorded at Marib Dam in small numbers
Trithemis arteriosa	Recorded at Wadi Mararah
Trithemis kirbyi	Small numbers at Wadi Mararah

Despite the limited amount of time available to study Odonata during the survey, it is clear that both Wadi Mararah, and in particular Marib Dam, are important sites in Yemen.

ACKNOWLEDGEMENTS

I wish to thank Jill Silsby for assistance with some of the identifications.

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** N.B. this paper includes records from both northern and southern Yemen*

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GUIDELINES FOR AUTHORS

The Editorial Committee of *Sandgrouse* will consider for publication original papers that contribute to the body of knowledge on the birds of the Middle East – their distribution, breeding biology, behaviour, identification, conservation, etc. The Middle East for this purpose includes Turkey, Cyprus, and Libya in the west to Afghanistan and the Palearctic fringe of Pakistan in the east, the southern shores of the Black and Caspian Seas in the north, and the Arabian peninsula and the Palearctic limits in Sudan and Ethiopia in the south. Submissions are considered on the understanding that the work has not been previously published and is not being offered for publication elsewhere.

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Figures should be drawn *without any lettering* in black ink on good-quality white or translucent paper. The *original* artwork must be supplied, plus one copy with rough lettering in place; the text of lettering should also be supplied on a separate sheet of paper (and on disk if possible; see below). In preparing figures, authors should have regard to the page size and format of *Sandgrouse*. Figures will ideally be drawn about 50 per cent larger than final size; if they are much larger than this care should be taken to avoid use of fine detail that will be lost in reduction. Areas of fine Letraset tint should be avoided and uniform half tones (e.g. pencil shading) are not usually acceptable.

Photographs are welcomed – colour (preferably transparencies) or black and white.

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