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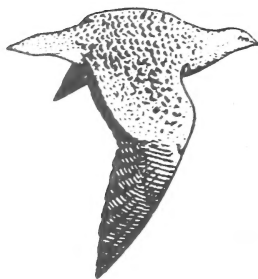
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EDITORIAL

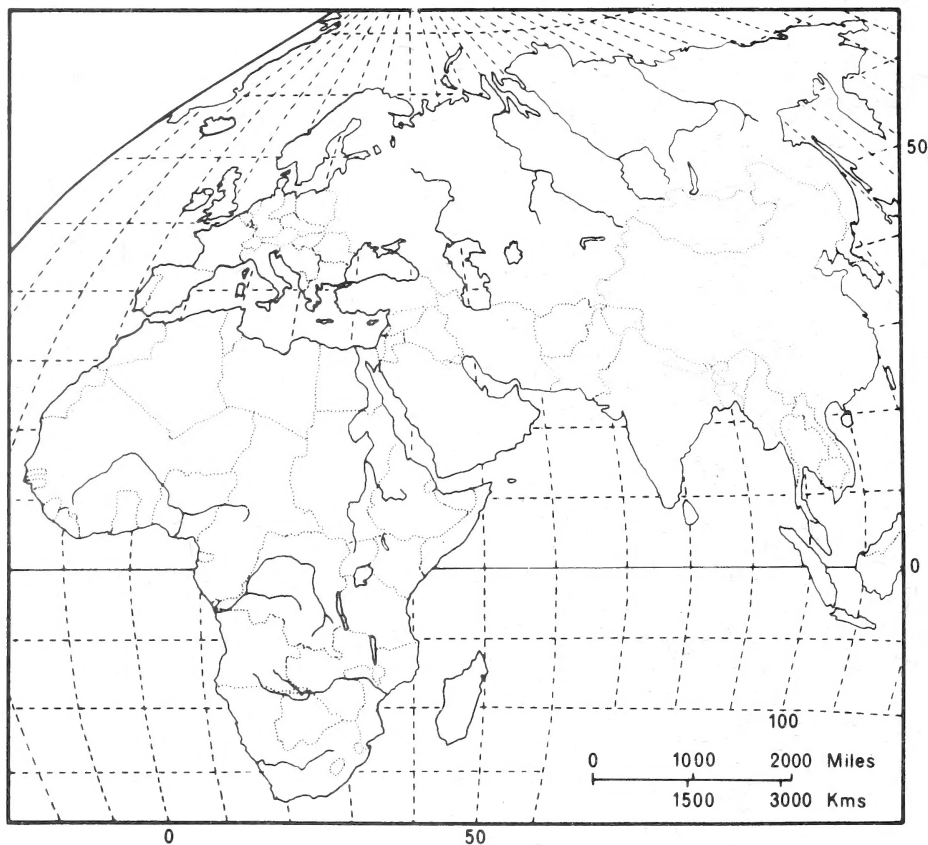
The publication of *Sandgrouse* 10 marks for me the end of an era. When some nine years ago I volunteered to take on the editorship of *Sandgrouse* in somewhat difficult and strained circumstances I little thought that I would still be Editor for OSME's tenth anniversary edition of *Sandgrouse*. The first three issues were completed and published over a period of eighteen months and admittedly *Sandgrouse* did have teething troubles. However, with active support from members of Council and particularly from the Editorial Committee progress was soon being made, both in quality and in the interest shown in our publication. OSME and *Sandgrouse* are now a respected part of the international ornithological scene.

It is with some relief and not a little pride that I hand over to my successor, Duncan Brooks. Duncan has helped me considerably in the production of issues 9 and 10 and I am happy to think that future volumes of *Sandgrouse* will be in his hands.

Donald Parr

The Council of OSME records its great sadness at the death of Don Parr on 4 December 1988 while this issue was in press. The first 10 years of *Sandgrouse* will ever stand as a tribute to the dedication, skill and judgement he exercised as its Editor, sometimes under difficult circumstances.

Our greatest sympathy goes to his wife, Joyce.



An equal-area map of the Palearctic, Oriental and Afrotropical zoogeographical regions. O.S.M.E.'s area lies in the centre of the map (see *Notes to Contributors*) which also embraces the breeding grounds and winter quarters of the vast majority of the migrants that pass through the area.

OBSERVATIONS ON THE BEHAVIOUR OF THE WHITE-CROWNED BLACK WHEATEAR IN EASTERN ARABIA

by

John Palfery

INTRODUCTION

This study of the White-crowned Black Wheatear *Oenanthe leucopyga* in eastern Saudi Arabia was begun in March 1985 and ended in December 1986; a few additional observations were made outside those dates. Two study areas were used, at Jebel Shadgum 26°05'N 48°51' E and at Hamrah Judah 25° 53'N 48° 48'E; they were some 10 km. apart and 200 km. inland from Dhahran on the Arabian Gulf. Visits were possible only at weekends and were made weekly during the breeding season and at least once a month during the rest of the year. 46 visits were made in all. Most of the observations in 1985 were made at Jebel Shadgum where there were five, perhaps six, pairs and in 1986 at Hamrah Judah where three pairs occupied the study area. A total of seven nests were located during the study.

Females were distinguished from males by behaviour. Breeding birds with black crowns occur throughout the species' range and during the study three black-crowned females paired to white-crowned males and one pair of black-crowned birds were noted. Cramp (1988) considers all such birds to be in their first summer (one year old), the white crown being acquired in the first post-breeding moult, though Clements (1987) believes that the black crown may be retained longer. During the first few months after fledging juveniles could be distinguished from older black-crowned birds by structural and, to some extent, by plumage differences. The study birds were not marked and it was not possible to distinguish individuals from one year to the next. A few juveniles could be recognized individually during their first autumn by the pattern of occasional white spots on their crowns.



Plate 1. Full-grown White-crowned Black Wheatear *Oenanthe leucopyga* with black crown, central Arabia, January 1987. (Lary Litke)



Plate 2. Recently fledged juvenile White-crowned Black Wheatear *Oenanthe leucopyga*, Hamrah Judah, April 1986. (John Palfery)

PALFERY, J. 1988. Observations on the Behaviour of the White-crowned Black Wheatear in Eastern Arabia. *Sandgrouse* 10: 1-25.

DISTRIBUTION AND HABITAT

The White-crowned Black Wheatear occurs in dry subtropical to tropical zones (Harrison 1982). Its range lies largely within the 30°C July isotherm. Throughout its range rainfall is scanty and irregular and it is absent from those areas, such as most of North Yemen, where the annual rainfall exceeds 250 mm. It occurs in desolate rocky deserts, but may also be found around houses and villages (Meinertzhagen 1922; Etchécopar & Hue 1967; Fischman 1977; Jennings 1980; Paz 1987). The race which occurs in the Arabian peninsula is *O. l. ernesti*. Its distribution there is patchy and the eastern Saudi Arabian population appears to be isolated from that of the central region (Figure 1).

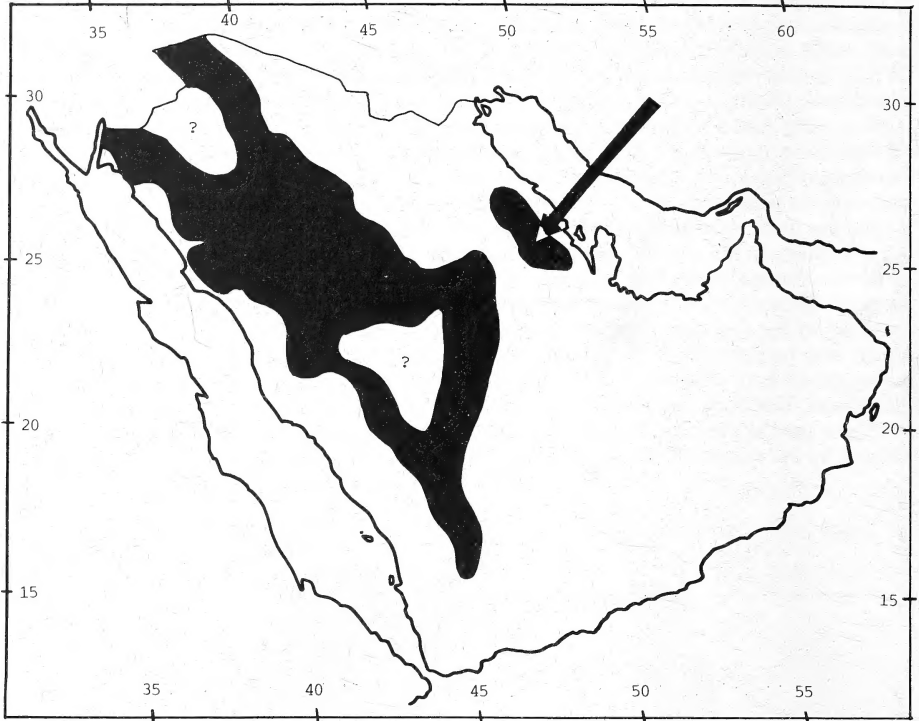


Figure 1. Distribution of the White-crowned Black Wheatear *Oenanthe leucopyga* in Arabia (based on data supplied to the *Atlas of the Breeding Birds of Arabia* project). The arrow indicates the location of the study areas.

The climate in eastern Arabia is characterized by hot, arid summers and cool winters. The daily temperature between June and September often rises to more than 40°C and there is a high rate of water evaporation which in June and July is increased by dry north-west winds (shamals). In winter the maximum daily temperatures are around 22 to 25°C, but marked daily changes occur, sometimes as great as 18°C, and the nights can be unpleasantly cold. Strong north-west winds prevail, often raising dust and sand. Rainfall is usually less than 100 mm. a year, but it is variable and in some years, for example 1986, is higher with important consequences for the breeding success. Most rainfall occurs between December and February. Humidity is extreme, especially near the coast, and can exceed 95%.

In eastern Arabia the White-crowned Black Wheatear is most common along the eastern edge of the Summan Plateau. This stony plateau lies between the Jafura and Dahna sand

deserts and extends north from the Hasa oasis to Iraq. Its eastern edge lies some 250 metres above sea level and is characterized by a series of escarpments and isolated jebels, the soft sedimentary rocks of which have been heavily eroded. It was here that the two study areas were located. The escarpment cliffs and the jebels are of only moderate height, rising some 20 metres at most. In some areas rocky wadis cut into the cliffs and jebels. Some of these wadis are quite long, winding back two or three km. until they reach the summit plateaux; others end abruptly in small box canyons or jumbles of fallen rocks and boulders. At the sides of the wadis and at the foot of the crags and cliffs lie talus mounds and piles of boulders. Gravel desert plains with small, isolated pockets of sand extend westwards from the escarpments and jebels.

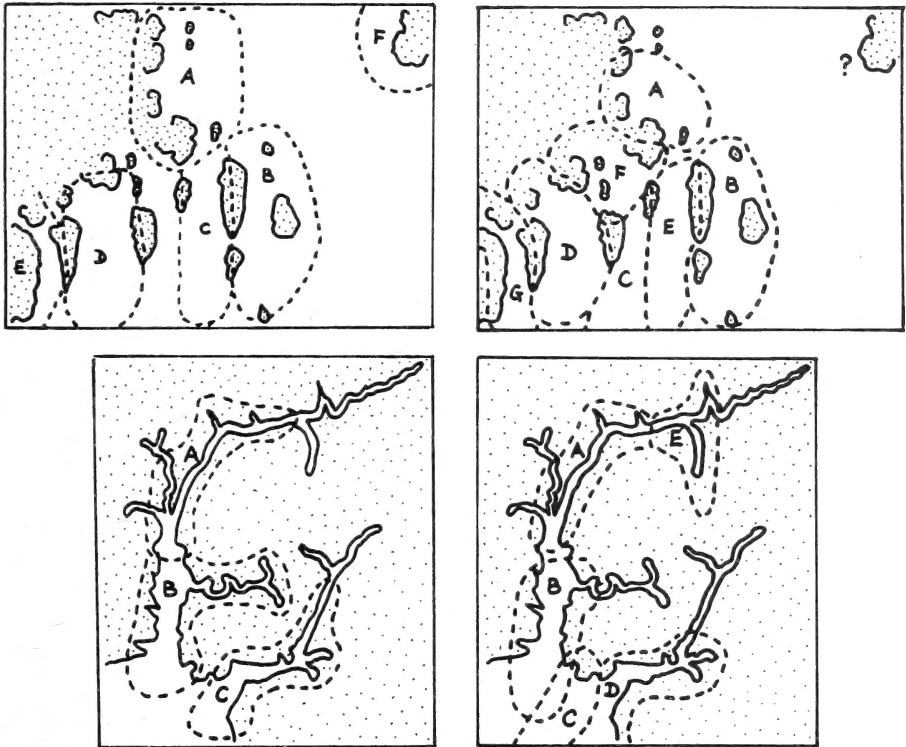


Figure 2. Study areas showing occupied territories. a) Jebel Shadgum, 1985 breeding season; b) Jebel Shadgum, February 1986; c) Hamrah Judah, 1986 breeding season (W. Ross *pers. comm.*) (Territory C occupied by a black-crowned pair [probably first years]; territory E by a single juvenile). Stippled areas indicate high ground, unbroken lines cliffs, and broken lines territory boundaries.

The two study areas differed markedly in character: that at Jebel Shadgum consisted of an area of escarpment cliff and some small isolated jebels, all of which faced onto an extensive area of open desert and a wide, shallow wadi; that at Hamrah Judah comprised two deep, narrow wadis cutting into a single large jebel and the only open desert lay at the mouths of the wadis or on top of the jebels (Figure 2). This meant that the individual wheatear territories at Judah were separated by physical barriers whereas those at Shadgum abutted onto each other; this may have been the reason why less song was noted at Judah than at Shadgum.



Plate 3. Jebel Shadgum study area, March 1986. One pair nested in a crevice in the low cliff on the right. (John Palfery)

The whole area is sparsely vegetated with xerophytic plants and shrubs, few higher than about 1.5 metres and most around 0.5 metres. These xerophytes, together with the ephemerals which occur following periods of rain, are concentrated along dry water courses in the middle of the gullies and gorges and at the wadi mouths where sheets of loose sand washed down by winter floods accumulate. They are favoured feeding areas for the wheatears and in some springs, if the winter rains have been good, the multitudes of blooms form ribbons of colour and the insect life is abundant. At the two study sites such areas supported an association of the rimth saltbush *Hammada salicornia* and the grass *Pennisetum divisum* (J. P. Mandaville pers. comm.).

There is no permanent surface water in the area, but after winter and spring rains small pools often form at the heads of the wadis and water may remain in these for a week or so. In a few areas farms have been set up in the desert adjoining the jebels and the fields are watered by irrigation pivots. Generally, however, the area is waterless for at least ten months of the year.

Very few species of breeding birds share this habitat with the White-crowned Black Wheatear all the year round. The principal ones are Long-legged Buzzard *Buteo rufinus*, Kestrel *Falco tinnunculus*, Rock Dove *Columba livia*, Eagle Owl *Bubo bubo*, Little Owl *Athene noctua*, Desert Lark *Ammomanes deserti*, African Rock Martin *Ptyonoprogne fuligula*, Brown-necked Raven *Corvus ruficollis* and House Sparrow *Passer domesticus*. Two other species, Pallid Swift *Apus pallidus* and Trumpeter Finch *Bucanetes githagineus*, breed in the study areas but move out at the end of the breeding season. Hooded Wheatear *Oenanthe monacha* has been recorded irregularly during the breeding season but there is no proof of breeding. Three species, Bar-tailed Desert Lark *Ammomanes cincturus*, Hoopoe Lark *Alaemon alaudipes* and Mourning Wheatear *O. lugens*, regularly winter but do not breed. Others occur irregularly in winter, and a variety of passage migrants, including several species of wheatear, occur in spring and autumn.

FOOD

Cramp (1988) records a remarkably diverse diet for the White-crowned Black Wheatear. It consists principally of insects, but plant material and even small reptiles are also taken. In the study areas the birds fed almost entirely on insects. The following were noted in their diet: flies (Diptera), adult and larval moths and butterflies (Lepidoptera), grasshoppers and locusts (Acrididae), beetles (Coleoptera) and ants (Formicidae). Not all ant species were eaten; the



Plate 4. Hamrah Judah study area, March 1986. (John Palfery)

larger ones were left alone, although birds sometimes showed curiosity about them. Termites (Isoptera) may also be taken, for one female was observed pecking at a termite mound. In spring darkling beetles (Tenebrionidae) are abundant, but on only five occasions were wheatears seen to take them and not once were they actually eaten, though sometimes they were dismembered. Birds were sometimes seen carrying white, soft-bodied grubs which may have been beetle larvae. Only once was vegetable matter eaten: a male ate two berries from an *Ochrademus baccatus* bush.

In eastern Arabia the young were fed on soft-bodied insects – adult and larval Lepidoptera and, possibly, beetle larvae. In spring 1986 the caterpillars of the Striped Hawk Moth *Hyles lineata* were particularly abundant and were frequently fed to the young.

The birds in the present study appeared to be independent of water.

FEEDING BEHAVIOUR

As with many species of desert birds, most feeding occurred in the early morning and late afternoon. In the middle of the day, when temperatures were at their highest, the birds retired to the shade of rocks and cliffs or stood sentinel around their territories on favoured vantage points. Feeding began around dawn and continued for about three hours. The afternoon feeding period also lasted about three hours; the birds moved out into their feeding areas in mid-afternoon and went to roost at twilight. In spring the most intensive feeding of the day often took place around sunset, with birds flitting from bush to bush and scarcely pausing on perches. Some sporadic feeding occurred in the middle of the day when birds foraged on talus slopes, often in the shade; and in winter, when temperatures were much lower, they might even return to their feeding areas and forage in the open for short periods.

All the territories included a feeding area, which was always comparatively well-vegetated: the centre of a wadi, or the alluvial fan which spreads into the desert from a wadi mouth, or the vegetated open desert adjoining the cliffs of the nest area. Such feeding areas were occupied and defended by individuals, by pairs, or in one case by what may have been two sibling first-year birds. The latter occupied a feeding area which was adjacent to and partly overlapped that of an adult which may have been their parent, and occasionally all three birds fed together, without any aggression.



Plate 5. Probable 1st-year White-crowned Black Wheatear *Oenanthe leucopyga* on foraging perch, Hamrah Judah, December 1986. (John Palfery)

A variety of feeding techniques was used. Usually birds perched on small desert shrubs, sometimes boulders, from which they dropped shrike-like onto prey, gliding or flying down to take it on the ground or from low vegetation. A variety of perches was used, including cliff ledges, boulders, talus mounds, piles of rubbish, fence posts, irrigation pivots, bushes, grass clumps, stones and small hillocks. Their height ranged from about 30 to 0.2 metres or less, though the usual height was between 0.5 and 1.5 metres. The prey was taken immediately below the perch or up to 10 metres from it. They did not restrict themselves to a few favourite perches, but moved from one to another around their feeding territory. When foraging actively they were constantly on the move and the time spent on any one perch was not usually more than one minute, although towards the end of the morning feeding period, when they were foraging less actively, they tended to spend longer.

In the absence of suitable perches birds would hover. Two black-crowned birds, probably first-years, were observed foraging in a field of young corn where there were no perching places and one bird persistently hovered. It would fly up to a height of about two metres, hover, then fly further on and hover again. Even in areas where perches were plentiful birds sometimes hovered while foraging.

When taking prey on the ground birds often spread their wings. The wings were flicked open two or three times and occasionally held open for a moment, fully or partly spread. This habit did not appear to be for shading purposes, for birds were seen wing-spreading while facing both towards and away from the sun, and also in the early morning and at dusk as well as in bright sunshine. More likely it helped to startle, confuse and entrap prey. Other wheatear species, Pied *O. pleschanka*, Desert *O. deserti* and Red-tailed *O. xanthopyrmyna*, spread their wings in this manner when taking prey, but never so regularly as White-crowned Black Wheatear.

Sometimes birds foraged on the ground for periods, before reverting to perching on bushes. At such times they often pecked repeatedly at items on the surface and also chased insects, darting after them with surprising speed and agility. They also dug in soft sand, tossing the sand sideways with vigorous pecks, delivered alternately from right and left, in the manner of a Hoopoe Lark. Valverde (1957) noted birds unearthing beetle larvae in this manner.

Although most prey was taken from the ground or from low vegetation, flycatching sallies were also made. Birds climbed to heights of up to six metres, swooped onto their prey, then glided back down to a perch to eat it. Such flycatching was sometimes persistent, with several birds feeding in the same manner.

Occasionally they foraged inside bushes, clambering about the branches in search of prey. This type of foraging behaviour usually occurred at times when few insects were on the wing, such as at cold winter dawns or during periods of windy weather, but sometimes it was just opportunism on a bird's part.

Once caught, prey was eaten either on the spot or first taken to a perch. Some caterpillars, usually those of the Striped Hawk Moth, were beaten repeatedly against the ground or rock before being eaten or fed to the young; both adults and juveniles treated the caterpillars in this manner. Smaller caterpillars were eaten without such treatment.

In the 1985 breeding season one black-crowned female dismembered a darkling beetle (probably *Erodium octocostatus*) by repeatedly shaking it in her bill and throwing it about. Once dismembered, the beetle was discarded. She twice took such beetles but never attempted to actually eat them. Juveniles also captured darkling beetles but they appeared to be merely curious and released them unharmed. Darkling beetles have an unpleasant taste and smell and are usually avoided by predators (Cloudsley-Thompson 1979) and this may be the reason why no bird was seen to eat them. However, they have been recorded among the stomach contents of birds in Niger (Fairon 1972).

Curiosity may also explain the strange behaviour of a male in February 1986. He dropped down from the top of the wadi onto a talus slope where a bright yellow composite was in bloom. He proceeded to pull off the petals and eat them until he had eaten all but one, then flew off. Several other yellow Compositae were in flower nearby, though of a different species, but he ignored them. The curiosity of White-crowned Black Wheatears towards unusual objects has been noted by others: a pair in Morocco was fascinated by a slice of lemon thrown out of a car, one bird repeatedly wing-fanning at it (Smith 1971).

ROOSTING AND LOAFING

The wheatears roosted within their territories in boulder piles, in crevices or on cliff ledges. The same site was used every night. Paired individuals usually roosted near each other, but in Sinai, Fischman (1977) found some individuals at considerable distances from their mates. In eastern Arabia, once the eggs were laid, the females spent the nights on the nest and continued to do so until the young were a few days old.

The adults usually went to roost some 20 to 30 minutes after sunset when it was almost dark; recently fledged juveniles roosted a little earlier. Around sunset foraging often became more hectic. As it got dark the birds became noticeably nervous, often reacting to an observer whom they had hitherto ignored. Short, harsh, grating calls, transcribed as "jrat" or "dzik", were uttered, sometimes repeatedly. Birds might also perform Anxiety Displays (see Anti-predator Strategies). Occasionally birds appeared to fly evasively as they made their way towards the roost site: they flew swift and low among the vegetation in the centre of the wadi where they were easily lost in the dusk. Usually, however, they approached the roost sites more openly, moving excitedly from perch to perch. In the morning they emerged at first light, some 10 to 15 minutes before sunrise.

Birds loafed during the middle of the day at all seasons. In the heat of summer they retired to the shade at about 0830 and did not resume feeding until about 1630 hrs. In winter loafing usually began at around 0900 to 1000 and ceased in the mid-afternoon at about 1530 hrs. Loafing was less intense in the cooler weather when birds often returned to the feeding areas for short periods in the middle of the day.

Regular loafing spots were used and individuals had several such spots within their territories and moved from one to another during the loafing period. They loafed on the ground, under boulders, on top of boulders and on rock ledges up to 20 metres high. Birds loafing on the ground remained standing and were never seen to flop on their bellies or to work a hollow in

the sand in the manner of many lark species. Sometimes the wings were held a little away from the body and birds occasionally gaped. Loafing birds dozed, preened, and uttered quiet subsong; some desultory foraging on shaded talus slopes in the vicinity of the loafing spots also took place.

As well as seeking shelter from sun and heat, they avoided rain. During even short showers they ceased feeding and sheltered under rock overhangs – often their loafing sites. They resumed feeding immediately the rain stopped. Although feeding usually stopped during rain, males did not always relinquish their song posts or stop singing. During dust- and sand-storms the wheatears also sought shelter.

A bird was once noted sun-basking briefly. At 0750 hrs. on 17 January a male, which had been singing in the lee of a boulder, flew to the top of a talus slope where it sheltered from the cold north-east wind in a sunny niche at the base of the cliff. Here it stood facing the sun with both wings spread, their ventral surface towards the sun. It retained this posture only briefly, then flew out to feed in the open desert.

THE ANNUAL CYCLE

In eastern Arabia some pair formation took place during early November and the pairs remained together through the winter. Not all birds found mates at this time and some remained unpaired until well into the spring and it may be that in some years the majority do not pair until January or later.

During the winter pairs were sometimes seen investigating holes and crevices in their territories and presumably they were looking for suitable nest sites. I noted this behaviour in mid-December, and in Sinai Fischman (1977) recorded it as early as the beginning of November. In Arabia nest building occurred from late January onwards.

The first eggs were laid in mid-February, although in 1985, which appeared to be a poor breeding season with few young raised, egg-laying did not commence until the beginning of March. In Sinai the incubation and fledging periods each last about two weeks (Fischman 1977). In Arabia in 1986 the first young hatched at the beginning of March and fledged a fortnight later. After fledging they were fed by the adults for a further three weeks until they became independent. They then moved out of the nesting area and occupied areas on the fringes of their parents' territories. In 1986, a good breeding season with good numbers of young raised, a second clutch was laid by one female during the latter part of March, after the first brood had fledged, and the young from this second clutch became independent of their parents about the middle of May.

In Sinai pairs remain together throughout the year (Fischman 1977), but there was no evidence that this happened in eastern Arabia. There, pairs appeared to break up at the end of the breeding season and from June until the end of October the breeding territories were occupied by single adults together with, in some cases, the young of the year.

TERRITORY

The territories of the study pairs all shared two features: a rock face (large or small) with fissures and broken areas where birds could nest, roost, loaf and find refuge in time of danger; and a feeding area, usually open and comparatively well vegetated. Territories were probably 'traditional' in that more or less the same areas were occupied in the second year of the study as in the first, although it was not known if the same birds were involved. Their boundaries usually followed natural features of the landscape such as cliffs, wadis, ridges and rock outcrops. They were used for courtship, mating, nesting and rearing the young, as well as for loafing, roosting and feeding. However, outside the breeding season, and even once the young had hatched, birds sometimes foraged beyond their territory boundaries. Most territories were occupied throughout the year, although a few were vacated for a period during the hot summer months when most of the vegetation in the feeding areas had died or was aestivating. After the young had attained independence they continued to occupy part of their parents' territories

or areas immediately adjacent to them and some remained in these 'juvenile' territories, where they were tolerated by the adults, until at least mid-December. In Sinai the young remain in their parents' territory until the following spring (Fischman 1977), but in the Dead Sea area of Israel they leave as soon as they become independent (Paz 1987).

The breeding territories were large, averaging 6.7 ha. (see *Figure 2*). At Jebel Shadgum in 1985 the territories of four pair averaged 6.9 ha. – the smallest being 4.8 and the largest 9.1 ha. At Hamrah Judah in 1986 the three territories averaged 6.6 ha. – the smallest being 5.0 and the largest 8.7 ha. The average size of the feeding areas within these last three territories was 2.2 ha. It was noticeable that towards the end of the breeding season the territory boundaries became more fluid and in 1985 the female of the main study pair began to forage well beyond the previous territorial limits so that the foraging area was increased to at least twice its original size. Perhaps linked to this extension was the fact that the greater part of it was into an area unoccupied by any other wheatears; moreover the males in the study area had almost completely stopped singing by this time. In autumn the feeding territories of six birds averaged 2.4 ha. per bird.

The breeding territories were considerably larger than those in Sinai where Fischman (1977) recorded an average size of about 0.4 ha. This may reflect the poor carrying capacity of the Saudi habitat.

TERRITORIAL BEHAVIOUR

During the hot summer period little territorial behaviour was seen although singletons were present in most if not all of the territories. In the course of the autumn, however, birds began to spend more time perched conspicuously on various vantage points around the perimeters of their territories. Such vantage points included rock pinnacles, boulders, ledges and cliff tops. There were several with each territory and birds moved from one to another. A territory holder (always male as far as I could judge) did not sing or display much at this stage, but merely stood about conspicuously, sometimes spending up to 20 minutes at a time on one perch. Later in the season such vantage points were used as song posts.

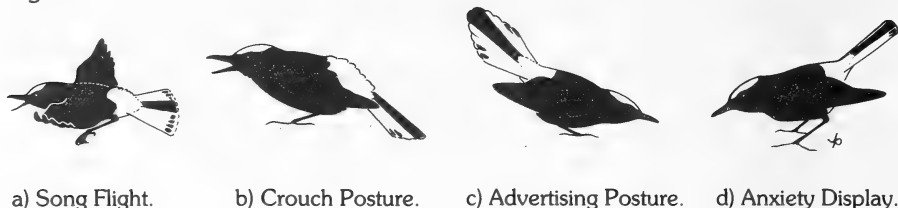
The first pairs formed in November and, from that time on, territorial behaviour – song and displays – became increasingly apparent. Song was noted in all months of the year except May and September but it was infrequent outside the breeding season. It was most intensive from the end of January through February and March. Song and other territorial behaviour declined noticeably towards the end of the incubation period and virtually ceased once the eggs had hatched. Thus there was little if any singing beyond the third week in April. As mentioned earlier, pairs in eastern Arabia appeared to break up at the end of the breeding season and only single adults or juveniles were found on the breeding territories during the heat of summer.

Most territories were occupied throughout the year but one exception was a territory well inside a wadi which seemed to be largely unoccupied during summer and early autumn. This territory offered little suitable foraging habitat once the vegetation had died back or begun to aestivate during the summer.

During the first half of the breeding season defence of territory appeared to be mostly by the males. They spent a lot of time singing from song posts around their territories and often engaged in song duels with neighbours. Each male usually had three or four favourite song posts. They were usually on prominent eminences up to 30 metres high although sometimes bushes only 1.5 metres high were used. Birds also sang in flight, and often flew from one perch to another without a break in their singing. Sometimes they performed special Display or Song Flights. These were made from one eminence, often a song post, to another. The flight usually took the form of a slow, high, showy glide, though the wings were sometimes beaten. The rump feathers were usually, but not always, raised, the tail was spread wide and the wings were held flat and stiff with the primaries curling up at the tips (*Figure 3a*). The legs sometimes dangled, but this was probably a thermo-regulatory device rather than an integral part of the display. During the flight a bird sometimes gave occasional rapid flicks of its wings, sometimes

fluttered them; Jennings (1980) notes that the wings may be quivered. The Song Flight was usually preceded by song and sometimes by the Crouch Display (see below). The Crouch Display was frequently performed on alighting at the end of a Song Flight. Song Flights were not common in either study area and the birds usually sang only from song posts.

Figure 3.



As well as song, two displays were used in territorial advertisement and defence. One was the Advertising Display which seemed to be used by males solely for territorial advertisement. In this display the male fans and raises his tail and bows forwards, showing his white crown (Figure 3c). Maintaining this posture, he shuffles around on the spot so as to present his spread tail in various directions. The wings are not flicked during the display, nor is the tail which is merely held up in the fanned position. The display was performed in silence, although in the Sahara, Canon Tristram (1859) noted birds calling while performing it. The posture was sometimes a reaction to the presence of another bird although whether it served to repel rival males or to attract females or both is not known. On one occasion it may have been triggered by a white butterfly which flew past. Usually, however, there was no apparent releasing factor.

More frequent than the Advertising Display was the Crouch Display. This was used by males for territorial advertisement and defence and also in courtship. During the display the male crouches with tail spread and the white rump feathers raised. The wings are usually dropped and held still; occasionally they are flicked (Figure 3b). The head may be bowed, accentuating the hunched appearance of the crouched bird. Maintaining this posture the bird often scurries forward, mouse-like, trailing its tail across the ground.

The circumstances in which the Crouch Display was given varied. It was frequently given by birds landing on a song post, rock, ledge or bush. Sometimes it was accompanied by a call. Sometimes a male adopted the Crouch Posture as he sang and shuffled forward, still singing. Birds disturbed by a human intruder also adopted the posture at times.

Clashes were sometimes seen between territory holders and what appeared to be intruding males. These clashes involved aerial pursuits, during which snatches of song might be uttered, and occasional face to face confrontations in which the squabbling birds would rise about two metres in a fluttering flight; Fischman (1977) noted actual fighting.

The wheatears often displayed aggression towards non-conspecific intruders which entered their territories, especially other wheatear species. Mourning Wheatears, which are winter visitors to eastern Arabia and share the same feeding areas, were frequently harassed. Other species which they chased from their territories were Isabelline Wheatear *O. isabellina*, Wheatear *O. oenanthe*, Pied, Desert and Red-tailed Wheatears, Blue Rock Thrush *Monticola solitarius* and Redstart *Phoenicurus phoenicurus*. All occur on passage during the breeding season and the Red-tailed Wheatear also winters in the area. Sometimes the White-crowned Black Wheatear merely displaced the intruder from its perch by flying directly at it and forcing it to drop to the ground or move to another perch; other times it pursued the intruder out of its territory. Birds often broke off foraging and flew fast and direct some 300 metres across their territory to evict an intruder. Aerial pursuits often ensued during which snatches of song might be uttered. One bird even followed a Redstart into a bush in which it had taken refuge. Occasional interactions also occurred with House Sparrows and with Desert and Bar-tailed Desert Larks (the first two species breed in the study areas and the latter is a winter visitor).

Although all three were usually ignored, the wheatears chased them away if they were feeding too close to them or if, during the breeding season, they were in the vicinity of the nest. Both male and female White-crowned Black Wheatears defended the breeding territory against non-conspecific intruders.

COURTSHIP

The mating system appeared to be monogamous, although there was some indication of promiscuity by paired males. The first pairs formed in November and courtship behaviour was observed from then through April. I never succeeded in establishing the full sequence, merely various aspects of it. Chases occurred and there were three displays, one of which appeared to be used only in courtship. Also a form of subsong was frequently uttered in sexual situations.

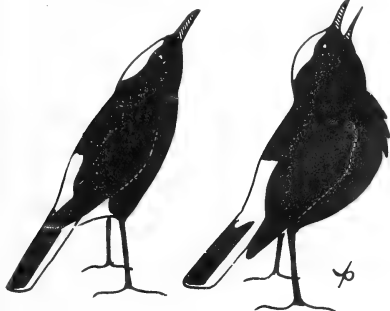
Chases were often noted between males and females. Usually these were short and fluttering, in and around boulders; occasionally long and high. During one series of chases between what appeared to be an unmated male and a female, the female sometimes halted in mid-course, climbed a few metres on fluttering wings and briefly hovered while the male undershot her to alight nearby. On alighting the male adopted the Crouch Posture and several times uttered a dull, clacking call. The chases in this instance were short, about 20 metres. During the same courtship sequence the male flew at the perched female from a distance of about 20 metres and swooped on her.

Whereas this courtship sequence lasted only a few minutes, another lasted almost ten. Then an adult bird, presumably a male, flew in to join a second bird, presumably a female. On alighting, the male started to sing and also to flick his closed tail excitedly. Next he shuffled stiffly towards the female with his rump feathers ruffled and his wings drooped; at the same time wheezing calls were heard. The female looked on passively, then flew a short distance, the male following. For the next five minutes the female led the male along the top of the escarpment in a series of short flights and whenever they alighted he adopted the posture described above. It appeared to be a version of the Crouch Display except that, although he leaned forward, he did not bow nor did he spread or trail his tail. He did not always approach the female; sometimes he stood motionless, facing either towards or away from her – but always in the same rather stiff posture. While displaying he uttered Courtship Subsong (*q. v.*).

On another occasion an unmated male sang and performed the Crouch Display, apparently directing both at a bird (presumably a female) on the ground below. She then flew behind some boulders and the male followed and began the Dancing Flight Display.

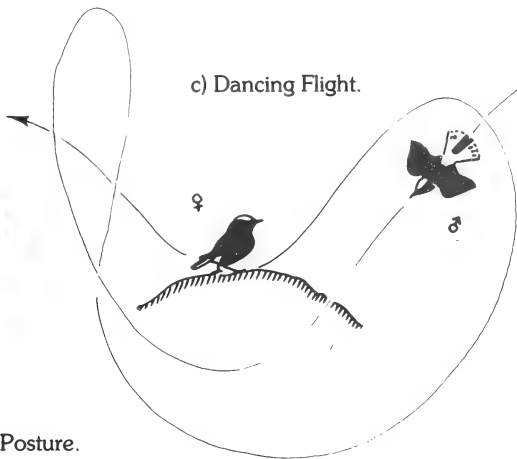
Figure 4.

a) Sleeked-upright Posture.



b) Courtship Display Posture.

c) Dancing Flight.



The Dancing Flight appeared to be associated solely with courtship. The female is perched either on the ground or on some eminence such as a boulder or cliff ledge, while the male, with tail spread, performs the dashing showy flight, repeatedly climbing, twisting, looping and diving in front of her (Figure 4c). Sometimes he touches down on the rock beside her, bounds up without pausing, twists around, then dives past her again. The whole display is performed in a confined area – within a few metres of the female and to heights of between one and two metres. It may last half a minute and the female remains passive throughout.

The Dancing Flight was directed by paired males at their mates, by unpaired males at strange females and, on one occasion, by a male at one of his own offspring (this juvenile, presumably a female, was between 23 and 28 days old and had been fledged between nine and 14 days).

It did not appear to occur within any particular courtship sequence. As noted above, once it was preceded by song and the Crouch Display; on another occasion the male flew to the spot where his mate was foraging and performed it without any preliminaries. Following such a display a male once alighted in front of his mate and faced her in a low, sleeked posture with his tail spread. At the same time some hisses and clicks were uttered, probably by the male. The female darted forward at the male and he flew off. Once an unmated male performed the Dancing Flight in front of what appeared to be a first-year female. At the end of the display, he alighted on the ledge about one metre from her and adopted an upright posture with his bill pointing skywards and feathers sleeked – the Sleeked-upright Posture (Figure 4a). At the same time Courtship Subsong (*q.v.*) was uttered – probably by the male. After a moment the immature flew off, with her tail spread, and the male followed, with his tail also spread.

The Sleeked-upright Posture and its associated calls may also occur at the end of aggressive encounters between rival males and is perhaps an appeasement or submissive gesture. On two occasions it occurred at the end of aerial chases between a paired male territory holder and an intruding bird; both birds alighted side by side and one of them adopted the Sleeked-upright Posture. At the same time, and also during the earlier pursuit flights, a variety of excited unmusical calls were uttered, as in Courtship Subsong. However, although the mating system appeared to be monogamous, sexual behaviour may not necessarily be restricted to the chosen mate and there is the possibility that these two incidents were courtship chases rather than aggressive encounters.

One further posture was noted which may have been a courtship display. An adult male foraging in a wadi began to utter a series of “*hoo hoo*” calls together with Courtship Subsong. I then noticed a black-crowned bird (a female?) on the ground some 20 metres in front of him. As he called he adopted a contorted attitude with his head bent right back so that he presented his throat and breast to the other bird (Figure 4b). After about 30 seconds the intruding bird flew across the wadi and the male gave chase. Both alighted on the cliff some 50 cm. apart and the male adopted the same stance again, facing the other bird with his head thrust back and bill pointing skywards; he continued calling. The other bird then flew out of his territory.

Although actual copulation was never observed, attempted copulation was seen. A male, which had been singing from a song post, flew across to his mate and alighted beside her on a boulder. He adopted a low posture and excitedly circled the female three or four times; he pursued her and both birds were lost to sight. The female was constructing the nest at the time.

On another occasion a male appeared to try to mount one of his own recently fledged young. He briefly mounted it with fluttering wings, then faced it in a low posture with his head and bill outstretched, then mounted it a second time. Pasteur (1956) describes the adoption of a similar horizontal posture by the male prior to mating.

Few examples were noted of pair-bonding behaviour among established pairs. Paired birds usually fed together, especially around sunset, and during the incubation period the male often accompanied the female, even though he might do little feeding himself. While in the presence of their mates, males often uttered subsong. Courtship feeding was never seen but may take place, for on one occasion, during the incubation of the second clutch, a female twice adopted a begging posture, crouching in front of her mate and rapidly fluttering her wings, at the same time one of the birds uttering Courtship Subsong. The male did not respond and the female flew off and began foraging.

THE NEST AND EGGS

The Nest

The first nests were built in January. In 1986 construction was first noted on 31 January and in 1987 on 22 January (W. Ross *pers. comm.*). The latest date on which it was observed was 29 March in 1985. Construction was by the females and the males took no part in it, but spent most of their time singing and defending the territories.

The actual selection of a nest site was never seen, although pairs which appeared to be prospecting nest sites were observed in mid-December in 1986. These pairs moved about the cliffs and rock falls within their territories, each member of the pair entering and inspecting a hole or crevice in turn, then moving on to the next.

A total of seven nests was located during the period of the study. Four were built in vertical clefts in rock faces, two in holes in softer strata, and one in a hole in the ground at the base of a large boulder. The height of the nests ranged from ground level to about 20 metres, but was usually between one and a half and six metres. Only a few of the nest sites were accessible and in these the nests were built 50 to 60 cm. back from the entrances of the crevices. The crevices were eight cm. wide at most – too narrow to admit an arm. All the nests were well sheltered from the sun and there was no pattern in the direction in which the nest sites faced.

Only one nest was visible – a neat cup constructed of fine grass bents and thickly lined with wool. The female was noted taking three different materials during the building of this nest – wool, fine bents of grass and camel hair from an abandoned bedouin tent. It was about six cm. in diameter. The most notable feature was a platform of rock flakes and pebbles extending forwards about 20 cm. in front of the nest. These flakes were about two cm. in diameter. Platforms were a feature of all the nest sites which I was able to inspect. Several other species breeding in hot, arid zones build such platforms (e.g. the closely related Black Wheatear *O.*



Plate 6. A nesting area at Hamrah Judah, March 1986, showing the spring growth of ephemerals along the wadi after winter rains. The nest was in the talus at the base of the large boulder in the centre. (John Palfery)

leucura and lark species such as the Black-crowned Finch Lark *Eremopterix nigriceps* and the Desert Lark) and it has been suggested by George (1978) that in the case of the White-crowned Black Wheatear the pile of flakes and chips, which are usually of porous rock, helps to regulate the nest temperature.

The construction of the pebble platform appears to be the first stage of the nest building. One female selected most of her pebbles from a talus slope about 100 metres from the nest site and usually carried them directly to the nest. Her mate took no part in collecting the pebbles but guarded the territory, chasing away intruders and uttering alarm calls at my presence. Fischman (1977) has suggested that pebble carrying forms part of the courtship display and the same suggestion has been made about similar behaviour of the Black Wheatear (Ferguson-Lees 1960). No evidence of this was seen in the present study. The one attempt at copulation which was witnessed took place at a time when the female of the pair was constructing the nest, but this nest was at an advanced stage and she was no longer carrying pebbles.

Nest construction takes place over a period of several weeks (George 1978) and some time may elapse between the completion of the nest and the laying of the first egg. In 1986, though nest building was first noted on 31 January, the first clutches were not laid in these nests until at least a fortnight later.

In 1986 one pair raised two broods. A new nest site was used for the second clutch, 150 metres from the first, although still within the original territory, and the new nest was occupied and incubation begun within 3-13 days of the first brood fledging.

Eggs and Incubation

Clutch sizes were established in only two nests – three eggs in one and four in the other. In the cases of four other nests the numbers of fledged young were known – three, four and in



Plate 7. A nursery area at Hamrah Judah, April 1986. As the fledglings grew older they began to forage away from the rock pile, among the grasses along the wadi in the foreground. (John Palfery)

the case of one pair, three fledglings in the first brood and seven in the second. The size of this second brood is most unusual for the normal clutch size is three to five eggs, occasionally two or six (Cramp 1988). There was no evidence that this brood of seven was an amalgam of two broods.

Incubation is by the female alone. No male was seen to enter the nest hole until after the eggs had hatched or at least were close to hatching. Only rarely did males approach the nest hole during the incubation period and they never entered it but remained at the entrance peering in – even though the female might be off the nest at the time. The female usually spent 20 to 40 minutes, sometimes up to 60, at a time on the nest, then came off to feed for 10 to 20 minutes. Incubation lasts approximately 14 days (Fischman 1977).

CARE OF THE YOUNG

Once the young had hatched they were fed by both parents although only the female brooded them. For the first few days she also spent the nights on the nest. The young fledge after two weeks (Fischman 1977) but remain dependent upon their parents for a further three weeks.

At the time they fledged they could fly only poorly and during the first week or so they spent most of the day in and around one or two favourite rock piles within a nursery area, usually in the vicinity of the nest. They stood about on these rocks and even ventured short distances from them but retreated among them in times of danger or during the midday heat. They did not necessarily roost in them, however, and at least one of the broods moved to other similar piles in a nearby side wadi at dusk. Once they had fledged they did not return to the nest. Although the pair which in 1986 successfully reared two broods used two different nest sites, the same nursery area was used successively by both broods.

The smaller broods of three or four usually remained together during the first few weeks and were fed by both parents. Some broods, however, may be split by the parents, and this certainly appeared to be the case with the large second brood of seven fledglings. When first observed they had probably only left the nest a few hours earlier for six of them were still among the rocks in the immediate vicinity of the nest. About 100 minutes before sunset the female began to lead one of the fledglings away from its siblings. She flew some five to ten metres, alighted within sight of the fledgling and uttered a soft repeated "juwee" call. The fledgling moved towards her, fluttering and scrambling across the scree and sometimes even flying short distances. She then moved a little further on, stopped and called again. Eventually she led the chick up the wadi to a boulder pile about 100 metres from the nest. A little later one of the adults, possibly the male this time, led two further fledglings away in the same manner. Early the following morning only one fledgling could be located near the nest; four others were at the boulder pile to which the female had led one of the chicks the previous evening, and one was in the side wadi up which the male (?) had led the other two chicks. The seventh chick could not be located.

It appears therefore that the adults may split up the young once they have fledged. Moreover, in the case of this particular brood, they were never again seen all together and the parents appeared to feed different chicks – the female feeding the group of four chicks and the male the others.

At the approach of an adult, fledglings uttered a begging call, a repeated buzzing "zwee" which was uttered with increasing intensity and frequency as the adult got closer. If the juveniles were in cover, they would emerge into the open as the adult approached. A juvenile begged by crouching before the parent and bobbing its body and fluttering its wings. It gaped widely and at the same time the begging calls rose to a crescendo and also became harsher in tone – a gravelly, buzzing "zreezreezree". Once the adult had departed the juvenile continued to call for several minutes.

Juveniles were dependent on their parents for three weeks after fledging. Within two weeks they had begun to forage actively in the nursery area, capturing caterpillars and making flycatching sallies, occasionally successfully. They sometimes accompanied the adults into the

open feeding areas well away from the nursery rock piles at this stage and were also seen to join them in mobbing predators (see Anti-Predator Strategies). By the fourth week they ranged widely through their parents' territory, fed themselves and only occasionally received food from the adults which largely ignored them. A week later they had occupied 'juvenile' territories – either a section of their parents' territory or an area immediately adjacent to it. They were now completely independent, although mostly they remained in sibling groups.

In the case of the pair which raised two broods in 1986, the first brood was fed and cared for by both parents when it first fledged, but later, when the female began to incubate the second clutch, by the male alone.

During the incubation of the second clutch the juveniles of the first brood were rarely seen in the vicinity of the new nest and then only during the later stages of the incubation period when they had begun to venture further from the nursery area. By the time the second clutch had hatched the first brood was largely independent and feeding itself. Both adults fed the second-brood nestlings and the only occasions on which the first-brood juveniles were fed was when they were in the immediate vicinity of the second nest, sometimes begging at the actual entrance itself. Even there, however, the adults did not always feed them; sometimes they ignored them and sometimes they scolded them and chased them away.

HELPERS AT THE NEST

Although the interest of the first-brood juveniles in the second nest may have been due initially to the prospect of obtaining food there, they later appeared to display curiosity about the nest and its chicks and one or more of the juveniles began actually to enter the nest hole. During the first visit to the study area after the second brood had hatched I noted first-brood juveniles entering the nest on eleven occasions between 1037 and 1550 hrs (n.b. a continuous watch was not kept on the nest during that period). Sometimes a juvenile remained inside the nest hole only a few seconds, at other times it spent up to a minute inside, and once about five minutes. On several occasions an adult entered with food whilst a juvenile was inside yet the juvenile was not ejected and did not emerge until after the adult had left. On two occasions a juvenile carried food into the nest and on another two a juvenile emerged carrying a faecal sac. I was not able to establish whether just one juvenile or more than one was involved. A week later juveniles were seen to enter the nest on five occasions. They may have been



Plate 8. Recently fledged juvenile White-crowned Black Wheatear *Oenanthe leucopyga* begging from adult, Hamrah Judah, April 1986. (John Palfery)

carrying food but I was unable to see for certain as on each occasion they flew directly from the foraging area to the nest hole and entered without pausing.

Thus, to sum up, juveniles (or perhaps the same individual on each occasion) were seen entering the nest hole on 16 occasions; in at least two of these food was taken into the nest and on two other occasions faecal sacs were removed. Once the second brood had fledged there was no evidence of the first-brood juveniles feeding them or even venturing near them.

ANTI-PREDATOR STRATEGIES

Several possible predators occurred in the study areas (see TABLE I).

TABLE I: POSSIBLE PREDATORS WHICH OCCURRED IN THE STUDY AREAS

Reptiles

- Sand Snake *Psammophis schokari*
- Horned Viper *Cerastes cerastes*
- Arabian Rear-fanged Snake *Malpolon moilensis*
- Desert Monitor *Varanus griseus*

Mammals

- Ethiopian Hedgehog *Paraechinus aethiopicus*
- Wild Cat *Felis silvestris*
- Red Fox *Vulpes vulpes*

Birds

- †Harrier spp. *Circus* spp.
- †Hawk spp. *Accipiter* spp.
- *†Buzzard spp. *Buteo* spp.
- * Kestrel *Falco tinnunculus*
- * Eagle Owl *Bubo bubo*
- * Little Owl *Athene noctua*
- †Shrike spp. *Lanius* spp.
- * Brown-necked Raven *Corvus ruficollis*

† = occurs on migration or as a winter visitor

* = breeds in the study area

The typical response to the appearance of a predator was to utter alarm calls (see Voice). These were usually uttered whilst the bird was perched but might also be given in flight or, especially when very agitated, while hovering over the predator. As well as calling the bird might display its agitation by performing the Anxiety Display. In the fullest form of this display the bird bobs nervously, repeatedly bowing forward, cocking its partly spread tail and flicking its wings open (Figure 3d). The display is usually, but not always, accompanied by alarm calls. As well as the full Anxiety Display, birds may perform any one of the individual actions which comprise it: for example the wings may be flicked nervously but the bird may not bow or cock its tail.

The display was most often seen at dusk, just before the birds went to roost, a time when they appeared to be most concerned by the presence of a human observer in their territory. Once it was performed by a bird which had just captured a large locust. Alighting on a talus mound, the wheatear dropped the locust and began to perform the display. It then uttered an alarm call and dropped out of sight behind the mound just as a Kestrel flew in, snatched up the locust, and flew off with it. Five minutes later the wheatear reappeared on the same spot, still showing signs of nervousness – bobbing and cocking its tail.

Occasionally birds adopt the Crouch Posture before a predator. G. Bundy (*pers. comm.*) observed a bird which was uttering subsong when a fox appeared. It flew down a scree slope towards the fox, pitched on a rock close to it, and adopted the Crouch Posture while continuing to utter an almost inaudible subsong. On several occasions birds appeared to react to the appearance of a human by adopting the Crouch Posture.

On two occasions males responded to my presence within their territories by calling and flying in the manner of the Song Flight. One male appeared especially alarmed by my presence, perhaps because his mate was nest building at the time. He approached to within 12 metres of me, flying from bush to bush with his rump feathers ruffled and tail spread and depressed and uttering loud alarm calls. On another occasion a male flew off with tail spread, rump feathers raised and with fluttering wing beats.

Birds were not especially furtive during the breeding season. Normally they approached the nest openly, making no apparent attempt to conceal its location. Females with nesting material usually flew directly to the nest site and only twice were birds noted approaching it indirectly. On both those occasions the female had been disturbed as she was collecting the material and it may have been because of this that she made an indirect approach, perching several times on rocks and other eminences, before finally proceeding to the nest. Incubating females also approached the nest fairly directly, as did both parents when feeding young, although sometimes they delayed returning to it if a human observer was close by.

There was usually little reaction to disturbance near the nest at the incubation stage. On three occasions incubating females were disturbed when the nest was inspected. One female remained sitting, the other two merely flew off silently. In one case the female remained nearby watching quietly from a boulder before eventually flying off out of sight; in the other the female was joined by her mate as she flew from the nest and both birds disappeared behind the jebel.

The adults were more demonstrative once the young had hatched. A human intruder often occasioned alarm calls and when an Isabelline Shrike *Lanius isabellinus* entered the feeding territory of one pair with young in the nest the female wheatear flew at the shrike and swooped twice at it, forcing it to move to another perch a few metres away. She then resumed foraging.

Only one nest was ever inspected at the nestling stage. It contained one nestling and only on my first visit, when it was an estimated seven to nine days old, did it react to my presence, gaping and begging with noisy "shreep" calls. On all subsequent visits it merely remained motionless in the nest.

Recently fledged young remained close to their nursery boulder piles for the first week or two. When alarmed, or on hearing their parents' alarm calls, they immediately retreated among the boulders, gradually emerging from hiding once the danger had passed. Large broods may be split by their parents (see Care of the Young). Fledglings often, perhaps usually, roosted in a different area to that in which they had spent the day.

Potential predators, including man, were mobbed if they approached recently fledged young. The wheatears repeatedly hovered above the predator, alighted near it, flicking their wings and performing Anxiety Displays, and uttered agitated alarm calls. They appeared to hover in the vicinity of a predator in order to obtain better views of it and to keep it in sight.

Older fledglings joined their parents in mobbing predators. One afternoon a Wild Cat crossed the territory of one pair. Its presence was announced by the male with loud alarm calls. These attracted the female and two of the young, which had fledged two to three weeks earlier. As the cat climbed the side of the wadi, all four birds mobbed it. They accompanied it up the slope, standing on boulders, flicking their wings, cocking their tails and uttering alarm calls. Once the cat had disappeared over the top of the cliff, the female and juveniles moved back down the slope, but the male remained at the top hovering above the cliff top and calling.

On another occasion an adult and juvenile White-crowned Black Wheatear, together with two Desert Larks, a Trumpeter Finch and a House Sparrow, were displaying at a Horned Viper which was lying buried in soft sand with only its head exposed. The two wheatears would hover briefly in front of the snake, then alight, then hover again. On the ground they spread their wings, holding them spread for a second or two, and constantly cocked their partly spread tails. No calls were uttered. As I approached the birds flew off one by one until only the juvenile

wheatear remained. It continued to display around the snake for a further minute or two. This particular juvenile had fledged about 30 days previously and had been independent of its parents for around nine to 14 days.

On the whole the study pairs were remarkably tolerant of human observers. Occasional individuals showed as much interest in me as I in them. Similar curiosity has been noted in Chad where birds approached people to watch them pass by (Gillet 1960). The wheatears were most agitated by a human presence at roost time or when fledged young were about.

VOICE

Song

The song of the White-crowned Black Wheatear was a characteristic sound of the arid wadis and jebels in early spring when rival males engaged in song duels. The songs carried well and the craggy habitat often added to their resonance. The annual song pattern has already been described (see Territorial Behaviour). Daily song was noted from dawn till dusk, although during the early hours of the afternoon most birds were loafing in the shade and there was little activity. Individual spells of singing might last five minutes or more and the song phrase was repeated every five to seven seconds, sometimes more frequently. Usually only the male sang, although on a few occasions in early winter song was noted from what appeared to be females.

The songs consisted of fairly simple, short, warbled phrases which were repeated and which included a variety of fluted and bell-like notes together with non-musical rattles and squeaks; they sometimes included mimicry. Each song phrase comprised two to five units. The songs were complex in their variety and are thus difficult to summarize. Each male has several song types and, though some were shared, there was considerable variation between individual birds. Moreover, even the songs within an individual male's repertoire could be extremely variable. The following is a selection of song phrases noted from eight different males during the course of the study:

1. "swee-swee chirrick chirrick"
2. "see-see terlitzewee"
3. "shroo-seetchi-srooee"
4. "swee-swee-sweetur"
5. "seepa-sweejit"
6. "tusweep-swilee sweep-swilee-sweep"
7. "seet-seet tootweeya tootweeya"
8. "siraweek siraweek siraweet"

Some songs were discordant and harsh but the best were lively and melodic with pure fluted notes. Many were reminiscent of a *Turdus* thrush in the richness and fullness of some of their notes and in their phrasing and repetition. Each male had a considerable repertoire of song phrases, eleven being noted from one individual during March 1985. Birds switched from one phrase to another within the same spell of singing and they also varied individual phrases. Some song types were shared, with minor variations, between individuals. The commonest and most distinctive of these has a ringing, bell-like quality:

Male A: "tchulaleet tchulaleeter"

Male B: "teulink teulink"

Male C: "tweelink-tweelink-tweelinka"

This song was noted from various males from both study areas and also from a bird in central Arabia. Bell-like notes, along with other call notes, were also incorporated into various song phrases. Another shared song type might also be classed as a call. It consisted of a long, shrill, wavering whistle or squeal:

Male D: "swee-ee-ee-tu-ur"

Male E: "see-i-i see-i-i seeily"

Male F: "hwi-hi-i-i-tic"

Occasionally the calls of other birds were mimicked and included in the song phrases. One bird repeatedly uttered the mew of a Buzzard *Buteo buteo*, "keea-keeow". Another mimicked the song of the Desert Lark, "tchee-tchiluhweet". Mimicry was also noted of a Crested Lark *Galerida cristata*, Brown-necked Raven, House Sparrow and, possibly, Kestrel, Pallid Swift, Black-crowned Finch Lark and Hoopoe Lark.

During the breeding season neighbouring males indulged in song duels, singing at each other from adjacent song posts. They sometimes uttered the same or similar phrases. One male sang a repeated "chi-irrup sweetswee sweetswee chi-irrup" while its neighbour responded with the same phrase from a song post some 200 metres away; both birds were facing each other. The reaction of a male to a taped playback of his own voice is perhaps another illustration of this behaviour. This male was singing some 40 metres away while I was below his most frequently used song post. On hearing the recording he immediately flew to that song post and on alighting changed from the song phrase which he had just been uttering to the one featured on the tape.

Snatches of song were sometimes uttered during aggressive interactions.

Birds chasing other *Oenanthe* species uttered song phrases while in flight. Once, loud song phrases were uttered during an aerial chase between two White-crowned Black Wheatears, both of which appeared to be males. The presence of a human intruder in their territory also appeared to stimulate some birds to sing.

A form of crude duetting may occur in established pairs. On one occasion one member of a pair uttered pure, fluty, warbled phrases while its nearby mate uttered Courtship Subsong (see below).

Subsong

Subsong was noted from both adults and juveniles. Adult subsong was heard in February, April, August, October and November. Compared to the full song it was quiet, rather weak, and sometimes more fluid and continuous. It incorporated whistles and fluted warblings as well as wheezy notes and chuckles. As in full song, motifs, calls and other sounds were frequently repeated. The subsong of one bird was reminiscent of a Blackbird *Turdus merula*. Usually it was uttered by lone birds while loafing and on a few occasions by males in the presence of their mates. Such subsong was not the same as Courtship Subsong which was frequently uttered in heterosexual situations.

Juvenile subsong was similar and was heard in March, April, October and November. It, too, was often uttered by loafing birds in between bouts of preening. Usually the bill was closed and the only perceptible movement was that of the tips of the mandibles. The subsong of one juvenile incorporated weak, slurred whistles, warbling and dull rattles. Another, heard in October, sang quietly for several minutes and uttered a series of song phrases, each repeated three or more times in succession. These phrases were very similar to those of the full song of the adults and one phrase included the bell-like notes.

Courtship Subsong

In addition to the usual subsong, a special courtship subsong was frequently heard. It was noted with certainty only from males, although it is possible that females may utter it. It was quiet and was uttered by the male when in the presence of a female; the female might be his established mate or a stranger. It included a mixture of squeaks, wheezy whistles, throaty rattles, clicks, creaking calls (reminiscent of the distant quacking of ducks), jingling, ping-pong, hissing and spluttering noises, and subdued warbled phrases. The overall effect was of a harsh, wheezy, spluttering, almost strangulated subsong which sounded as if it was uttered deep in the throat and was reminiscent of a Starling *Sturnus vulgaris*. It was sometimes uttered with

the bill open and pointed upwards at an angle of 45°. Although the male usually uttered it while perched beside the female, he sometimes continued to utter it in flight. Courtship Subsong was often heard when a pair of birds alighted at the end of a courtship chase and was associated with the Sleeked-upright Posture. Once I heard it when a female adopted a begging posture beside her mate, although I was unable to establish which of the two birds was actually uttering it. One male frequently uttered it when in the presence of his own fledged young. He often uttered it when approached by a begging juvenile and on one occasion followed it with the Dancing Flight, again directed at one of his offspring. He also uttered it repeatedly at sunset one evening, just before the brood retired to roost. It may be that Courtship Subsong is also associated with aggression and occurs in territorial disputes. Possibly it is uttered generally in tense situations – hence the behaviour of the above male at roost time.

Calls

These were variable and difficult to classify. They were often incorporated into the songs and it was not always easy to distinguish between the two types of vocalization. Furthermore some calls appeared to be used in a variety of situations and their function was not always clear. Another complicating factor was the incidence of mimicked calls. Included in this account therefore are only the commoner calls or those whose function appears easy to determine.

The adults commonly uttered two types of alarm call. The first was a high-pitched, piercing “sweek” or “swee-sweek” which was usually repeated. It was a strong, far-carrying call and similar to the sharp “wheet” of Wheatear. It was uttered by both sexes and was most often heard during the breeding season, especially once the young had hatched. On hearing it, fledged juveniles usually sought the shelter of boulders and even adults might leave the open feeding areas and fly to the jebels. This call was used when a predator was first sighted and was always uttered when an avian predator flew over. At times of high anxiety it was repeated rapidly – “sweekeekeek”

The second alarm call, uttered by both sexes and heard throughout the year, was a harsh, grating “jrak”, like the sound of two broken stones grated sharply together; at times, especially when there were young about, it was lengthened to “jaark”. Again this call was uttered in the presence of potential predators. At moments of intense anxiety it was interspersed with “sweek” calls. Whereas the “sweek” calls were used when a predator was first sighted, the alarming bird later switched to the grating calls or to a combination of the two.

A variation of the second alarm call was a short, sharp, grating “dzik”. It often accompanied the Anxiety Display and was frequently uttered by birds just prior to going to roost when it was often occasioned by the presence of a human intruder. Other calls which appeared to function as alarm or anxiety calls included a harsh, jagged “chairz” or “tjair”, a long, harsh “kwaah”, and a Buzzard-like “heeyah”. All were uttered by birds disturbed by a human intruder.

Some calls were uttered in aggressive situations and appeared to have a scolding or threatening function. One pair of adults, which was feeding its second brood, several times scolded juveniles of the first brood which they found near the nest hole with a low-pitched, harsh “jaar” or “kraar” which was reminiscent of a Jay *Garrulus glandarius*.

One call appeared to be uttered only by the male and to have a sexual and territorial function. It occurred in numerous variations but had as its basic unit a long “hroo-oo” and was characterised by its rather breathy, hoarse, quavering quality. It was uttered during short Display Flights and also on alighting when the bird adopted the Crouch Posture or a partial version of that display with the rump feathers ruffled and the wings dropped. On a few occasions birds uttered a similar call when disturbed, as if in alarm.

A very distinctive courtship call which I heard only once was a dull, rapid clacking uttered by a male courting a strange female. The clacking noises were repeated rapidly, though they did not become a rattle.

A call used by adults to entice the young was a repeated, soft “juwee”. This enticement call

was noted only once, when two adults led their recently fledged young away from the nest area (see Care of the Young).

As noted under **Song** the wheatears mimic other species. In addition to those already mentioned, several calls noted in eastern Arabia had a nasal, cat-like quality which may have been due to mimicry. One of the most striking examples of mimicry involved a bird in central Arabia which, as it was being photographed, started to mimic accurately the sound of the camera motor-drive followed by the click of the shutter (L. Litke *pers. comm.*). In Sinai and Israel birds have been heard to mimic a variety of animals and sounds, including donkeys, dogs, goats, human whistles and Rock Hyraxes *Procavia capensis* (Fischman 1977; Ilani & Bouskila 1982).

Two calls were noted only from juveniles. A well-feathered nestling gaped and uttered noisy "shreep" calls as it was inspected. Fledged juveniles uttered a begging call, a repeated, buzzing "zwee" (see Care of the Young). In addition to this begging call, fledglings began to utter adult alarm calls or variants of them within a week of fledging.

DISCUSSION

Perhaps the most interesting point to emerge from this study is the possibility that cooperative breeding occurs in this species. Although there is too little evidence to draw any firm conclusions about whether first broods regularly act as helpers at the nest, the social pattern, especially that which Fischman (1977) describes in Sinai, is one which is likely to foster the development of cooperative breeding: there is no sexual dimorphism; there is a monogamous mating system; the pair bond (in Sinai at least) is for life; territory is held all year round; there would appear to a shortage of suitable breeding habitat in that the rocky areas required for nesting, roosting, loafing and shelter are absent from large tracts of desert; and there is long-term tolerance of the young by the adults. These are all features associated with cooperative breeders (Perrins & Birkhead 1983). Grimes (1976) records three cases among the African Turdidae of extra birds helping to feed broods of young, although in each case the helpers were adults; one of the species was the Abyssinian race of Mourning Wheatear *O. l. lugubris*.

The long-term tolerance of the young by the adults is a feature of the behaviour which would be compatible with the incidence of nest-helpers. In 1986 some juveniles were tolerated in and around their parents' territories until at least mid-December. A few first-years may disperse in summer and autumn for black-crowned individuals have occurred at isolated jebels in eastern Arabia where the species is not known to breed (W. Ross *pers. comm.*). Other individuals, at least some of which were adults, have occurred in Kuwait, Bahrain, Qatar, Oman, and on Das Island in the Persian Gulf (all areas well outside the known breeding range) in various months of the year but especially in spring (F. E. Warr & M. C. Jennings *pers. comm.*). Generally, however, the White-crowned Black Wheatear is mostly sedentary in eastern Arabia and there is little evidence of juvenile dispersal. Possibly juveniles are constrained to remain in their natal areas by a shortage of territory openings – there may be a shortage of suitable breeding habitat for the reasons mentioned above.

A further ecological constraint which may force them to remain is the unpredictability of the desert environment, the carrying capacity of which can fluctuate greatly not only from year to year but also from season to season. Many species of cooperative breeders reside in such environments in Africa and Australia (Emlen 1984). In the present study the two breeding seasons differed markedly and various factors, proximate and ultimate, appeared to operate on the breeding success. The winter of 1984/5 was dry and there was little rain and consequently the spring vegetation was sparse. It also appeared to be a poor breeding season for the wheatears: they nested late, there was no evidence of second clutches and few young birds were seen in the summer and autumn. In contrast, a lot of rain fell during the winter of 1985/6 and plants, flowers and insects were particularly abundant in the spring. This was a successful season for the wheatears: they nested early, at least one second brood was raised and first-year birds were numerous in late summer and autumn. The apparent link between

breeding success and similar factors has been remarked in north-west Africa and Sinai (Heim de Balsac & Mayaud 1962; Fischman 1977), and in years of severe drought in Israel pairs may not breed at all (Paz 1987).

In Sinai the pair bond is life-long; in eastern Arabia pairs appeared to break up at the end of the breeding season, although it is not known if the birds paired with the same mates in successive seasons. The Arabian territories were large compared to those in Sinai and this suggests that the Saudi habitat has a poor carrying capacity, which may explain the break up. It may be that the territories cannot support both birds during the summer period, although, if this is so, it is difficult to explain the continued presence of some juveniles in and around the territories. A further possibility is that some adults were overlooked during this period when they are particularly skulking both because of the high temperatures and because they are moulting.

Such questions cannot be answered by a short, part-time study, but they do suggest that detailed, long-term work, which included the trapping and marking of birds, could be very worthwhile. Such a study might also help to clarify the age of breeding black-crowned birds about which there has been some comment recently (Brown 1986; Mountfort 1988). Two points from the present study touch on this discussion. Firstly few breeding black-crowned birds were noted in the study areas: during the 1985 breeding season only one of eleven birds was black-crowned, in 1986 only one of seventeen, and in 1987 four of nine birds. These ratios contrast with that noted by Mountfort (1988) in Jordan where 10 of the 13 breeding birds seen had black crowns.

The second point concerns the territories which in the study areas appeared to be traditional in that approximately the same territories were occupied in successive years (*Figure 2*) – though not necessarily by the same birds. It may be that only adult males succeed in occupying traditional territories. Three black-crowned birds mated to white-crowned ones bred on the study sites in three successive seasons. Each time a different pair was involved and in each case the black-crowned bird was a female; no black-crowned males paired with white-crowned females were found. In the 1987 breeding season, however, a pair of black-crowned birds (which I considered to be first-years) held territory at Hamrah Judah (*see Figure 2d*). This pair remained on this territory until at least 13 March and thereafter at least one bird was present until 10 April (W. Ross *pers. comm.*) but it is not known whether they bred. It is interesting, however, that they did not occupy a traditional territory but a peripheral one which had not been occupied the previous year. The fact that territory is defended by the male, that all traditional territories were occupied by white-crowned males, and that the only obviously peripheral territory was occupied by a black-crowned pair, lends some support to the belief of Cramp (1988) that a black crown is always a sign of immaturity (since younger birds generally compete less well for territory).

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SUMMARY

The results are presented of a study of the behaviour of a small population of White-crowned

Black Wheatears *Oenanthe leucopyga* which was carried out during 1985 and 1986 in eastern Arabia. The habitat comprised rocks and crags which were used for nesting, roosting, loafing and refuge, and open, lightly vegetated desert used for feeding. Diet consisted almost entirely of insects which were usually caught by a 'perch and pounce' technique. Breeding territories averaged 6.7 ha. Territories were occupied through the year, and methods of defence included song, song flights, aerial pursuits and two displays. Territories were defended against both non-conspecific and conspecific intruders. Courtship was noted from November, and nest construction from late January onwards. Courtship chases, courtship subsong and three types of courtship display occurred. Nests were built by the female in holes and crevices and their chief feature was a platform of pebbles. Incubation was by the female alone but the young were cared for by both parents; in one case the male raised the first brood while the female incubated the second clutch. There was some evidence of cooperative breeding with one or more first-brood juveniles helping to feed a second brood. The young were dependent on their parents for three weeks after fledging and thereafter some were tolerated in and around their parents' territories until at least December. Pairs appeared to break up after the breeding season, but there is no information on fidelity from one breeding season to the next. Anti-predator strategies included an anxiety display, alarm calls and the mobbing of predators. Song was varied and comprised both musical and non-musical elements; two types of subsong were uttered and there was a variety of calls.

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THE AUTUMN MIGRATION OF RAPTORS AND OTHER SOARING BIRDS ACROSS THE BAB-EL-MANDEB STRAITS

by

Geoff Welch and Hilary Welch

INTRODUCTION

Over the course of two expeditions to Djibouti, Djibouti II (Welch & Welch 1986) and Djibouti III (present study), we have discovered and monitored a small part of the very impressive migration, principally of raptors, which is now known to take place across the Bab-el-Mandeb Straits into Africa each autumn. For birds which use the Arabian Peninsula as a migration flyway on their journey between Russia and Africa, the straits provide a natural funnel. Until such time as it becomes possible to carry out similar work on the Yemen side of the straits, Djibouti presents an unsurpassable observation point to obtain insight to the importance of the whole Arabian Peninsula for migrants.

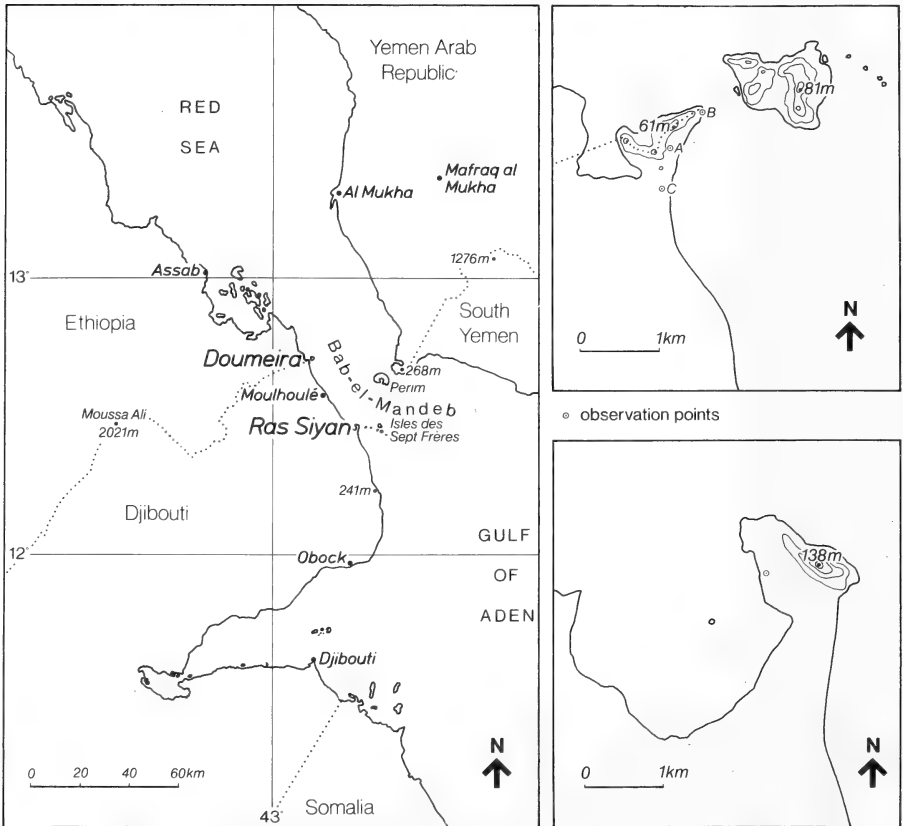


Figure 1. Left: Bab-el-Mandeb Straits. Top right: Doumeira. Bottom right: Ras Siyan.

WELCH, G. & WELCH, H. 1988. The Autumn Migration of Raptors and other Soaring Birds across the Bab-el-Mandeb Straits. *Sandgrouse* 10: 26-50.

With the northern end of the Red Sea a comparatively well-known and documented concentration point for migrating birds of prey (Bijlsma 1983, Shirhai 1987), it came as a surprise to discover that almost nothing but speculation had been written about the southern end. Although the northern route provides a slender bridge of land between the Asian and African continents for birds not equipped for a long journey over water, it was not known whether or not the 20 km. of the Bab-el-Mandeb Straits would prove too wide for such birds. Reports of large numbers of raptors in the straits had, however, already been published – Madarász (1915) wrote of “many thousands” of Black Kites *Milvus migrans* over the island of Perim on 5 March 1907, and Tuck (1965) and Casement (1983) described spring and autumn records in the same area, involving Black Kites and unidentified “large buzzards or small eagles”.

THE COUNT SITES

Ras Siyan

Ras Siyan is a promontory lying 18 km. south of the Moulhoulé army post (Figure 1); at its tip is a stepped hill rising to 138 metres which dominates the surrounding coastal plain. On the landward side of the hill lies a large tidal lagoon bordered by mangroves, whilst out to sea, at distances between 5 and 13 km., are six islands which together with Ras Siyan form Sept Frères. Our count site lay to the west of the hill, on the edge of the lagoon.

Ras Siyan was our initial observation point in both 1985 and 1987, and here we discovered the most concentrated migration to occur when winds were north-westerly. The route across the straits is at its shortest here, for birds following a SSW course from Perim Island, 2 km. off the Arabian coast, it totals 20 km. Birds leaving Yemen can maintain and increase their altitude over Perim, and any which are drifted south can again obtain lift over Sept Frères before completing their crossing.

Doumeira

Doumeira lies 32 km. north of Ras Siyan, straddling the Djibouti-Ethiopian border. The area comprises a low ridge rising to 61 metres, orientated NE/SW and continued on an offshore island with a hill of 81 metres. To the north of the ridge (on the Ethiopian side) is a small sheltered bay, and stretching away to the west and south is the flat and featureless coastal plain. Looking south from the top of the ridge, Ras Siyan is clearly visible as the only relief in



Plate 1. The straits of the Bab-el-Mandeb, from the campsite at Moulhoulé with Yemen in the background, November 1987. Perim Island is the flat area of land on the right. (Geoff and Hilary Welch)

the landscape. Westwards, across 16 km. of plain, the inland hills (rising eventually to Moussa Ali – 2,021 metres) can be seen, as can the Yemen coast to the east. Further north the coast curves westwards as the Red Sea widens, and the inland hills peter out.

During the course of the 1985 count it became apparent that the winds at Bab-el-Mandeb become settled in the south-east from October, and this results in the migration moving north, from Ras Siyan to Doumeira, and the birds' crossing of the straits from Perim increasing to 27 km. Doumeira straddles the Djibouti/Ethiopian border, and this restricted the choice of count sites to vantage points on the Djibouti side of the frontier. Additionally, we were requested not to camp at Doumeira, where the army could not guarantee our safety, so base-camp was set up south of the border post at Moulhoulé, 15 km. south of Doumeira, and we travelled from there to the count site each day.

WEATHER

The Bab-el-Mandeb Straits provide migrating birds with exceptionally reliable and favourable weather. Each year, from October to the end of April low-level winds are SE-SSE, and from June to August they are NW-NNW. In the intervening months of May and September, winds are more variable, often dropping altogether, and the weather is extremely hot and humid. High-level winds are always northerly (Smith 1960).

In 1985 and 1987, air temperature, relative humidity, cloud cover, wind direction and strength were recorded at hourly intervals during the count period, along with the minimum night temperatures. A summary of these weather records is given in the table below.

SUMMARY OF THE WEATHER RECORDS KEPT DURING THE COUNT PERIODS IN 1985 AND 1987.

		1985	1987
Temperature Range	maximum	29-35°C	33-37°C
	minimum	23-27°C	23.5-32°C
Relative Humidity Range		55-80%	32-82%
Maximum Wind Speed	average	26 kph	25 kph
	range	13-48 kph	14-35 kph
Minimum Wind Speed	average	15 kph	15 kph
	range	6-29 kph	3-24 kph

The table confirms the remarkably stable weather conditions, at least on the Djibouti side of the straits. However, the birds' crossing of the Red Sea is unlikely to be influenced by the small fluctuations in the weather they encounter on arrival in Djibouti, conditions in Yemen and further north being more relevant to any variations in the daily movement. We knew that the weather in Yemen was often different from our own as on more than one occasion in 1987 spectacular storms were seen and heard at night, lighting up the Yemen mountain skyline. However, even these storms had no noticeable effect on the movement.

The only factor we measured which had any direct and predictable influence was wind direction and strength. Northerly winds appeared to drift the birds to Ras Siyan and southerlies to Doumeira. Light or no winds meant a direct and more arduous crossing, in a straight line across the straits to Moulhoulé – this we observed only three times, on 26 September 1987 from a light aircraft (see Supplementary Observations from a Light Aircraft, below) and on 8 and 9 November 1987. Daily wind direction is given in TABLES I-III.

PERIOD OF OBSERVATIONS

In 1985 a team of three observers (the authors plus M. L. Denton) counted for a total of 17 days (125 hours), from 15 October to 1 November, with 15-22 October at Ras Siyan and 24 October-1 November at Doumeira (Figure 1). However, of the eight days spent at Ras Siyan,

significant migration was recorded on only the two days of north-westerly winds, 16/17th. From 18 October the winds were south-easterly and it was seven days before we found and could follow the migration 32 km. up the coast to Doumeira. Thus figures for 1985 represent little more than 11 days counting at the centre of the movement.

In 1987, a team of up to seven observers (the authors plus D. J. Burges, R. van Diggelen, F. R. Gomes, H. C. Thurgate and J. Visser) documented the movement from 3 October to 9 November, a total of 38 days (197 hours), with the birds most concentrated at Doumeira on all but one of these days. From 3-9 October our base camp was at Ras Siyan, but the wind settled in the south-east earlier than in 1985, and significant migration was only observed here on 3rd. Even then it was evident that Ras Siyan was receiving only the southern edge of the movement (the figures in TABLE III for this day are all from Ras Siyan). To save time and fuel base camp was finally moved to Moulhoulé on 10 October, thus reducing the journey to Doumeira from 1½ hours to 30 minutes.

The period covered each day varied, particularly in 1987, and is given in TABLES I-III. The time spent counting was principally governed by vehicle availability, so on occasions parts of the movement were missed. The days on which we totally failed to reach Doumeira or arrived there to find the movement already well underway are marked in the tables – on these occasions we are likely to have missed in excess of a thousand birds, and on 7 October 1987 probably over 20,000.

COUNTING THE MOVEMENT

In 1985 the three observers counted as a group from the same vantage point, with each person having the same duties from day to day. Thus during the two days of passage at Ras Siyan, observer 1 counted Steppe Buzzards (the most numerous species), whilst observers 2 and 3 divided the counting and identifying of the remaining species between them, observer 3 having the additional task of writing down the hourly totals and recording the weather. At Doumeira, observer 2 counted the main stream of Steppe Eagles passing overhead, observer 1 counted the movement passing to the south (again, principally Steppe Eagles), whilst observer 3 identified and noted all other species, and again kept hourly records of totals and the weather. With this system the possibility of double counting was eliminated.



Plate 2. Dave Burges and Hugh Thurgate counting south of Doumeira in open desert, October 1987. (Geoff and Hilary Welch)

In 1987 counts were made by two to six observers and, although the basic 1985 system was adopted, observers had different duties each day. Additionally, experiments were made to try and improve our coverage of the migration. The principal concerns were to determine the extent of the migration (i.e. the breadth of the front) and to endeavour to count *and identify* as large a proportion of the birds passing as possible, without double counting. Most of the experimentation was done when there were six observers (15-26 October) and involved dividing into two teams, counting from one to four km. apart (see Choosing a Count Site). In 1987 the weather was recorded at base camp by the team member on duty there.

In 1985 and 1987 the bulk of the birds were found and counted using 10× binoculars. However, often the centre of the movement at Doumeira would be counted by one observer with the naked eye (the birds being so close and on such a broad front), whilst someone else scanned through to find and identify the scarcer species. Telescopes (20-60×) proved invaluable for counting the northern and southern edges of the movement and resulted in more birds being found, though heat-haze often made identification extremely difficult.

RECORDING THE COUNTS

In both 1985 and 1987 records were kept in the same way. During the day counts were made in hourly units (using hand tally counters for the most numerous species) and at the end of each hour totals were noted, tally counters zeroed and weather recorded. At the end of the day all information was transferred to a standardised form on a Migration Recording Sheet. In 1985 tally counters were limited to one per person. However, in 1987 observers used up to three tally counters at one time, this enabling one person to produce more detailed counts, particularly of the principal species. Thus by counting the main stream of passing eagles on two tally counters it was possible for one person to produce separate figures for identified and unidentified birds – i.e. Steppe Eagles and *Aquila* sp. Only on the two heaviest days of Steppe Buzzard movement (6 and 8 October 1987) was it necessary on occasion to estimate the number of birds passing, otherwise all birds were counted individually.

HEIGHT OF MIGRATING BIRDS

Birds arriving at Doumeira in the strong south-easterlies were generally at heights between 60 and 100 metres, with small numbers lower than this, and some birds possibly as high as 300 metres. Observing the migration from the Djibouti coast under south-easterly winds the birds seemed to find no difficulty in making the crossing. Both eagles and buzzards could be seen a long way out to sea, never at any great height, gliding straight towards Doumeira. Furthermore, in the late morning/early afternoon 'thermals' of over 100 birds were frequently seen forming at least two kilometres from land. The air currents low over the straits thus appeared to provide very favourable conditions for a crossing.

At Ras Siyan in 1985 the light northerlies appeared to produce a more taxing journey, and from midday up to six buzzards at a time could be seen resting on the Ras Siyan hill, panting. Additionally a local told us of a raptor (from his description, a Short-toed Eagle) which he had disturbed from one of the Sept Frères islands. The bird had flown away from him a short distance over the sea before dropping exhausted into the water; with some difficulty he managed to retrieve it from the sea and return it to dry land. However, the exhaustion of all these birds was most likely to have been due to the lightness of the wind (less than 14 kph) rather than its direction. On 8 November 1987 when the southerly winds remained below 14 kph all day, birds were seen having difficulties flying over the sea towards Moulhoulé (a Steppe Buzzard was so low that its flapping wings touched the water), but these difficulties were not observed when the wind was stronger.

Before our initial work in 1985, we had assumed that birds leaving Yemen would attain considerable height before embarking on their journey across the straits, heights which would have made them invisible to the naked eye on the Yemen coast. However, as yet we have found no evidence to support this, though birds have certainly been recorded moving south

through North Yemen at great height (Porter & Christensen 1987). The only available information on altitude from the Yemen side of the straits is that provided in three accounts, all of observations made whilst travelling through the straits by boat.

31 October 1962 . . . 14.00 hrs – 4 Buzzards and 1 Long-legged Buzzard passed bows very close →W. An island (1½ miles to port) [Perim] had some 500 raptors, i.e. *Buteos* and *Aquilas* and some Black Kites soaring in thermals above it, often many very low. At least 100 birds sitting about on rocks, walls or ground, probably Steppe Buzzards, Steppe Eagles and Kites mainly.
P. Colston *pers. comm.*

. . . on 9 November 1963, Commander J. N. Humphreys reports a swirling spiral of raptors at 1,000 feet over Perim Island which were probably this species [Black Kite]. Tuck 1965

On 3 October 1980 when approaching Bab-el-Mandeb Straits . . . several hundred (possibly over a thousand) unidentified raptors flew over the ship east-west towards Africa at heights varying 0-500ft. They were the size of large buzzards or small eagles, and flew in random small groups.
Casement 1983

TIME OF MIGRATION

In 1985 the times between which raptors crossed the straits were very predictable, particularly at Doumeira when the principal species was Steppe Eagle and the period of migration each day was very short. From 25 October to 1 November the first eagle was seen between 0850 and 0905 hrs. on six of the eight days. The migration was at its peak between 0930 and 1100 hrs. every day (peak hour 1000-1100 hrs., with a maximum of 4,574 raptors on 25 October). From 1200 hrs. the movement rapidly petered out so that after 1400 hrs. very

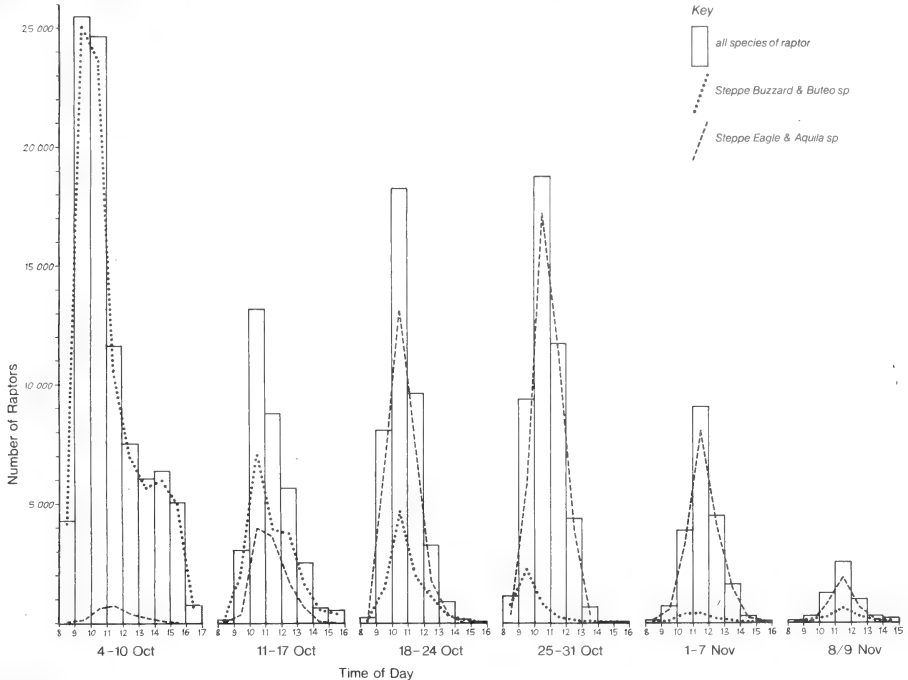


Figure 2. Total number of raptors per hour at Bab-el-Mandeb in weekly periods.

few birds were recorded (out of the four days on which it was counted the highest total from 1400-1500 hrs. was on 26 October with 19 raptors).

During the two days of movement at Ras Siyan the principal species was Steppe Buzzard, and the migration was spread over more of the day, with much larger numbers of birds passing. Once again birds began moving between 0900 and 1000 hrs., and with the wind remaining in a northerly quarter, Steppe Buzzards were still arriving between 1700 and 1800 hrs on 16 October (73 raptors), despite the hard crossing (see above). The highest hourly total was on 17 October at 1200-1300 hrs. with 5,332 raptors.

In 1987, a much longer period was covered, and a greater fluctuation in the pattern was observed. On occasions there were inexplicable daily variations, presumably the result of holdups caused by changes in weather further north along the birds' route. Generally the peak hour of movement became later in the day as the principal species changed and the season progressed (see *Figure 2*).

The most intriguing feature of the pattern of movement at Bab-el-Mandeb was the shortness of the period each day when birds could be seen migrating. When Steppe Buzzards were at their most numerous, migration would start early in the morning (probably before 0800 hrs. at Doumeira in 1987) and continue throughout the day with birds still arriving at rates of hundreds per hour after 1600 hrs. (Unfortunately, in 1987 it was never possible to cover a complete day's movement when Steppe Buzzards were at their peak so no precise times are available.) However, when the Steppe Eagle became the principal species the migration was slower starting, and by 1400 hrs. each day the movement was effectively over, with relatively insignificant numbers of birds passing – average 44 between 1400 and 1500 hrs. This is a rather high figure since the only days for which counts are available are those on which reasonable numbers of birds were passing.

Watching the movement from day to day, each of the team members was convinced that the birds were not passing at heights beyond sight in the afternoon, and scans of the sky with binoculars produced no birds. However, only work with radar will discover whether or not birds are passing: at the Straits of Gibraltar the migration visible to ground-based observers does not commence in any numbers until midday, but radar has shown the movement to be well established at 0800-0900 hrs. (Evans & Lathbury 1973).

CONCLUSIONS ABOUT THE MOVEMENT

- i Birds have been observed crossing the Bab-el-Mandeb Straits under *any* wind conditions, adapting their route to suit the conditions available.
- ii Once the Steppe Eagle became the principal migrant species, from about 1300 hrs. each day the whole movement would come to an abrupt end. There was no sign of birds arriving at greater and greater altitudes as numbers dwindled.
- iii Following the 1985 count, it was considered possible that the early end to the day's migration was due to the birds' landfall being drifted further north. However, frequent scanning of the coast to the north produced no evidence to support this in 1987.
- iv On days with wind speeds below 14 kph the migration of all species continued into the late afternoon, with the last Steppe Eagles recorded at 1500-1600 hrs.

Postscript – When Peter Colston sailed through the Bab-el-Mandeb Straits at 1400 hrs. on 31 October 1962 he made the following observation:–

“A few birds that had gained sufficient height then glided off east. I think most of the birds were not making much progress and presumably were going to sit it out till the next day. The few Steppe Buzzards that passed us flew rather low and labouredly across the straits – I don't think that the Steppe Eagle, etc., even contemplated doing the same.”

It would be very interesting to carry out observations from the eastern side of the straits in autumn to discover what the daily pattern of movement is there. If the birds are found to be grounded from 1400 hrs. it may be that the air currents on days with winds in excess of 14 kph

are not conducive to a successful crossing.

CHOOSING A COUNT SITE

Choice of a count site was governed by the fact that birds arrived at very low levels (generally about 70 metres) and on a front 8-10 km. wide. At Doumeira this meant that close birds were soon lost from view behind the ridge, and distant birds were rendered difficult to see and identify by the heat-haze. The latter problem was overcome to a certain extent by endeavouring to count birds whilst they were still over the sea, where heat-haze was minimal.

In 1987 we tried counting from three different vantage points at Doumeira, all the time hoping to discover a site from where it was possible to see the majority of birds passing (to obtain the maximum possible count) combined with long views (to give time to identify the more difficult species). All three sites (marked on *Figure 1*) were on the beach a little above sea level. Some team members advocated trying a fourth site, on the end of the ridge at about 50 metres a.s.l. This latter site gave excellent panoramic views, but at the time was rejected largely on the grounds of its political sensitivity; it was right on the Ethiopian frontier and



Plate 3. Geoff Welch and Dave Burges counting at site B, looking east from Doumeira to the island, October 1987. (Geoff and Hilary Welch)

observers (armed with binoculars and telescopes) would be readily visible from Ethiopia. With hindsight, it is likely that the site would also have compounded a developing problem which we had not foreseen – identifying the closest birds which passed over the ridge. Inevitably, by moving our observation point to provide counters with longer views of more birds, we had to move away from the ridge as it obscured our view. At our count site to the south of the ridge (C) very few birds passed directly over us, but larger numbers of birds could be counted than from our northernmost site (B). However, due to the birds' low altitude, as soon as one ceased to be underneath the main stream of arriving raptors, identification became extremely difficult. Ultimately the count sites either gave excellent split-second views of birds as they passed overhead and then disappeared behind an overhanging rock, or long, more distant head-on or wing-tip views. The fourth, which was never tried (on the end of the ridge directly above

point B), would have placed observers at the same altitude or higher than the arriving raptors, with very close but unhelpful views when it was necessary to identify birds in a hurry if counters were to keep pace with the arriving stream.

Overall, the best counting of the movement appeared to be accomplished when there were enough people available to split into two teams: one team of two observers counting from point C, recording birds moving to the south and directly overhead, and the other of three observers counting the main stream of birds channelled by the ridge and any movement to the north from point B. However, when only two or three observers were available it made more sense to count from one site, and then the 1985 observation point (A) seemed the best compromise.

SUPPLEMENTARY OBSERVATIONS FROM A LIGHT AIRCRAFT

Through the generosity of the Djibouti Office of Tourism (ONTA), we were able to make a one and three-quarter hour flight over the Bab-el-Mandeb Straits a week before the 1987 count. This proved to be both worthwhile and exciting.

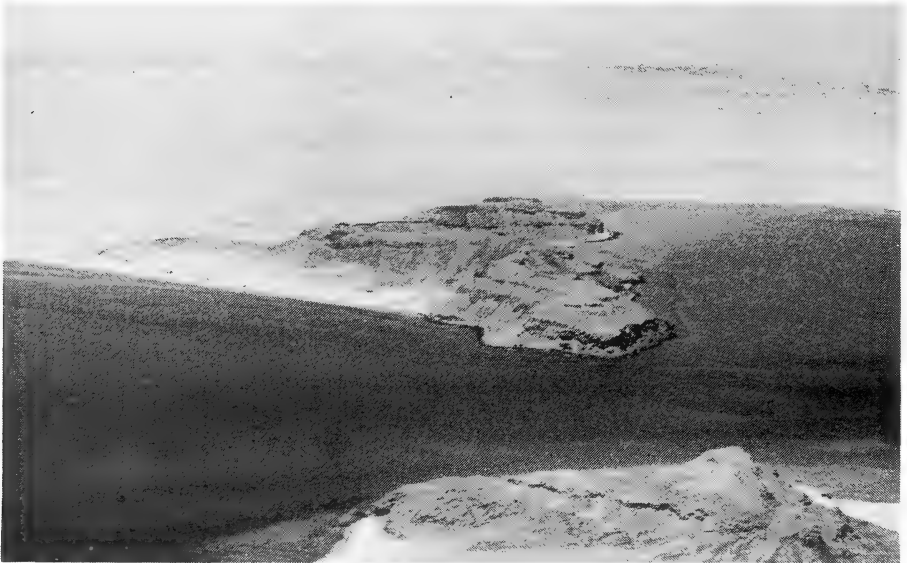


Plate 4. Doumeira from the air, looking west from over the island, September 1987. Sites A, B, and C are all visible. (Geoff and Hilary Welch)

The flight took place on 26 September when winds were northerly. However, at the time of take-off (0945 hrs.) the wind was so slight that the airport windsocks were not moving, and its strength had changed little by the time we returned at 1130 hrs. The flight took in the entire east coast of Djibouti, from Obock to Doumeira, but it was only in the region of Moulhoulé that raptors were found arriving, flapping in low over the sea. Having ascertained where the birds were, they were then followed inland in an effort to determine their line of flight. This proved not only difficult but also dangerous; the birds were fast gaining height and from being some distance below us would suddenly appear out of nowhere at the same altitude as the plane. Furthermore, 13 km. inland it became impossible to find the centre of the movement as the birds spread out in all directions – without radar or other assistance from the ground little more could be done. Nonetheless, some interesting information was obtained from this short exercise.

- i On 26 September, in around 20 minutes, about 1,000 raptors were seen, the majority of which were Honey Buzzards; over the five and a half weeks of the count which followed only 17 more of this species were recorded. Also identified were Black Kite, Booted Eagle, Egyptian Vulture and Short-toed Eagle.
- ii Under the almost windless conditions prevailing at ground-level, the birds were flapping low over the sea and following a WSW course which amounted to a straight line from Perim Island, via Moulhoulé, into Djibouti.
- iii On arrival at the coast birds were thermalling to heights of around 300 metres and at 13 km. inland had reached at least 900 metres.
- vi The width of the movement, i.e. the distance over which large raptors could be observed arriving along the coast at any one time, was 8-10 km. and this was regularly confirmed from the ground over the following 5½ weeks.

SPECIES ACCOUNTS

Figures given relate to birds, migrating across the straits, recorded during each count period: 15 October to 1 November 1985; 3 October to 9 November 1987. For the purposes of this paper, Ras Siyan records include birds observed up to 10 km. north of the site, whilst Doumeira includes those records made from the base camp at Moulhoulé. Records of migrants outside these areas are not included. TABLES I-III give daily totals of the counts.

Ciconia nigra

Black Stork

1985 Three at Ras Siyan on 16 October, six on 17 October.

1987 166 at Doumeira 8 October to 7 November. The largest parties were 72 on 20 October and 52 on 24 October.

Ciconia abdimii

Abdim's Stork

1985 No records.

1987 713 between 3 and 25 October. Of these, 69 were at Ras Siyan on 3 October. The largest party was c. 300 on 10 October. 15 unidentified 'black' storks *C. nigra/abdimii* were recorded, all at Doumeira.

The 1987 observations suggest a healthy population in SW Arabia, perhaps larger than hitherto suspected.

Ciconia ciconia

White Stork

1985 One at Ras Siyan on 17 October, three at Doumeira on 29 October.

1987 55 at Doumeira on 10 October, and singles on 19 October and 9 November. Three were observed feeding along the shoreline at Moulhoulé on 8 November, presumably having just completed a crossing of the straits.

It seems unlikely that Bab-el-Mandeb is an important route for White Storks but work needs to be carried out in August/September, when any migration would be at its peak, to verify the situation.

Plegadis falcinellus

Glossy Ibis

1985 No records

1987 Two flying west over Doumeira, 9 November.

Pernis apivorus

Honey Buzzard

1985 Singles at Ras Siyan on 17 and 18 October. One at Doumeira on 25 October, two on 29 October.

1987 17, most in the first half of October, with a daily maximum of five at Ras Siyan on 3 October.

Most of the 1,000 raptors observed during c. 20 minutes of the light aircraft flight on 26 September 1987 were judged to belong to this species, though identification was exceedingly difficult. This suggests that Bab-el-Mandeb may be an important route for Honey Buzzards but the bulk of the movement is likely to take place in late August and September.

TABLE I. DAILY TOTALS OF SOARING BIRDS OBSERVED MIGRATING AT BAB-EL-MANDEB.

RAS SIYAN 1985

DATE—October	15	16	17	18	19	20	21	22
Wind direction and speed (kph)	SE 6-18	NW-E 8-14	NW-S 7-13	SE-S 6-16	SE 13-16	SSW-SE 13-16	ESE 12-29	ESE 13-16
Period of observations (hrs) ¹	0800 1800	0600 1800	0900 1800	0800 1800	0800 1700	0800 1300	0800 1600	0800 1300
<i>Ciconia nigra</i>		3	6					
<i>Ciconia abdimii</i>								
<i>C. nigra/abdimii</i>								
<i>Ciconia ciconia</i>			1					
<i>Plegadis falcinellus</i>								
<i>Pernis apivorus</i>			1	1				
<i>Milvus migrans</i>		37	8	1				
<i>Neophron percnopterus</i>		18	5	3	1			
<i>Gyps fulvus</i>								
<i>Circaetus gallicus</i>		16	102	1				
<i>Circus aeruginosus</i>	2	2				1	1	
<i>Circus macrourus</i>	1	2	5	2		1	1	
<i>Circus pygargus</i>		3	2	1				
<i>C. macrourus/pygargus</i>		4	3	3	3	1	1	
<i>Accipiter nisus</i>	9	107	132	16	14	2	18	4
<i>Accipiter brevipes</i>	1	1						
<i>A. nisus/brevipes</i>	10	2	1					
<i>Buteo buteo vulpinus</i>	1	6,052	10,529	72		1	1	
<i>Buteo rufinus</i>		1		1				
<i>Buteo sp.</i> ²	7	883	1					
<i>Aquila pomarina</i>								
<i>Aquila clanga</i>		2	3					
<i>Aquila nipalensis</i>		147	155	9	2	1		
<i>Aquila heliaca</i>								
<i>Aquila sp.</i>		3	12	1	1		3	2
<i>Hieraaetus pennatus</i>		42	54	1				
<i>Hieraaetus fasciatus</i>				2				
Eagle sp.					1			
<i>Pandion haliaetus</i>								
<i>Falco naumanni</i>			3					
<i>Falco tinnunculus</i>	1	17	12	2	1			
<i>Falco vespertinus</i>								
<i>Falco subbuteo</i>		2	7	1	1	1		1
<i>Falco eleonora</i>							1	
<i>Falco biarmicus</i>		1	2					
<i>Falco cherrug</i>		1	2					
<i>Falco peregrinus</i>		2	3	1				
<i>Falco sp.</i>		9	5				1	
Raptor sp.								
<i>Grus grus</i>								
TOTAL RAPTORS	32	7,354	11,047	118	24	8	27	7
OTHERS		3	7					

* Observers not on site for the whole of the peak of the movement, 1,000+ birds missed.

¹ With some additional records from base camp outside this period.² *Buteo sp.* probably includes a few *Pernis*, *Milvus* and *Hieraaetus*.

TABLE II. DAILY TOTALS OF SOARING BIRDS OBSERVED MIGRATING AT BAB-EL-MANDEB.

DOUMEIRA 1985

DATE—October/November	*24	25	26	27	28	29	30	31	1
Wind direction and speed (kph)	SE 21-32	SE 16-26	SE 16-24	SE 16-48	SE 19-32	SE 24-29	SE 26-35	SE 16-39	SE 29-34
Period of observations (hrs) ¹	1030 1600	0800 1500	0900 1500	0900 1400	0900 1500	0800 1330	0900 1400	0900 1400	0900 1330
<i>Ciconia nigra</i>									
<i>Ciconia abdimii</i>									
<i>C. nigra/abdimii</i>									
<i>Ciconia ciconia</i>						3			
<i>Plegadis falcinellus</i>									
<i>Pernis apivorus</i>		1				2			
<i>Milvus migrans</i>	1	2		2	1	3			
<i>Neophron percnopterus</i>			1	1		1	8	1	2
<i>Gyps fulvus</i>									
<i>Circus gallicus</i>	5	16	4	9	24	9	11	3	3
<i>Circus aeruginosus</i>									
<i>Circus macrourus</i>	1			2				1	
<i>Circus pygargus</i>									
<i>C. macrourus/pygargus</i>				1	1				
<i>Accipiter nisus</i>	18	15	3	6	15	7	11	19	7
<i>Accipiter brevipes</i>									
<i>A. nisus/brevipes</i>									
<i>Buteo buteo vulpinus</i>	7	166	42	130	153	342	112	201	66
<i>Buteo rufinus</i>		1			1				
<i>Buteo sp.</i> ²						3			
<i>Aquila pomarina</i>									
<i>Aquila clanga</i>									1
<i>Aquila nipalensis</i>	3,240	10,204	6,577	6,776	9,824	5,929	7,658	4,529	5,846
<i>Aquila heliaca</i>		8		1		1	1	1	4
<i>Aquila sp.</i>	2						2		
<i>Hieraaetus pennatus</i>	3	5	1	2	3	4	6	3	
<i>Hieraaetus fasciatus</i>									
Eagle sp.									
<i>Pandion haliaetus</i>									
<i>Falco naumanni</i>				1					
<i>Falco tinnunculus</i>	1	1	1	3	2	1	4	1	1
<i>Falco vespertinus</i>									
<i>Falco subbuteo</i>		1			1			1	
<i>Falco eleonorae</i>							1		
<i>Falco biarmicus</i>	2		2		1				
<i>Falco cherrug</i>									
<i>Falco peregrinus</i>	2	2		1	2	1	1	1	
<i>Falco sp.</i>	3	2				1			1
Raptor sp.						1			
<i>Grus grus</i>									
TOTAL RAPTORS	3,285	10,424	6,631	6,935	10,028	6,305	7,815	4,761	5,931
OTHERS						3			

* Observers not on site for the whole of the peak of the movement, 1,000+ birds missed.

¹ With some additional records from base camp outside this period.² *Buteo sp.* probably includes a few *Pernis*, *Milvus* and *Hieraaetus*.

TABLE III. DAILY TOTALS OF SOARING BIRDS OBSERVED MIGRATING AT BAB-EL-MANDEB.

RAS SIYAN – DOUMEIRA 1987

DATE – October	*3	*4	*5	*6	*7	*8	9	*10	11	
Wind direction and speed (kph)	ENE-SE	SE	ESE-E	ESE-SE	SE	SE	SE	SE	SE	
Period of observations (hrs) ¹	1100 1630	1220 1530	0925 1600	14-24 1630	14-26 1630	14-27	19-26 1500	13-23 1400	10-23 1530	16-23 0910 1600
<i>Ciconia nigra</i>						1		1		
<i>Ciconia abdimii</i>	69	84	36	18				c. 300		
<i>C. nigra/abdimii</i>									13	
<i>Ciconia ciconia</i>								55		
<i>Plegadis falcinellus</i>										
<i>Pernis apivorus</i>	5	2	1				2	1	1	
<i>Milvus migrans</i>	1	20	19	33	1	12	8	37	43	
<i>Neophron percnopterus</i>	2	35	15	41		74	18	17	12	
<i>Gyps fulvus</i>										
<i>Circus gallicus</i>	2	1	16	25		23	53	52	117	
<i>Circus aeruginosus</i>	3	5		5	2	1		4		
<i>Circus macrourus</i>	14	3	1	6	1	3	2	1	1	
<i>Circus pygargus</i>	3	1		1					3	
<i>C. macrourus/pygargus</i>	7	1	7	14		5	3	2	2	
<i>Accipiter nisus</i>	135	34	41	71	17	99	130	120	81	
<i>Accipiter brevipes</i>								1		
<i>A. nisus/brevipes</i>						1				
<i>Buteo buteo vulpinus</i>	131	3,768	9,398	19,870		19,781	8,197	7,124	6,321	
<i>Buteo rufinus</i>								1		
<i>Buteo sp.</i> ²	2,440	3,179	2,679	5,604		5,514	3,607	548	1,454	
<i>Aquila pomarina</i>										
<i>Aquila clanga</i>		1								
<i>Aquila nipalensis</i>	5	30	173	267		200	896	617	1,268	
<i>Aquila heliaca</i>			1				3			
<i>Aquila sp.</i>		20	62	17		7	2		10	
<i>Hieraetus pennatus</i>	3	14	35	70		105	149	129	123	
<i>Hieraetus fasciatus</i>			1							
Eagle sp.										
<i>Pandion haliaetus</i>										
<i>Falco naumanni</i>										
<i>Falco tinnunculus</i>	4	2	1	6		1		1		
<i>Falco vespertinus</i>										
<i>Falco subbuteo</i>	2		3			3	1	1	3	
<i>Falco eleonorae</i>										
<i>Falco biarmicus</i>	1	1	1				1			
<i>Falco cherrug</i>										
<i>Falco peregrinus</i>										
<i>Falco sp.</i>			1	2	1	1	3		2	
Raptor sp.			70	12					59	
<i>Grus grus</i>										
TOTAL RAPTORS	2,758	7,117	12,525	26,044	22	25,830	13,075	8,656	9,500	
OTHERS	69	84	36	18		1		356	13	

* Observers not on site for the whole of the peak of the movement, 1,000+ birds missed.

¹ With some additional records from base camp outside this period.² *Buteo sp.* probably includes a few *Pernis*, *Milvus* and *Hieraetus*.

TABLE III (contd.)

RAS SIYAN – DOUMEIRA 1987

DATE – October	*12	13	*14	15	16	17	*18	19	20
Wind direction and speed (kph)	SE 16-26	SE 14-27	SE 13-26	SE 19-26	SE 19-23	SE 16-23	SE 14-29	SE 14-29	SE 16-27
Period of observations (hrs) ¹	1200 1600	0800 1300		0820 1600	0830 1500	0815 1400	1019 1500	0810 1500	0800 1600
<i>Ciconia nigra</i>	6				5		2	4	c. 72
<i>Ciconia abdimii</i>									135
<i>C. nigra/abdimii</i>							1		
<i>Ciconia ciconia</i>								1	
<i>Plegadis falcinellus</i>									
<i>Pernis apivorus</i>						2		1	
<i>Milvus migrans</i>	4	3	1	107	9	3	7	12	27
<i>Neophron percnopterus</i>	11	41	5	75	50	26	3	30	10
<i>Gyps fulvus</i>									
<i>Circaetus gallicus</i>	8	6		126	53	52	13	29	62
<i>Circus aeruginosus</i>		1	4	4	1	1	1	1	
<i>Circus macrourus</i>		1		1		7		5	3
<i>Circus pygargus</i>				1	1	2			1
<i>C. macrourus/pygargus</i>	4	6	2	4	3	2	1	4	4
<i>Accipiter nisus</i>	23	26	15	121	160	130	21	44	52
<i>Accipiter brevipes</i>				2	3				
<i>A. nisus/brevipes</i>				6					
<i>Buteo buteo vulpinus</i>	520	505	1	1,214	1,366	6,914	1,100	1,144	2,437
<i>Buteo rufinus</i>				2		1			1
<i>Buteo sp.</i> ²	81	6		228	404	334	221		1,509
<i>Aquila pomarina</i>				4	4	3	2	2	1
<i>Aquila clanga</i>				5	1	3	1	2	1
<i>Aquila nipalensis</i>	465	63	1	3,111	2,517	1,655	1,217	3,467	4,785
<i>Aquila heliaca</i>					3	1	2	3	3
<i>Aquila sp.</i>	16	6		945	314	97	83	90	190
<i>Hieraaetus pennatus</i>	30	5		93	48	32	17	25	43
<i>Hieraaetus fasciatus</i>									
<i>Eagle sp.</i>					16				
<i>Pandion haliaetus</i>								1	
<i>Falco naumanni</i>						4			1
<i>Falco tinnunculus</i>	6	6	1	4	7	6	7	7	5
<i>Falco vespertinus</i>									
<i>Falco subbuteo</i>	2	5		1	7	3			
<i>Falco eleonora</i>									
<i>Falco biarmicus</i>					2			2	
<i>Falco cherrug</i>									
<i>Falco peregrinus</i>				1			1		2
<i>Falco sp.</i>	2	1	1	5	3	1	1	2	
<i>Raptor sp.</i>	77	34		1,857	399	367	131	98	103
<i>Grus grus</i>									
TOTAL RAPTORS	1,249	715	31	7,917	5,371	9,646	2,829	4,969	9,240
OTHERS	6				5		3	5	207

* Observers not on site for the whole of the peak of the movement, 1,000+ birds missed.

¹ With some additional records from base camp outside this period.

² *Buteo sp.* probably includes a few *Pernis*, *Milvus* and *Hieraaetus*.

TABLE III (contd.)

RAS SIYAN – DOUMEIRA 1987

DATE – October	21	22	23	24	*25	26	27	28	29
Wind direction and speed (kph)	SE 16-26	SE	ESE 24-32	SE 23-26	ESE 19-24	ESE-SE	ESE 14-16	ESE-SE 16-24	ESE 23-26
Period of observations (hrs) ¹	0825 1500	0820 1500	0820 1300	0800 1300	1045 1530	0840 1330	0820 1345	0942 1330	0830 1300
<i>Ciconia nigra</i>	9	3	2	52		3			
<i>Ciconia abdimii</i>		1							
<i>C. nigra/abdimii</i>									
<i>Ciconia ciconia</i>									
<i>Plegadis falcinellus</i>									
<i>Pernis apivorus</i>						1			
<i>Milvus migrans</i>	24	5	6	6	3	5	9	1	8
<i>Neophron percnopterus</i>	19	21	2	2		1	5		
<i>Gyps fulvus</i>									
<i>Circus aeruginosus</i>	50	41	37	33	19	75	60	8	4
<i>Circus macrourus</i>	3				1		1		
<i>Circus pygargus</i>		1				1	1		2
<i>C. macrourus/pygargus</i>	2			1	1				
<i>Accipiter nisus</i>	3	5	2	1	2	4	6	1	
<i>Accipiter brevipes</i>	144	61	33	53	54	28	48	10	13
<i>A. nisus/brevipes</i>	1							1	9
<i>Buteo buteo vulpinus</i>	786	959	711	390	175	1,543	1,476	31	82
<i>Buteo rufinus</i>	1	2			1	1	1		
<i>Buteo sp.</i> ²	524	2	122	42		245	306	109	18
<i>Aquila pomarina</i>	3	2	3	1		1	1		
<i>Aquila clanga</i>	2		2	1					
<i>Aquila nipalensis</i>	2,174	3,837	2,827	4,993	4,269	4,953	3,442	1,276	2,477
<i>Aquila heliaca</i>		2	1	3	1	4	5		
<i>Aquila sp.</i>	693	34	51	4,571	1,028	5,038	5,970	2,026	1,106
<i>Hieraaetus pennatus</i>	27	24	20	17	5	19	7	2	3
<i>Hieraaetus fasciatus</i>									
Eagle sp.							2		
<i>Pandion haliaetus</i>					1				
<i>Falco naumanni</i>									
<i>Falco tinnunculus</i>	6	11	4	8	5	4	5	1	2
<i>Falco vespertinus</i>					1				
<i>Falco subbuteo</i>	6	2		4	3	3		3	
<i>Falco eleonora</i>	1								
<i>Falco biarmicus</i>									
<i>Falco cherrug</i>									
<i>Falco peregrinus</i>								1	
<i>Falco sp.</i>	1	1	1	1		1	1		1
Raptor sp.	195	70	74	126	201	1,894	383	85	12
<i>Grus grus</i>									
TOTAL RAPTORS	4,665	5,080	3,896	10,253	5,770	13,821	11,729	3,555	3,737
OTHERS	9	4	2	52		3			

* Observers not on site for the whole of the peak of the movement, 1,000+ birds missed.

¹ With some additional records from base camp outside this period.² *Buteo sp.* probably includes a few *Pernis*, *Milvus* and *Hieraaetus*.

TABLE III (contd.)

RAS SIYAN – DOUMEIRA 1987

DATE – October/November	30	*31	1	2	3	4	5	6	7
Wind direction and speed (kph)	SE 18-26	ESE	SE 16-23	SE 13-26	SE 16-24	SE 13-23	SE-ESE 16-26	SE 13-35	SE 14-21
Period of observations (hrs) ¹	0815 1400	1007 1300	0820 1345	0815 1400	0825 1430	0830 1530	0815 1400	0800 1330	0800 1430
<i>Ciconia nigra</i>					1	3			2
<i>Ciconia abdimii</i>									
<i>C. nigra/abdimii</i>	1								
<i>Ciconia ciconia</i>									
<i>Plegadis falcinellus</i>									
<i>Pernis apivorus</i>									
<i>Milvus migrans</i>	1	3	4	15	9	66	12	13	17
<i>Neophron percnopterus</i>		4	3	9	1	2	2	5	6
<i>Gyps fulvus</i>									
<i>Circaetus gallicus</i>	14	11	24	4	13	42	14	8	63
<i>Circus aeruginosus</i>		1			1	1	3		
<i>Circus macrourus</i>			1		1	2		2	
<i>Circus pygargus</i>									
<i>C. macrourus/pygargus</i>	1		3	2	3	3	2	1	2
<i>Accipiter nisus</i>	26	15	24	33	62	53	26	13	29
<i>Accipiter brevipes</i>									
<i>A. nisus/brevipes</i>									
<i>Buteo buteo vulpinus</i>	75	37	145	55	38	112	169	114	489
<i>Buteo rufinus</i>		1	1	5	6	9	8	16	15
<i>Buteo sp.</i> ²		5	2	1		10	22	6	5
<i>Aquila pomarina</i>	1			1	1				1
<i>Aquila clanga</i>									
<i>Aquila nipalensis</i>	4,850	3,153	1,801	1,754	1,804	2,698	901	2,219	4,800
<i>Aquila heliaca</i>	2		2	5	2	4	6	5	8
<i>Aquila sp.</i>	317	691	726	55	105	525	147	24	326
<i>Hieraaetus pennatus</i>	4	5	7	2	6	13	7	4	18
<i>Hieraaetus fasciatus</i>									1
<i>Eagle sp.</i>	1		1						
<i>Pandion haliaetus</i>									1
<i>Falco naumanni</i>				1					
<i>Falco tinnunculus</i>	1	1	5	3	7	8	8	1	3
<i>Falco vespertinus</i>									
<i>Falco subbuteo</i>	1			3		1	4	1	2
<i>Falco eleonora</i>									
<i>Falco biarmicus</i>		1							
<i>Falco cherrug</i>									
<i>Falco peregrinus</i>						1			1
<i>Falco sp.</i>	1	2		3	1	1	4	1	
<i>Raptor sp.</i>	398	1	70	95	53	84	51	18	76
<i>Grus grus</i>									
TOTAL RAPTORS	5,693	3,931	2,819	2,046	2,113	3,635	1,386	2,451	5,863
OTHERS	1				1	3			2

* Observers not on site for the whole of the peak of the movement, 1,000+ birds missed.

¹ With some additional records from base camp outside this period.

² *Buteo sp.* probably includes a few *Pernis*, *Milvus* and *Hieraaetus*.

TABLE III (contd.)

RAS SIYAN – DOUMEIRA 1987

DATE – November	8	9		
Wind direction and speed (kph)	SE-ESE 6-23	SE 0-14	Total	Total
Period of observations (hrs) ¹	0815 1515	0800 1330	1985	1987
<i>Ciconia nigra</i>			9	166
<i>Ciconia abdimii</i>			–	643
<i>C. nigra/abdimii</i>			–	15
<i>Ciconia ciconia</i>	3	1	4	60
<i>Plegadis falcinellus</i>		2	–	2
<i>Pernis apivorus</i>		1	5	17
<i>Milvus migrans</i>	12	13	55	579
<i>Neophron percnopterus</i>	6	1	41	554
<i>Gyps fulvus</i>	2	1	–	3
<i>Circaetus gallicus</i>	27	17	203	1,202
<i>Circus aeruginosus</i>	1		6	45
<i>Circus macrourus</i>	3	4	16	67
<i>Circus pygargus</i>			6	17
<i>C. macrourus/pygargus</i>	2	2	17	116
<i>Accipiter nisus</i>	55	35	403	2,135
<i>Accipiter brevipes</i>			2	7
<i>A. nisus/brevipes</i>			13	17
<i>Buteo buteo vulpinus</i>	687	474	17,875	98,339
<i>Buteo rufinus</i>	36	23	4	131
<i>Buteo sp.</i> ²	30	594	894	29,851
<i>Aquila pomarina</i>			–	31
<i>Aquila clanga</i>		1	6	20
<i>Aquila nipalensis</i>	1,145	476	60,897	76,586
<i>Aquila heliaca</i>	4		16	70
<i>Aquila sp.</i>	1,755	875	26	27,922
<i>Hieraaetus pennatus</i>	10	2	124	1,123
<i>Hieraaetus fasciatus</i>			2	2
Eagle sp.	1		1	21
<i>Pandion haliaetus</i>			–	3
<i>Falco naumanni</i>	1	1	4	8
<i>Falco tinnunculus</i>	9	27	48	183
<i>Falco vespertinus</i>			–	1
<i>Falco subbuteo</i>	3	2	16	69
<i>Falco eleonorae</i>			2	1
<i>Falco biarmicus</i>			8	9
<i>Falco cherrug</i>			3	–
<i>Falco peregrinus</i>			16	7
<i>Falco sp.</i>	1	1	22	48
Raptor sp.	148	53	1	7,294
<i>Grus grus</i>	26		–	26
TOTAL RAPTORS	3,938	2,603	80,732	246,478
OTHERS	29	3	13	912

¹ With some additional records from base camp outside this period.² *Buteo sp.* probably includes a few *Pernis*, *Milvus* and *Hieraaetus*.

*Milvus migrans***Black Kite**

1985 47 at Ras Siyan, 16 to 24 October, with a daily maximum of 37 on 16 October. Eight at Doumeira. Birds were usually noted singly, the largest party being four.

1987 A total of 579, with passage noted throughout the period. Daily counts were generally below 50 but with maxima of 66 on 4 November and 107 on 15 October. A flock of 19 on 15 October was the largest group. At least six were noted during the flight on 26 September.

Although this species has an extensive breeding range in eastern Europe and the USSR (extending north to 65°N) and despite the fact that the majority of the population is migratory, surprisingly small numbers have yet been recorded on autumn migration through the Middle East. The only movement of any size is 5,775 at Eastern Pontics, principally in late August (Beaman & Porter 1977), but with maxima of only 106 at Suez and 236 at Eilat it would appear that no large numbers use these routes into Africa. As Smith (1960) noted large numbers in Eritrea on both passages, it would seem that the autumn birds must use an as yet undiscovered route through the Levant, whilst those in the spring are likely to be the birds noted at Eilat – c. 30,000 each year (Shirihai 1987).

Despite the relatively small numbers so far recorded at Bab-el-Mandeb, there is evidence which indicates an as yet undocumented major migration in September (A. Laurent *pers. comm.*). Furthermore, Black Kites may also be discovered to be numerous there in spring; Madarász (1915) mentions "immense numbers of many thousands on the 5th March [1907] being in migration above the Island of Perim passing to SE". If there is a movement of any size through Bab-el-Mandeb it would seem likely to be of a more eastern population, and separate to that recorded at the northern end of the Red Sea.

*Neophron percnopterus***Egyptian Vulture**

1985 27 at Ras Siyan and 13 at Doumeira, with daily maxima of 18 on 16 October and eight on 30 October respectively. Of the 40 birds noted, 31 were adults and nine immatures.

1987 554 between 3 October and 9 November, with a maximum of 75 on 15 October. Of these, 363 were adults, 125 immatures, with the ages of the remaining birds not noted. The majority of the birds passed during the first 3 weeks of October with only 68 recorded after 21 October. At least nine additional migrants were observed during the flight over the straits on 26 September.

At Suez the peak for this species occurs during September (Bijlsma 1983) so it is probable that both the 1985 and 1987 counts missed the main passage period.

*Gyps fulvus***Griffon Vulture**

1985 No records

1987 Two on 8 November and one on 9 November all at Doumeira.

The 1987 records are the first of this species for Djibouti. On the two days that they were recorded the winds were very light and it is possible that only under these unusual conditions is the crossing possible for them. Despite the relatively large numbers recorded in North Yemen (Brooks *et al.* 1987), it seems unlikely that Griffon Vulture is a regular or numerous migrant across the straits.

*Circetus gallicus***Short-toed Eagle**

1985 119 at Ras Siyan, with a maximum of 102 on 17 October, and 84 at Doumeira, maximum 24 on 28 October.

1987 1,202, with a maximum of 126 on 15 October. At least one was observed during the flight on 26 September.

With the wintering range of this species in Africa lying due west of Bab-el-Mandeb (Cramp & Simmons 1980), it is somewhat surprising to find so many Short-toed Eagles using this route. The majority of the birds entering Africa appear to use Gibraltar (c. 9,000: Gensbøl 1987) and Suez (12,136: van Diggelen *et al.* 1987), but Bab-el-Mandeb could provide a more convenient crossing point into Africa for the eastern populations. With only relatively small numbers

recorded at the Bosphorous (1,261: Porter & Willis 1968), Iskenderun (728: Sutherland & Brooks 1981) and Eastern Pontics (243: Beaman & Porter 1977) the route the bulk of the birds are using to reach Suez and Bab-el-Mandeb is as yet unknown.



Plate 5. Short-toed Eagle *Circaetus gallicus*, Doumeira, October 1987. (Geoff and Hilary Welch)

Circus aeruginosus

Marsh Harrier

1985 Six at Ras Siyan, with two female/immatures on 15 and 16 October and one on 20 October, and an adult male on 21 October.

1987 Eight at Ras Siyan and 37 at Doumeira, with no more than five on any date. Most records were of female/immatures and only two adult males were noted.

Circus macrourus

Pallid Harrier

1985 11 at Ras Siyan and four at Doumeira. Most records were of ringtails, with adult males at Ras Siyan on 17 and 24 October and Doumeira on 27 October.

1987 67, with a maximum of 14 at Ras Siyan on 3 October. The majority of birds were noted during the first three weeks of October. 15 adult males were recorded, the majority during the second half of the count.

Circus pygargus

Montagu's Harrier

1985 Six ringtails at Ras Siyan, 16-18 October. 18 unidentified ringtail harriers were recorded, 15 at Ras Siyan and three at Doumeira.

1987 17 between 3 and 25 October, with three at Ras Siyan and 14 at Doumeira. Again the majority were ringtails, the only record of a male being at Ras Siyan on 4 October. There were 116 unidentified ringtail harriers during the count: 17 at Ras Siyan and 99 at Doumeira.

Accipiter nisus

Sparrowhawk

1985 405 were recorded, 302 at Ras Siyan and 103 at Doumeira.

1987 2,135, with a maximum of 160 on 16 October.

These figures must represent but a small proportion of the actual number of birds crossing the Bab-el-Mandeb Straits, as the Sparrowhawk was the first species to start moving each day, with records from 0700 hrs. and often continuing until just before dusk at c. 1800 hrs. In addition birds tended to cross on a very broad front, certainly covering the 30+ km. between

Ras Siyan and Doumeira and possibly extending over the whole of the north-east coastline of Djibouti. 17 Sparrowhawks could not be assigned to species. The majority, if not all, are likely to have been *A. nisus* but a tight spiralling party of nine birds at Doumeira on 29th October could have been *A. brevipes*.

These results are in marked contrast to the literature (e.g. Cramp & Simmons 1980, Brown *et al.* 1982), which states that *A. nisus* is a scarce winter migrant to tropical Africa. However, most authors admit that the species is probably overlooked.

*Accipiter brevipes***Levant Sparrowhawk**

1985 Single adults at Ras Siyan, 15-16 October.

1987 Seven at Doumeira between 10 and 21 October. It is possible that a few were overlooked amongst the commoner *A. nisus*.

These records suggest that Bab-el-Mandeb is a route regularly used by this species but the extent of the movement will remain unknown until August/September counts are made.

*Buteo buteo vulpinus***Steppe Buzzard**

1985 A total of 17,900 with 16,681 at Ras Siyan and 1,219 at Doumeira. At Ras Siyan the bulk of the passage occurred on just two days, with 6,052 on 16 October and 10,529 on 17 October. The daily maximum for Doumeira was 342 on 29 October. A total of 894 unidentified buzzard-sized raptors was recorded, all at Ras Siyan.

1987 This was by far the commonest raptor with a total of 98,339. Peak movement was at Doumeira during the first two weeks of October, with daily maxima of 19,870 on 6 October and 19,781 on 8 October. Regrettably no observations were possible on 7 October when it is likely that a similar number of birds would have passed through. Following this main peak, numbers gradually declined to very low levels between 28 October and 3 November but then began to increase again. 29,853 unidentified buzzard-sized raptors were recorded.

The majority of unidentified birds were almost certainly *B. b. vulpinus* though it is also likely that a small proportion would have been *Pemis apivorus*, *Milvus migrans*, *Buteo rufinus* and possibly dark phase *Hieraetus pennatus*, these species being difficult to separate from *B. b. vulpinus* at long range.



Plate 6. Steppe Buzzard *Buteo buteo vulpinus*, Doumeira, November 1987. (Geoff and Hilary Welch)

Plate 7. Adult Steppe Eagle *Aquila nipalensis*, Doumeira, October 1987. (Geoff and Hilary Welch)

It is interesting to note that, other than one bird over the Forêt du Day on 25 March 1984 (Welch & Welch 1984), this species has not been recorded from any other site in Djibouti.

These observations establish Bab-el-Mandeb as the second most important site in the Middle East for observing the autumn movements of this species. The major site remains Borçka, and Arhavi in eastern Turkey where 204,959 were recorded in autumn 1976 (Beaman & Porter 1977). Since Steppe Buzzards are virtually unknown at other documented Middle Eastern migration concentration points, it is possible that the Borçka birds travel south on a broad front through Arabia and are next recorded crossing the Red Sea into Africa at Bab-el-Mandeb. However, with the routes of so many other Bab-el-Mandeb species unaccounted for, and the indication that a large proportion of the birds recorded in Djibouti are from more eastern populations, it is possible that the Steppe Buzzards too have more eastern origins.

*Buteo rufinus***Long-legged Buzzard**

1985 Singles at Ras Siyan on 16 and 18 October and at Doumeira on 25 and 29 October.

1987 More numerous than in 1985 though this is probably a reflection of the prolongation of the observation period into November. 131 were recorded, the bulk (120) occurring from 31 October onwards. Daily maximum was 36 on 8 November.

As numbers showed a general increase from 2 November it is possible that Bab-el-Mandeb is an important route for this species, with November being the main passage period.

*Aquila pomarina***Lesser Spotted Eagle**

1985 No records.

1987 Between 15 October and 7 November 31 eagles believed to be this species were recorded. However, following examination of photographs of a few of the Djibouti birds and discussion with observers experienced with this species, and given the extreme variability in plumage of the *A. nipalensis* passing through Djibouti, it is now thought that some but not all of the birds were actually *A. nipalensis*; the exact number recorded is therefore unknown.

Although the bulk of the breeding population lies in eastern Europe, some birds do breed eastwards to the south-eastern corner of the Caspian. It is most likely to be these birds which enter Africa via Bab-el-Mandeb. Only more detailed observations will reveal the true picture.

*Aquila clanga***Spotted Eagle**

1985 Two at Ras Siyan on 16 October and three on 17 October, one at Doumeira on 1 November.

1987 20 at Doumeira between 4 October and 9 November, the majority being in the period 15 to 27 October.

*Aquila nipalensis***Steppe Eagle**

1985 The most numerous species with 61,119 recorded, 314 at Ras Siyan and 60,805 at Doumeira. The daily maximum was 10,204 on 25 October. Only 27 unidentified eagles were noted, the remainder of the more distant birds being recorded as *A. nipalensis*. This was because whenever a soaring flock which first crossed the coast far to the south of Doumeira was drifted north to pass overhead, the birds involved were invariably found to be *A. nipalensis*.

1987 76,586 recorded. There was a general trend of increasing daily numbers throughout October to give a maximum of 4,993 on 24 October. After this date numbers varied erratically, e.g. only 901 on 5 November but 4,800 on 7 November. 27,943 eagles were seen which were too distant to be identified to species. The vast majority were likely to have been *A. nipalensis*, further highlighting the importance of Bab-el-Mandeb for this species.

The 1987 figure would appear to be the highest count of *A. nipalensis* anywhere in the Middle East in spring or autumn. The birds crossing the northern end of the Red Sea at Eilat and Suez in the autumn are clearly not going to be the same birds crossing at Bab-el-Mandeb: the Djibouti birds are likely to be from more eastern breeding grounds. Furthermore, the number of Steppe Eagles passing through Suez and Eilat in autumn is roughly equal to the numbers observed there in spring (data in Bijlsma 1983, van Diggelen 1987, Shirihai 1987

and *in litt*, Wimpfheimer *et al.* 1983), which suggests that those birds travelling into Africa via the northern Red Sea make the return journey in spring by the same route. If the Bab-el-Mandeb birds too return by their autumn route the spring migration here (as yet unstudied) may be found to be equally impressive.

*Aquila heliaca***Imperial Eagle**

1985 16 recorded at Doumeira and a daily maximum of eight on 25 October. All were 1st or 2nd year birds.

1987 A total of 70 between 5 October and 8 November, becoming more regular from 2 November. With the exception of adults on 6 and 7 November, all records were again of 1st or 2nd year birds.

This species exhibited a similar pattern to that shown by Long-legged Buzzard with birds becoming more numerous as the count progressed. It is possible that good numbers of birds may pass during November. This would appear to be comparable with observations made at Suez in autumn 1981 (Bijlsma 1983), where the species peaked at the end of October (97 on 27 October) with 10-40 continuing to be seen daily during the first week of November when observations ceased. The slightly later timing of the movement through Djibouti may reflect the more southerly location of the site.

*Hieraaetus pennatus***Booted Eagle**

1985 124 recorded, 97 at Ras Siyan and 27 at Doumeira. Of these, 96 passed on 16 and 17 October. All of these birds were assigned to the three recognised plumage morphs with 85 pale, eight intermediate and 31 dark.

1987 1,123 recorded with peak passage occurring during the middle two weeks of October, and a daily maximum of 149 on 9 October. As in 1985, birds were assigned to colour morph, with 667 pale and 448 dark. The remaining eight were undetermined. It is probable that small numbers of distant dark phase birds were overlooked amongst the more numerous *Buteo* sp.

*Hieraaetus fasciatus***Bonelli's Eagle**

1985 Two adults flying in off the sea at Ras Siyan on 18 October.

1987 An adult at Ras Siyan on 5 October and an immature with migrating Steppe Eagles at Doumeira on 7 November.



Plate 8. Adult Bonelli's Eagle *Hieraaetus fasciatus*; nesting bird in Forêt du Day (Djibouti), March 1984. (Geoff and Hilary Welch)

The systematic position of this species in Djibouti is unclear. It is generally accepted that *H. fasciatus* is largely resident with some dispersion in autumn, with no records of the western Palearctic race from the Afrotropics (Cramp & Simmons 1980). In this part of Africa, *H. fasciatus* is replaced by the sedentary African Hawk Eagle *H. spilogaster*, considered by some to be a race of *H. fasciatus* (Brown *et al.* 1982).

On consultation of the literature and study of skins at the British Museum (Natural History) Tring, the main differences between adults of these two forms would appear to be (a) the presence of a pale patch on the back in *fasciatus*, absent in *spilogaster*, and (b) streaked, 'dirty-looking' thighs in *fasciatus*, white in *spilogaster*. Additionally Brown *et al.* (1982) and D. J. Fisher (*pers. comm.*) mention the presence of a conspicuous grey patch at the base of the spread primaries on the upperwing in *spilogaster*. The latter feature has not been noted on any of the Djibouti birds, but all of the adults seen and photographed have exhibited the other features typical of *fasciatus*.

To add further to the confusion, birds showing all of the characteristics of *H. fasciatus* have been recorded breeding in the Forêt du Day (nest with young) and holding territory in the Mbla mountains.

*Pandion haliaetus***Osprey**

1985 No definite records of migrants due to the presence of resident birds at both sites.

1987 Again there were problems distinguishing migrant and resident birds. However, singles observed flying inland at Doumeira on 19 and 25 October and 7 November are likely to have been true migrants.

*Falco naumanni***Lesser Kestrel**

1985 Two males and a female/immature at Ras Siyan on 17 October and a male at Doumeira on 27 October.

1987 Eight, all males, at Doumeira between 17 October and 9 November with a maximum of four on 17 October.

On both counts some birds were almost certainly missed amongst the more numerous *F. tinnunculus* – under the bright conditions, with the light of the sun reflected off the sand, the underparts of all kestrels looked very white making separation difficult.

*Falco tinnunculus***Kestrel**

1985 Numbers of migrants were difficult to determine due to the presence of resident birds. 48 presumed migrants were noted, 33 at Ras Siyan and 15 at Doumeira. Of those at Ras Siyan, 29 passed on 16 and 17 October.

1987 183 recorded, with a maximum of 27 on 9 November. There was no clear pattern to the movement but the species appeared to be becoming more numerous as the count progressed.

*Falco vespertinus***Red-footed Falcon**

1985 No records.

1987 A female at Doumeira on 25 October.

*Falco subbuteo***Hobby**

1985 13 at Ras Siyan and three at Doumeira. All except one were adults.

1987 69 were recorded, with a maximum of seven on 16 October.

*Falco eleonora***Eleonora's Falcon**

1985 Singles at Ras Siyan on 21 October and Doumeira on 30 October.

1987 One at Doumeira on 21 October.

*Falco biarmicus***Lanner**

1985 Presumed migrants were one at Ras Siyan on 16 October, two on 17 October and two at Doumeira on 24 and 26 October.

1987 A minimum of nine migrants, two at Ras Siyan, the remainder at Doumeira.

*Falco cherrug***Saker**

1985 One at Ras Siyan on 16 October and two on 17 October.

1987 No records.

*Falco peregrinus***Peregrine**

1985 16 presumed migrants were recorded, six at Ras Siyan and 10 at Doumeira.

1987 A minimum of seven migrants, all at Doumeira.

Falco sp.

1985 23 falcons were observed which could not be assigned to species, 15 at Ras Siyan and eight at Doumeira.

1987 A total of 48.

Raptor sp.

1985 Only one raptor was seen which could not be assigned to a family.

1987 A total of 7,294 raptors was seen which were too distant to assign to group or species.

*Grus grus***Crane**

1985 No records.

1987 A flock of 26 flying in off the sea at Moulhoulé on 8 November. The first record of this species for Djibouti.

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SUMMARY

Autumn observations made on the Djibouti side of the Red Sea have shown that the Bab-el-Mandeb Straits form part of a major migration route for raptors and, to a lesser extent, other soaring birds. In 1985, 17 days counting by three observers produced 80,732 raptors, whilst in 1987, a team of seven observers recorded 246,478 raptors in 38 days. To date 27 species of migrant raptor have been recorded. The principal species are Steppe Buzzard *Buteo buteo vulpinus* and Steppe Eagle *Aquila nipalensis*. This paper discusses the nature of the movement, counting techniques and the problems to be overcome in finding a suitable count site.

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THE BLACK FRANCOLIN IN TURKEY

by

Vincent van den Berk

INTRODUCTION

From 28 April to 11 May 1986 and from 19 March to 20 May 1987, the coastal wetlands of the Çukurova, southern Turkey, were visited by several Dutch and Turkish biologists for migrant wader studies in connection with the South Turkey Project (van den Berk *et al.* 1988). During the stay in this area in both years, a thriving and noisy population of Black Francolins *Francolinus francolinus* was found. This paper gives a survey of the population in the Çukurova, discusses the impact of agricultural development in relation to the species distribution and analyses its status in Turkey. Although the Çukurova region extends much further north, the study area was restricted to the fluvial plain and coasts south of the cities of Tarsus, Adana and Ceyhan (*Figure 2a*).

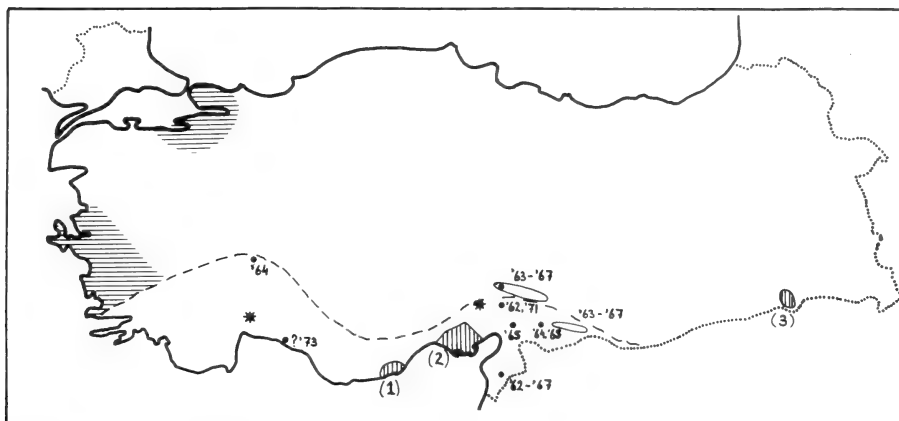

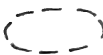





Figure 1: The distribution of Black Francolin in Turkey.

-  : areas where the species disappeared in the 19th Century (Kumerloeve 1963).
-  : expected distribution range based on records between 1941 and 1962 (Kumerloeve 1963).
-  : locations of records between 1962 and 1971, with year of observations, excluding the Göksü Delta and Çukurova (OST 1975, Kumerloeve 1967, 1970, Warncke 1965, M. Kasperek *in litt.*),
-  : present distribution. The Göksü Delta (1) and Çukurova (2) are known to hold long-standing populations. Near Cizre (3) recorded regularly since 1983 (Martins *et al.* 1988).
-  : areas outside the Çukurova where special protective measures are planned or established (Erkan 1987, Tarhan 1987).

DISTRIBUTION IN TURKEY

Until the second half of the 19th Century, Black Francolins seemed to have been fairly well established over much of the Mediterranean zone of Turkey. The steady decline and disappearance of the species since then was described by Kumerloeve (1963) and is believed to be due to indiscriminate shooting throughout the year (Kumerioeve 1963, Cramp & Simmons 1980). The marked change and fragmentation in distribution is summarised in *Figure 1*. During the past 15 years, Black Francolins have been recorded in parts of the Çukurova, the Göksu Delta and, since 1983, yearly in the Tigris valley near Cizre (Martins *et al.* 1988). At present, these areas seem to hold the only viable populations. The Turkish Forestry Service planned, or recently established, four special protection and reproduction areas for this species (Erkan 1987, Tarhan 1987). Apart from areas near Tarsus and Adana in the Çukurova, they are located at Antalya Düzlerçamı and at Kozan Çandık, suggesting that Black Francolins still occur in those places. Unfortunately no published records are available from these areas (see *Figure 1*).

DISTRIBUTION AND DENSITIES IN THE ÇUKUROVA

Since the 19th Century the Çukurova has been known as the main area for Black Francolins in Turkey (Kumerloeve 1963). In the springs of 1986 and 1987, at least 126 different calling males were plotted on a map giving an indication of distribution and densities (*Figure 2b*). There appeared to be a marked individual difference in calling activities. Around Zeynepli and Deveciüşağı, where base camp was made, one male called daily from 9 April to 14 May, two males were heard during six days and on only two days three were heard simultaneously. Other parts of the area were less intensively plotted (*Figure 2a*). Some extensive, good looking Francolin habitats were visited only once, briefly, or even not at all. Because of these factors the actual number of male Black Francolins is estimated as at least 300 to 450.

Highest densities were recorded in dune areas (one male per 2-5 ha.) and agricultural lands south of Akyatan Gölü (one male per 15-30 ha). The latter area is part of a game preservation area which includes Akyatan Gölü, where hunting of waterfowl and Black Francolin has been forbidden since 1986 (ABM 1986). Since 1972, the area changed markedly when the barren



Plate 1. Adult male Black Francolin *Francolinus francolinus*, Deveciüşağı (Turkey), April 1987. (Arnoud B. van den Berg).

and highly mobile dunes were planted and human activities banned to protect agricultural lands, villages and Akyatan Gölü from the drifting sand. Until then dunes were moving northward at a rate of approximately 23 metres per year (ABM 1972). Further shifting was prevented by planting grass on the beach side and trees on the landward sides and by regulation of grazing and tree-cutting. These attempts were successful and nowadays the dunes are covered with grass and other herbs whereas lower areas and depressions between dune ridges are covered with scrub, bushes and young plantations. The adjacent agricultural lands between the dunes and Akyatan Gölü are used mainly as cereal fields. These fields are flanked by scattered bushes, dune remnants, sandy paths with vegetated verges or other low cover. This activity has created the best habitat for Black Francolin available at present. The extensive plantations south of Tarsus hold populations with densities of up to one male per 80-100 ha. at the Karabucak Güresin forest (1,000 ha.) and up to one male per 40-60 ha. at the Turan Emeksiz forest near the Berdan mouth (1,200 ha.). The first forest was created in 1939 and planted with Eucalyptus trees. Black Francolins are concentrated at the edges of this plantation and on forest clearings or young afforestations rich in scrub cover. At the Turan Emeksiz forest which was created between 1960 and 1965 to protect the agricultural hinterland from drifting sand dunes, Black Francolins are found particularly in damp (not wet) areas with luxuriant undergrowth bordering the Berdan river and in clearings, young afforestations or more open mature stands with dense undergrowth. They are not recorded in cultivated dunes or west of the Seyhan mouth around Dipsiz Gölü. All along the Berdan river south of Tarsus, Black Francolins were found between the river dikes, especially in cattle grazed tussocky grassland with Tamarisk thickets, but also among corn fields. Although 18 males were counted, coverage was poor and an estimate of density impossible.

In the fluvial lands of the Ceyhan river, especially east of the Davudi mountains, Black Francolins were found in densities of up to one per two km. of transect on natural levees in agricultural use which are intersected by steep sides, scattered low cover, former river cut-offs flanked by bushes and trees and sandy paths with vegetated verges.

On the slopes of the Davudi mountain ridge, especially west of Ağyayan Gölü, densities of one male per 20 ha. were recorded. The slopes are cultivated for cereal crops and rich in low but dense scrub. Single birds were recorded in the bare shifting dunes south of Ağyayan Gölü, in good habitat along the Ceyhan river south of Yakapınar and at the kidney-shaped lake north of Karataş at the edge of cotton fields. On 19 May 1987, during a short visit to the Çukurova University in the hills north of Adana seven males were heard, indicating that the distribution of Black Francolin is not restricted to the coastal zone. Black Francolins were not recorded on saltmarshes, cotton fields or on the higher parts and steep uncultivated slopes of the Davudi mountains.

DISCUSSION ON COUNTS

All previously published records of Black Francolins from the last 25 years at Çukurova fit into the 1986-87 distribution pattern (Figure 2b). During this period many visiting ornithologists, even when in the peak time of singing, did not record this species at all. It is not clear whether this bird was generally overlooked.

The number of recorded birds is normally low (one to three), with the exceptions of at least 10 near Akyatan Gölü on 28 December 1985 (M. Kasperek, *in litt.*) and 50 males on one km² in mid-May 1966 or 1967 (Lehman in Kumerloev 1970). The interesting latter record came from the just afforested dunes near the Berdan mouth, i.e. the Turan Emeksiz forest. Nowadays this particular population is estimated to be considerably smaller, two males per km². This is probably due to the fact that the habitat changed when the plantation grew to maturity.

NOTES ON BIOLOGY

The first singing Black Francolins were recorded on 9 April. Song activity was highest during the second half of April and first half of May. Most calls were heard in early morning and in

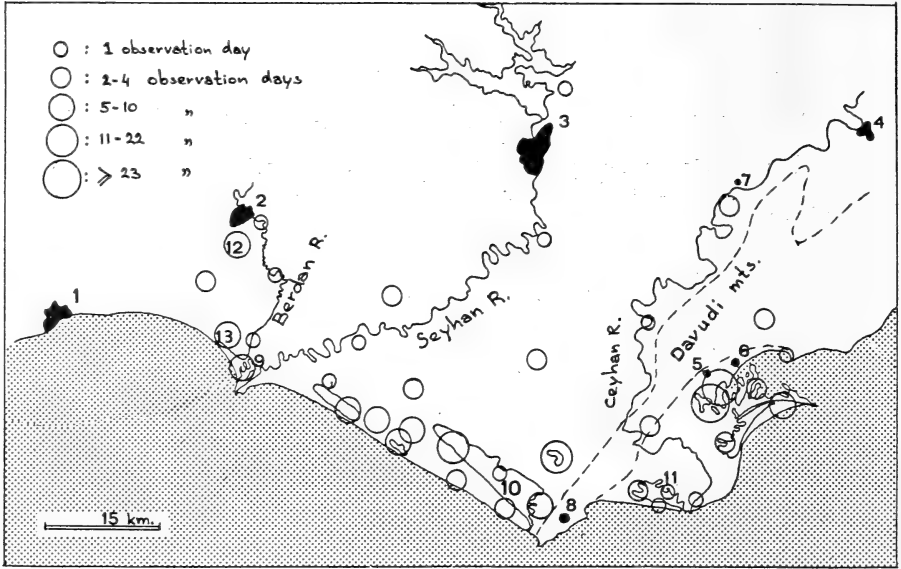


Figure 2a: The number of observation days per location in the Çukurova area, irrespective of time or length of day, and the locations of names cited in the text.

Cities: 1. Mersin, 2. Tarsus, 3. Adana, 4. Ceyhan. Villages: 5. Zeynepli, 6. Deveciüşağı, 7. Yakapınar, 8. Karatas. Lagoons: 9. Dipsiz Gölü, 10. Akyatan Gölü, 11. Ağyayan Gölü. Forestries: 12. Karabucak Güresin, 13. Turan Emeksiz.

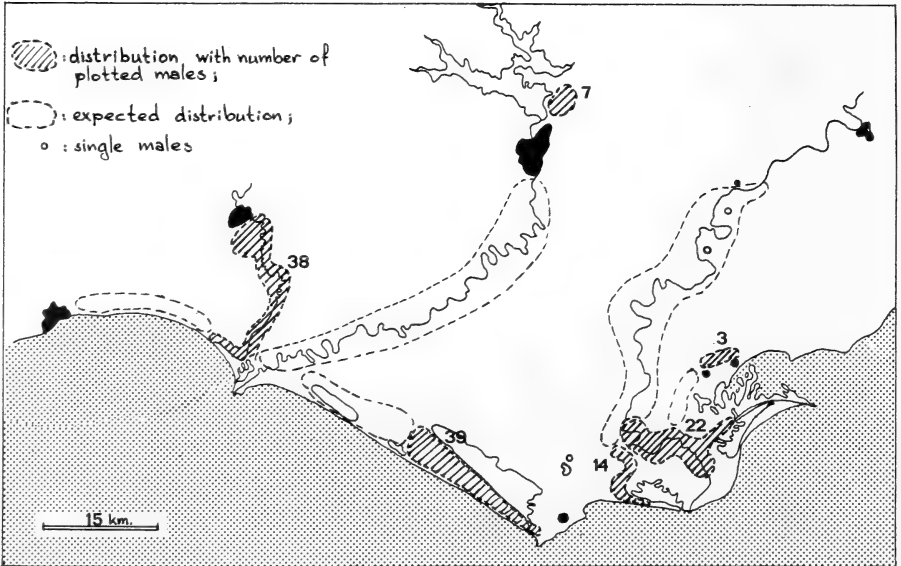


Figure 2b: The distribution of male Black Francolin in the Çukurova area, 1986 and 1987.

late afternoon until dusk, not at night. A few males appeared to call continuously throughout the day. Rain did not seem to affect singing activity. During the second half of May singing was heard less frequently, often short reactions to other calling cocks. The recorded singing season for Turkey appears to be longer. The first was recorded on 10 March 1986 in the Göksu Delta (M. Kasperek *in litt.*), the last in the second half of July at Haruniye in 1956 (Kumerloeve 1963).

The cocks seemed to prefer rather permanent singing posts like certain dune ridges or sand depots along canals. They mostly sang from the ground. Nests were never found but on 10 May 1986 local people showed us chicks caught during harvesting cereals. They said this happened often. With an incubation period of 18-19 days (Cramp & Simmons 1980), breeding must have started around mid-April.

Although heard daily, the francolins were seen less often. When alarmed they prefer to run rather than fly. One ran at a speed of at least 30 km. per hour in front of our car.

Single females were seen on 23 occasions.

HISTORICAL PERSPECTIVE

In 1875, Black Francolins were reported to be very plentiful between Mersin and Tarsus, the greater part of that area being scrub covered wasteland (Danford 1877). They were found in the orchards and vineyards around Adana but were most numerous on the large grass and reed-covered plain near the Ceyhan in 1879 (Danford 1880) and were found in all scrub covered damp areas around Mersin by the end of the 19th Century (Schrader 1891).

Economic development programmes for the Çukurova area were initiated around 1950 (Hinderink 1966). Apart from some individual reclamation of marshy areas and the drainage of the former Regma Lake, now the Karabucak Güresin forest, the environment did not differ greatly from that in the 19th Century. Up to then, annual flooding, malaria and the wooden plough dominated the plain. Great changes were brought about with the construction of dikes along the Berdan, Seyhan and Ceyhan rivers between 1948 and 1953 and the Seyhan dam in 1956 (Altan *et al.* 1981). The plain was drained, the arable land expanded excessively and when malaria was brought under control it was made into a habitable place in summer (Hinderink 1966). Together with agricultural innovation and change in technology, the existing pattern of farming was revolutionized. Mechanization, improved seeds and better yielding varieties, fertilization, the use of herbicides and pesticides, the enlargement of operational units, etc., and the end of the former crop-rotation at the cost of cereal growing changed the environment dramatically. In only 30 years the plain became dominated by commercialized cotton-farming which must have had its impact on the distribution of Black Francolins.

Back in the early nineteen-fifties before the great environmental changes started, dunes were unprotected and barren (e.g. Tschermak 1938). Higher yields and better prices of agricultural products led to an increase in land values. This put an extra burden on the uncultivated areas which remained. On the other hand it became necessary to protect the production capacity of the land, one of the threats being drifting dunes moving landwards (Forestry Service Adana *pers. comm.*). The dune areas which were stabilized became suitable habitat for Black Francolins.

PROTECTION

The protection and recovery of Black Francolins has the special attention of the Turkish authorities. It is hoped to achieve this objective by game protection measures and establishment of breeding stations for re-introduction (Erkan 1987, Tarhan 1987). Recent attempts to raise birds in captivity at Karabucak have failed because they appeared to be very frightened and shy, were injuring themselves and were sensitive to diseases. Nevertheless a new breeding station is planned south of Akyatan Gölü (Forestry Service Adana and Karabucak *pers. comm.*). Apart from aesthetic and general objections against re-introduction, one may have doubts about the necessity and prospects of success of such a policy. In many places, Black Francolins seem to be exterminated by hunting and destruction of suitable habitat

with sufficient cover. It may well be that hunting will lead to failure as soon as introduction in an unprotected environment takes place. The presence of healthy wild populations now living in the fixed dune areas together with the prospect that other, still mobile dune areas will inevitably be planted and protected in the near future to secure agricultural interests and thus become good habitat, may be the correct basis for a policy to conserve this species. Together with effective controls of hunting this may lead to further range extension into adjacent agricultural land where cereals are grown as is the case in parts of the Çukurova.

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SUMMARY

Data are presented on the past and present distribution of Black Francolin *Francolinus francolinus* in Turkey in particular along the Çukurova coast, southern Turkey, where data were collected April-May 1986 and 1987. Although the study area was not fully covered, 126 territorial males were counted and the total population was estimated to be at least 300-450 males. The habitat occupied in the Çukurova is characterised by well developed ground cover alternating with open patches and a lack of human activity. When cereals are grown and enough cover is available, agricultural land is also occupied. Cotton fields and saltmarshes are avoided. It is thought that during the past 30 years Black Francolins moved away from the fluvial plain to coastal dunes. Annual flooding of the plains was controlled by the construction of dikes, arable land expanded and farming changed radically, at the same time as the planting of the coastal dunes and banning of human activity there. Subsequently, when the dunes were afforested, the suitability decreased again, though these plantations apparently continue to hold small populations. In areas where this species has survived, the necessity for re-introduction (currently planned) is doubted, and protection against hunting is thought to be more important.

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THE AUTUMN MIGRATION OF WADERS AND OTHER WATERBIRDS THROUGH THE NORTHERN UNITED ARAB EMIRATES

by

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INTRODUCTION

A fundamental pre-requisite for the effective conservation of migratory wetland birds is a knowledge of the most important sites used by particular species and populations. Studies of the migratory systems of arctic and sub-arctic breeding waders have shown how complex these can be (Parish *et al.* 1987, Piersma *et al.* 1987, Morrison & Myers 1987), and it is vital that they are well understood in order for suitable conservation policies to be constructed.

The migration of birds along what may be termed the West Asian Flyway is poorly understood compared with migrations in some other parts of the world, such as Europe and West Africa. Nevertheless, enough knowledge exists to demonstrate that this route, following the rivers of west and central Siberia to the shores of the Caspian and Black Seas and onwards through the Arabian Gulf to southern Arabia, East Africa, Iran and the Indian sub-continent is of considerable importance to waders breeding in Scandinavia and west and central Siberia (Curry 1978, Hammonds *et al.* 1984, Scott & Carp 1982, Etheridge 1980, Smart *et al.* 1983, Tucker 1985).

Summers *et al.* (1987) reviewed the distribution and movements of waders in the whole of southern and eastern Africa and western Asia and concluded that there was a requirement for detailed studies of migration through the Middle East in autumn.

This project was originally inspired by the report of Smart *et al.* (1983) of up to 15,000 waders and other waterbirds occurring on the small mudflats of Khor Dubai, Dubai, United Arab Emirates (UAE) (25° 15' N, 55° 19' E) (Figure 1). The presence of such large numbers *per se* was not the only reason for which Khor Dubai attracted our interest. In addition it was apparent that the Khor must be supporting very high densities of feeding birds, since its total area is quite small (1.5 km²). Furthermore, Smart *et al.* (1983) reported that the number of birds on the Khor was increasing and speculated that this was a result of nutrient enrichment by sewage from the surrounding Dubai City. Thus Khor Dubai appeared to have great potential as a site at which to study problems related to the management and enhancement of tidal mudflats as habitats for migratory waders.

The project was initiated in May 1985 as a collaboration between the Department of Zoology at the University of Durham and Sheikh Mohammed bin Maktoum's Dubai Wildlife Research Centre. The field-work was carried out in two parts from 8 October–12 November 1986 and 22 August–30 September 1987.

The aims of our work were fourfold: (1) to describe the autumn migration of waterbirds throughout the Khor in terms of both the species and populations present and the numbers using the site; (2) to determine the importance of the Khor as a moulting and re-fuelling site for passage waders; (3) to study the feeding ecology of waders there and relate this to prey densities and nutrient levels; (4) to compare and contrast Khor Dubai with other sites along the coastline of the northern UAE, and estimate the total number of waders using this area in autumn.

This report presents a summary of the results from the first and fourth parts of the project.

UTTLEY, J. D., THOMAS, C. J., GREEN, M. G., SUDDABY, D. & PLATT, J. B. 1988. The autumn migration of waders and other waterbirds through the northern United Arab Emirates. *Sandgrouse* 10: 58-70.



Figure 1: Sites in the northern United Arab Emirates mentioned in the text.

1. INTENSIVE STUDIES ON KHOR DUBAI

Methods

Birds were counted and identified when possible during the flood and high water periods. It proved impossible to obtain accurate counts of all species on a single day and so on any one day only certain species were counted. Most of the roosting sites could be viewed adequately from a track allowing a vehicle to be used as a hide, but where this was not so only a short walk was necessary and the birds could be counted with minimal disturbance. Raptors such as Marsh Harriers *Circus aeruginosus* often hunted over the mudflats and frequently caused counts to be abandoned.

Most species of arctic and sub-arctic wader have a very extensive breeding range and thus the same species may be found on mudflats in both Europe and the Arabian Gulf. However, the individual birds migrating to such widely separated wintering areas often belong to populations which breed in separate, though perhaps not distinct, ranges. Many species exhibit variation between populations in morphological characteristics such as plumage features and body-size parameters which allows approximate breeding origins to be identified (e.g. Greenwood 1984).

Birds were caught using single-shelved Japanese mist-nets on nine nights in 1986 and on nine nights in 1987, when conditions were suitable, i.e. high water was more than three hours after the fall of darkness and the high water level was at least 1.5 metres. Each bird was fitted with an individually numbered British Trust for Ornithology metal ring and aged and sexed according to the criteria of Prater *et al.* (1977). Molt score was recorded using a standard system (Ginn & Melville 1983). Wing-, total head-, tarsus- and toe-lengths were measured to the nearest 1mm. and bill-length to the nearest 0.5mm. Weight was measured to the nearest 1 gram. Small samples of Little Stint *Calidris minuta*, Dunlin *C. alpina*, Curlew Sandpiper *C.*

ferruginea and Broad-billed Sandpiper *Limicola falcinellus* were marked with plumage-dyes (Rhodamine B, Sevron Blue or Picric Acid) to investigate the magnitude of population turnover in these species by comparing changes in the proportions of differently marked groups over the study period (Kersten *et al.* 1983) and to look for movements of marked birds away from the Khor. Of these dyes only Picric Acid was found to be suitable because the other two dyes faded within a few days of application in the strong sunlight. Birds were released immediately after processing.

The Site

Khor Dubai is a blind tidal inlet, approximately 10 km. long, leading off the Arabian Gulf and through Dubai City (Figure 2). The head of the Khor lies just to the south of Dubai City and contains tidal mudflats with a maximum low water extent of approximately 1.5 km². Seawards of the mudflats the creek has been dredged to allow shipping access, and much is bounded by commercial development. The intertidal zone supports an abundant macrobenthic fauna of low diversity. Nutrient inputs to the Khor come via run-off from irrigated areas and input of treated sewage effluent from Dubai Municipal Sewage Works which has an outflow two kilometres below the head of the creek. Sabkha desert surrounds the intertidal area, and waders use this area to roost on during high spring tides. In 1987 a saline pool was formed on sabkha adjacent to a road 0.5 km. from the Khor and many sandpipers and small plovers chose to roost here, even though alternative areas were available on the mudflats. Half a kilometre from the Khor are four fishponds (50 × 20 metres), with associated damp areas. There are no other large areas of intertidal habitat within 15 km. Consequently birds do not have the opportunity to alternate the use of the Khor with other sites elsewhere, and changes in the number of birds present probably reflect migratory movements. In 1986 the area was declared a nature reserve, and now enjoys a 24-hour armed guard. Consequently the wildlife is quite undisturbed.

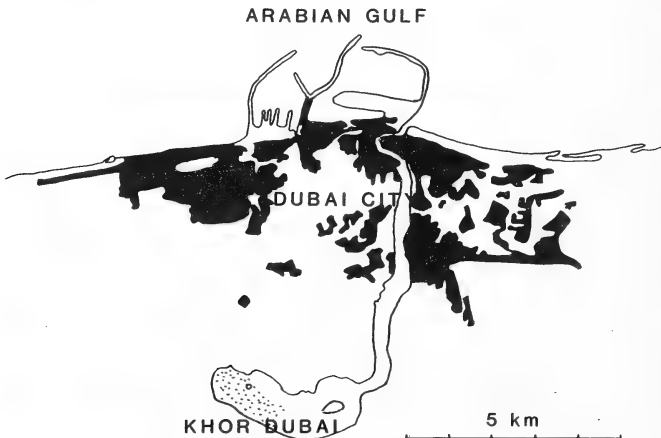


Figure 2: The location of Khor Dubai relative to Dubai City.

Species Accounts

In this section the counts of birds made on Khor Dubai are presented, together with brief accounts of population turnover, biometrics and likely breeding origins, moult and migration strategies, summarised from Dubai Shorebird Project (1987) and Thomas *et al.* (*in prep.*). Counts of the most common waders and waterbirds are given in TABLES I and II, and for other species in the text.

TABLE 1: COUNTS OF WADERS ON KHOR DUBAI IN 1986 AND 1987.

	27/8	31/8	8/9	12/9	16/9	22/9	28/9	14/10	20/10	25/10	2/10	10/11
Oystercatcher												
<i>Haematopus ostralegus</i>	64	70	36	74	58	nc	84	45	41	nc	49	nc
Ringed Plover												
<i>Charadrius hiaticula</i>	60	159	135	263	204	nc	344	133	nc	330	nc	200
Kentish Plover												
<i>C. alexandrinus</i>	263	106	406	365	230	nc	452	612	nc	530	nc	691
Lesser Sand Plover												
<i>C. mongolus</i>	693	554	—	—	—	nc	—	—	nc	306	nc	—
Greater Sand Plover												
<i>C. leschenaulti</i>	40	35	—	—	—	nc	—	—	nc	110	nc	—
Sand plover sp.												
Grey Plover	—	—	871	676	679	nc	827	610	nc	—	nc	410
<i>Pluvialis squatarola</i>												
Little Stint	302	316	283	556	388	nc	465	727	500	nc	497	nc
<i>Calidris minuta</i>												
Curlew Sandpiper	809	670	696	798	809	763	1,181	1,173	1,000	660	600	820
<i>C. ferruginea</i>												
Dunlin	2,352	2,205	1,994	1,505	1,101	973	855	278	253	106	40	nc
<i>C. alpina</i>												
Broad-billed Sandpiper	23	22	33	117	76	171	930	2,188	1,715	3,860	3,700	4,000
<i>Limicola falcinellus</i>												
Bar-tailed Godwit	424	950	992	926	1,208	1,445	1,070	2,336	4,050	1,480	740	200
<i>Limosa lapponica</i>												
Curlew	952	793	932	1,243	983	nc	746	800	802	nc	856	nc
<i>Nurmenius arquata</i>												
Redshank	116	nc	109	101	114	nc	126	93	98	nc	97	nc
<i>Tringa totanus</i>												
	262	314	483	334	172	nc	797	700	630	nc	650	nc

Waders*Haematopus ostralegus***Oystercatcher**

No indication of any major passage or build-up of wintering birds although counts made in 1986 during the later portion of the study period show less variation than those made earlier in 1987, suggesting that some migration may have been occurring in August and September 1987. Peak numbers (84) on 28 September 1987. The brown mantle characteristic of *H. o. longipes* which breeds in Asia Minor, south-central USSR and western Siberia (Cramp & Simmons 1983) was apparent in all birds on the Khor. One bird, caught on 22 September 1987, was in active primary moult.

*Himantopus himantopus***Black-winged Stilt**

Six on the Khor, 29 September 1987. Often present at the sewage farm and fishponds; maximum of 12 on 9 September 1987.

*Recurvirostra avosetta***Avocet**

One adult, 28 September 1987

*Glareola pratincola***Collared Pratincole**

One immature, 31 August 1987.

*Charadrius hiaticula***Ringed Plover**

In 1986 numbers peaked markedly in late October when 330 were present, whereas in 1987 numbers built-up steadily to peak at 344 on 29 September. Migration may have been earlier or involved larger numbers of birds in 1987 than in the previous year. Two birds, caught on 22 September 1987 and 11 October 1986 were in primary moult; the second bird had suspended moult and its very high weight (84 gram) indicates that it was probably about to migrate. All birds displayed the dark upperparts characteristic of *C. h. tundrae* (Hatman *et al.* 1986) which breeds in northern Scandinavia and the USSR.

*Charadrius alexandrinus***Kentish Plover**

Numbers highly variable: maxima 452 on 29 September 1987, 691 on 10 November 1986. However, a trend is discernible of a build-up of wintering birds, and the variability is probably caused by passage migrants moving along the coast. The mean weight of 38 gram ($n=43$, SD 3.3 gram) is similar to that found for birds wintering in Sharjah (25° 20'N, 55° 26'E) (Etheridge 1971) and Masirah Island (20° 20'N, 58° 40'E) (Curry 1978, Etheridge 1980). Only birds caught between 25 and 30 August were still in active primary moult, and males were in fresh breeding plumage.

*Charadrius mongolus***Lesser Sand Plover***Charadrius leschenaultii***Greater Sand Plover**

These two species were counted separately on only three occasions when they formed two distinct high water roosts. Lesser Sand Plovers formed the majority of the birds on each occasion. Highest numbers of the two species combined occurred on 8 September 1987 when 871 were present and declined thereafter to a fairly stable wintering population of just over 400 birds of which about a quarter were Greater Sand Plovers. Several adult Lesser Sand Plovers which were caught were in active primary moult.

*Pluvialis fulva***Pacific Golden Plover**

About 40 present throughout.

*Pluvialis squatarola***Grey Plover**

The maximum number present was 727 on 12 October 1986. The great variation in the numbers present and lack of any consistent trend indicates that a continuous passage of birds was probably occurring. Some birds were moulting their flight feathers on the Khor; two birds were caught in active moult, on 4 September and 21 September 1987.

*Calidris alba***Sanderling**

Only small numbers are found on the Khor with a maximum of 22 birds. They favoured areas of more sandy substrate and therefore would not be expected to occur in large numbers. However, Smart *et al.* (1983) report occasional influxes of up to 1,000 birds in winter.

*Calidris minuta***Little Stint**

A maximum of 1,181 was present on the Khor on 29 September 1987 and there is a suggestion of a peak in migration between then and mid-October (*Figure 3*). Some African wintering Little Stints are known to migrate through the Middle East from two ringing recoveries; one of a bird ringed in South Africa and recovered in Iran (Lessells 1977) and another ringed in Ethiopia and recovered in Kazakhstan (Ash 1978). In Iran no adults passed through after the end of August when only first-year birds occurred (Lessells 1977). The age composition of birds caught by us in September and October (72% adults) shows clearly that adult birds are present in the southern Gulf at this time. Thus it appears that Little Stints may be interrupting their southern migration in between the Caspian coast and Dubai, despite the fact that the maximum flight ranges of Iranian migrants as calculated by Lessells (1977) would allow them to fly as far as the southern Gulf. Studies of population turnover in 1986 revealed that maximum turnover occurred in the period up to 21 October after which most new arrivals remained. In 1987, one bird which had been marked with plumage dye was seen at Khan Lagoon, Sharjah, just 20 km. away. This suggests that birds may have been migrating in very short hops. A total of 1,700 Little Stints was estimated to have used the Khor between 16 October and 11 November. The majority of birds caught in 1987 were in active primary moult, but most had finished by the middle of October 1986. This is contrary to expectation since Pearson (1984) found that Little Stints wintering in the Kenyan Rift Valley did not begin primary moult until after they had arrived there. Moulting adults have also been found in autumn at Masirah Island (Etheridge 1980). The weights of captured birds (mean 26.8 gram, $n=131$, SD 4.0 gram) were consistent with those of migrating Little Stints elsewhere, e.g. Iran (Lessells 1977) and Masirah Island (Etheridge 1980). Birds caught later in 1986 showed a significant tendency to be lighter and the majority of later birds were within the range of winter weights found by Etheridge (1971) in Sharjah. One Little Stint, marked with Picric Acid in 1986, was seen near to Iraklion on the north coast of Crete on 15 April 1987 (H. Galbraith *pers. comm.*).

*Calidris ferruginea***Curlew Sandpiper**

The number of Curlew Sandpipers on the Khor fell steadily from a peak of 2,352 present on 27 August 1987 when the earliest count was made (*Figure 3*). There was no evidence of any turnover in the population indicating that no new birds were arriving. It is likely that considerably higher numbers of this species are present earlier in August (A. Chapman *pers. comm.*). One previously ringed Curlew Sandpiper was caught on 4 September 1987. It had been ringed as an adult in Cape Province, South Africa, in February 1985. It has already been shown that Curlew Sandpipers migrate to southern and eastern Africa via the Caspian Sea (Elliot 1976) but this is the first evidence from the Gulf. Most birds caught before 20 October were in active primary moult, suggesting that birds move on as soon as their moult of flight feathers is completed. The mean weight of 71 birds caught in 1987 was 63.9 gram which is similar to that found for migrating Curlew Sandpipers in the Camargue (Cramp & Simmons 1983) and Morocco (Dick & Pienkowski 1979).

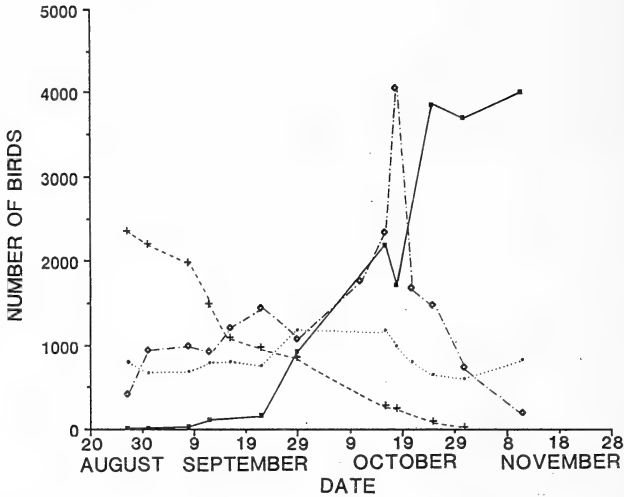


Figure 3: Counts of Broad-billed Sandpipers ----, Curlew Sandpipers ----, Dunlin — and Little Stint ···· on Khor Dubai in 1986 and 1987.

Calidris alpina

Dunlin

Large numbers arrived in late September and October, with the largest influxes occurring between 19 and 25 October 1986 (Figure 3). As at other sites in the region (e.g. Summers *et al.* 1987) it is the commonest wintering wader on the Khor. Dunlin wintering in the Gulf have been thought to be nominate *alpina* originating from breeding grounds in Fenno-Scandinavia and western USSR (Greenwood 1984, Cramp & Simmons 1983) but the biometrics and plumage features of birds caught in 1986 suggest very strongly that Dunlin in the Gulf include not only nominate *alpina* but also a large proportion of *C. a. sakhalina* coming from much further east (Thomas *et al. in prep.*). Only two adults were caught which had not finished primary moult. This would be expected in *C. a. sakhalina* which begins to moult before leaving the breeding grounds (Cramp & Simmons 1983) and suggests that *C. a. alpina* wintering on the Khor stopover at a site further north to complete primary moult.

Limicola falcinellus

Broad-billed Sandpiper

Broad-billed Sandpipers are widespread in the Arabian Gulf in autumn (e.g. Nisbet 1961, Feeny *et al.* 1968, Griffiths & Rogers 1975, Rucker 1985) but seem to have frequently been overlooked. However, the 4,050 present on the Khor on 19 October 1986 (Figure 3) appear to be unprecedented. The subspecies found in the Gulf is the nominate from Fenno-Scandinavia, as judged by the summer feathers retained by some of the birds which were caught. Thus the peak count on the Khor represents 18% of the known population as estimated by Piersman (1986), although this includes no estimate for birds breeding in western USSR. A few hundred stay on the Khor over the winter (S. Newton *pers. comm.*) but the majority pass on. Only in the Indian sub-continent, on the Makran and Sind coasts of Pakistan are they known to be common (Ali & Ripley 1969). Nearly all the adults caught in 1987 were in active primary moult and some had shed as many as four primaries at once, rendering them almost flightless. Khor Dubai is certainly an extremely important moulting ground and migratory stopover for this species.

Philomachus pugnax

Ruff

This species was uncommon on and around the Khor. The maximum number noted was eight on 31 August 1987, but Ruff were regularly seen in smaller numbers at the Sewage Farm.

*Limosa limosa***Black-tailed Godwit**

A few present on the Khor; peak of 36 on 4 November 1986. This species showed a marked preference for areas of damp ground close to the fishponds caused by irrigation. Overall numbers in the area were constant and these birds probably overwinter in Dubai.

*Limosa lapponica***Bar-tailed Godwit**

Some evidence of migration in early autumn with 1,243 present on 12 September 1987. The Khor supports a large wintering population of about 800 birds, present from from early October. Examination of birds caught in 1986 confirmed that the race present is *L. l. lapponica* which may be differentiated from *L. l. baueri* by the pattern of barring on the axillaries (Prater *et al.* 1977).

*Numenius arquata***Curlew**

Numbers of Curlew maintained a fairly constant level in both years, the maximum count being 126 on 28 September 1987. These are probably wintering birds. The birds on the Khor resembled *N. a. orientalis* more closely than *N. a. arquata*, exhibiting larger size, paler plumage, longer bills and unmarked axillaries and underwing.

*Tringa totanus***Redshank**

Counts in 1986 indicated that a wintering population of approximately 700 birds was present on the creek from early October. In 1987 numbers came to a peak of 483 on 8 September before falling and then rising again to 797 on 29 September which indicates that some passage was occurring in early autumn.

*Tringa stagnatilis***Marsh Sandpiper**

Small groups were occasionally seen in the area with a maximum of three on the Khor on 11 October 1986.

*Tringa nebularia***Greenshank**

Numbers fluctuated considerably in early autumn reaching 43 on 12 September 1987 but were stable at about 30 in October 1986.

*Xenus cinereus***Terek Sandpiper**

Numbers declined from 43 at the beginning of our study on 31 August 1987 to less than 10 by mid-September. Of six birds caught between 6 and 21 September, four were in primary moult.

*Arenaria interpres***Turnstone**

Turnstone were present in largest numbers in late August/early September, when approximately 30 were counted (31 August and 12 September 1987). Numbers declined after this but up to 30 birds were again present in October/November 1986. None of the 15 birds caught at the end of August had begun to moult their flight feathers.

*Phalaropus lobatus***Red-necked Phalarope**

Twenty-two were present on the Khor and fish farm on 31 August 1987.

Other Waterbirds

The Khor also supports large number of other species of waterbirds during the autumn. The counts of the most common of these are presented in TABLE II. In addition to these species the following also occurred:

Platalea leucorodia **Spoonbill**: up to three.

Phoenicopterus ruber **Greater Flamingo**: the Khor supports large numbers of non-breeding Greater Flamingoes during the winter and numbers tended to increase during the autumn, though there were some fluctuations; the peak number counted was 960 on 16 September 1987, but up to 2,000, most of which were immatures, have been present in late winter in previous years (JBP pers. obs.).

Anas acuta **Pintail**: a flock of approximately 40 birds was resident in 1986.

Anas clypeata **Shoveler**: present in small numbers (less than 10) for most of the time.

Larus ichthyaetus **Great Black-headed Gull**: one, 4 November 1986.

Larus genei **Slender-billed Gull**: approximately 100.

Larus fuscus **Lesser Black-backed Gull**, *Larus argentatus* **Herring Gull**: a flock of approximately 400 birds was present.

Gelochelidon nilotica **Gull-billed Tern**, *Sterna repressa* **White-cheeked Tern**, *Chlidonias hybridus* **Whiskered Tern**, *Chlidonias leucopterus* **White-winged Black Tern**: small numbers (less than 10) of each of these species were present in 1987, but only Gull-billed and White-winged Black Terns were seen in 1986.

Sterna caspa **Caspian Tern**: up to five present throughout.

TABLE II: COUNTS OF OTHER WATERBIRDS (NON-WADERS) ON KHOR DUBAI IN 1986 AND 1987.

	27/8	12/9	16/9	28/9	11/10	21/10	3/11
Western Reef Heron <i>Egretta gularis</i>	10	25	33	27	23	18	25
Great White Egret <i>E. alba</i>	0	0	0	0	4	2	3
Grey Heron <i>Ardea cinerea</i>	47	90	49	96	96	97	81
Greater Flamingo <i>Phoenicopterus ruber</i>	760	791	960	561	642	743	850
Little Tern <i>Sterna albigrons</i>	53	50	46	78	24	18	32

2. COASTAL SURVEY OF NORTHERN UAE

To complement our studies in Dubai we surveyed some areas of suitable habitat at other sites in the northern Emirates (Dubai, Sharjah, Ajman, Umm al Qaiwain, Ras al Khaimah and Fujairah) (Figure 1). We also made a cursory survey of some coastal areas around Abu Dhabi. Many of these sites were previously surveyed in 1975 by Carp (1975) who found more than 12,000 waders in coastal lagoons and creeks north of Dubai.

Methods

Areas of suitable habitat, i.e. lagoons and tidal creeks, were located from maps and navigation charts. These sites were then surveyed from a four-wheel-drive vehicle where access proved possible. In 1987 the use of a shallow-bottomed boat enabled extensive lagoons to be surveyed in more detail. Survey trips were made on 12, 23, and 28 October and 8 November in 1986, and 2, 13, 14, 24, 26 and 27 September in 1987.

Site descriptions and counts

Ghalilah (25° 59'N, 56° 4'E)

This is a small, sandy tidal creek. In 1986 it held approximately 100 waders but in 1987 a total of 1,280 waders, including 200 Bar-tailed Godwits, 100 Grey Plovers and 287 Redshank. Also present were 34 Western Reef Herons *Egretta gularis*, 18 Greater Flamingoes and two Arctic Skuas *Stercorarius parasiticus*.

Rams (25° 53'N, 56° 1'E)

The coastline here forms a series of lagoons containing at least 5 km² of mudflat and some mangrove. At least 2,000 waders were present in 1986, including at least 250 Bar-tailed Godwits; the majority were Kentish Plover, sand plovers and Dunlin. This site held far fewer birds in 1987; only 77 were seen.

Ras al Khaimah (25° 48'N, 55° 56'E)

This large lagoon of c. 4 km² was very silted up, with some low mangrove vegetation. About 650 waders were counted in 1986 and 385 in 1987.

Al Jazirah al Hamra (25° 40'N, 56° 50'E)

This is an extensive coastal lagoon complex stretching for c. 15 km. with many sandbars. In 1986 about 3,500 waders were present, mainly Dunlin, *Charadrius* plovers and Redshank. About 100 Western Reef Herons were also present. The same number of birds was present in 1987 but the species composition was very different. Furthermore, two separate counts were made in 1987, on 2 and 13 September, and changes in the species composition were very apparent between these dates. On 2 September 3,410 birds were counted, the majority being Curlew Sandpiper (1,060), Terek Sandpiper (745), Redshank (511) and Bar-tailed Godwit (220). Later on the number of Curlew Sandpipers and Terek Sandpipers had fallen to only 139 and 215 respectively whilst the number of sand plovers had risen from 300 to 1,171. These changes are similar to those observed on Khor Dubai and some other species also mirrored trends revealed by our extensive studies there; Turnstone numbers fell from 110 to 42 and Dunlins increased from 2 to 65. One notable difference between Khor Dubai and Al Jazirah was the proportion of sand plovers in winter plumage which was very high at Al Jazirah and other coastal sites. The number of Western Reef Herons was the same in both years. Large numbers of terns were present; in 1987 c. 400 were counted roosting on the main sandbar. These were mostly Lesser Crested Terns *Sterna bengalensis* with a few Sandwich *S. sandvicensis*, Gull-billed, Caspian, White-cheeked and Little Terns *S. albitrons*. In 1986 a Roseate Tern *S. dougallii* was present.

Khor al Beidah (25° 32'N, 55° 38'E)

This is a very large (c. 50 km²) area of mudflats, islands and mangrove, bounded by desert to the south and west and by low lying islands to the seaward side. In 1986 this area was extremely difficult to count due to its size and inaccessibility. Nevertheless the counts in both years were similar, with a total of approximately 10,000 birds, but once again the species composition varied. In particular, 1,300 Curlews and 350 Crab Plovers *Dromas ardeola* were present in 1986; the counts in 1987 were 333 and 166 respectively. Even in 1987, using a boat to survey the area, 6,500 birds could not be identified to specific level though most of these were small species (probably *Charadrius* plovers and other small waders). Western Reef Herons and Greater Flamingoes were more numerous in 1986 (170 and 250) than in 1987 (71 and 90). A roost of 440 Lesser Crested Terns was present in 1987. In 1986 thousands of Socotra Cormorants *Phalacrocorax nigrogularis* were seen on As Siniyyah, one of the offshore islands, where they are reported to breed (C. Richardson *pers. comm.*). In 1987 it was possible to approach from the seaward side of the island and a flock estimated to comprise 30-40,000 birds was found. Some 10,000 of these were on the island itself.

Khor Ajman (25° 23'N, 55° 26'E)

This large and shallow lagoon held low densities of birds; only 100 were seen in 1986 and 582 in 1987 the vast majority of which (452) were sand plovers. A roosting flock of 233 terns was present of which 146 were Sandwich.

Khan Lagoon (Sharjah) (25° 20'N, 55° 26'E)

This large lagoon c. 5 km.², was similar to Ras al Khaimah, i.e. very silted and covered with low mangrove vegetation. 1,500 waders were present in 1986 and 700 in 1987, 440 of which were *Charadrius* plovers. A flock of 123 terns was counted, comprising 51 White-cheeked Terns and 65 Sandwich.

Khor Kalba (25° 6'N, 55° 20'E)

Khor Kalba is the only extensive area of wader habitat on the east coast. It is dominated by tall, mature mangrove and the extent of mudflats is limited to the edges of creeks. About 200 waders were present in 1986, including one Great Knot *Calidris tenuirostris*. Numbers in 1987 were lower (142). One adult Indian Pond Heron *Ardeola grayii* was present in 1986, and in 1987 a juvenile of this species or Squacco Heron *A. ralloides* was seen. White-collared Kingfishers *Halcyon chloris* were also present; two were seen in 1987.

Abu Dhabi Wetlands (24° 28'N, 54° 25'E)

Even from a boat this area proved extremely difficult to survey and only a small fraction of the area to the east of Abu Dhabi was covered. We chose to concentrate on the area around the island of Jast al Sadiyat which we had been told was the best site close to Abu Dhabi city. We found 1,769 waders, most of which were *Charadrius* plovers and other small waders.

DISCUSSION

The coastline of the northern United Arab Emirates is certainly of great importance to migrating waders; autumn counts show that at least 40,000 birds used sites in the area in 1986 and 1987, 17,000 of which were counted on Khor Dubai. In addition to this, 1,300 terns, 1,250 Greater Flamingoes, 350 Western Reef Herons and 40,000 Socotra Cormorants were present. Since these counts were made during a period when birds were migrating through the area the total number of birds using this coast in autumn is much higher than this. The complex of sites from Khor Dubai to Ghalilah is certainly of national importance within the United Arab Emirates. In terms of international importance, Khor Dubai most certainly satisfies the criteria laid down by the RAMSAR convention under which a site must hold at least 1% of a regional population of a species; the 4,050 Broad-billed Sandpipers present in 1986 may represent as much as 18% of the Fenno-Scandinavian population.

Khor Dubai appears to be unique within the UAE, supporting a more varied assemblage of birds at much higher densities than other sites. Notably no significant concentrations of Broad-billed Sandpipers were found anywhere else. Whether the probable nutrient enrichment of this site within the past decade has concentrated birds which would otherwise have been more widely dispersed cannot now be known. Nevertheless, the fact that Khor Dubai can, and does, support such high densities of birds deserves further study. The extent to which birds using Khor Dubai also use other sites in the northern Emirates is unknown, though the movement of one Little Stint from Dubai to Sharjah does suggest that this occurs.

On a world-wide basis wetlands are one of the ecosystems most threatened by human activity and the protection of important sites such as Khor Dubai, Khor al Beidah and Al Jazirah is very important in order to conserve populations of waders and other species. Fortunately, pressures for the development of coastal habitats in the Gulf is, as yet, slight, and tends to be limited to areas providing ready access to deep water for ports and marinas. However, the attractiveness of shallow lagoons and inlets for leisure developments may put increasing pressures upon them. Khor Dubai is very well protected from human disturbance at present and efforts should be made to ensure that such protection continues and is extended to other sites.

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MIGRATION PATTERNS THROUGH DUBAI 1984-88

by

C. Richardson and J. A. D. Chapman

INTRODUCTION

In 1985, while collating a number of records for the Dubai Natural History Group we noticed that some consistency was emerging of regular passage of many species. Continuous recording in the Dubai area continued, often daily, and by the end of 1987 our individual field observations had provided enough data to chart migratory patterns for over 100 species. The study of migration patterns through a region might normally have been a task outside the capabilities of a small team in a limited period, but unique circumstances had prevailed to enable this to be done with some accuracy during our leisure time.

Dubai's rapid planned development, and the authorities' provision of large areas of green landscaping, was creating tracts of rich habitat in a region at best considered arid and infertile in its natural state. A number of very good sites (TABLE I) were identified which appeared to act as magnets for a number of tired and hungry migrants. In addition, a number of water treatment plants, sewage works and natural mudflats (Khor Dubai) had already established the combination of suitable habitat for a broad range of species.

LIMITS OF THE AREA

The location of Dubai in the United Arab Emirates is shown in *Figure 1* and the sites are shown in *Figure 2*. We restricted our studies to observations within 10 km. of the Arabian Gulf coast, in the Emirate of Dubai.

THE SITES

With the exception of the Jebel Ali Hotel, all sites are within 5 km. of each other. The Jebel Ali Hotel is approximately 40 km. south-west of the city area, on the Arabian Gulf coast. The major sites are shown in *Figures 1* and *2*. TABLE I shows the site area and the total species count during the period. All the sites, with the exception of Dubai sewage works, have been recorded on the Sites Register Scheme of the Ornithological Society of the Middle East.

TABLE I: PRINCIPAL SITES IN THE DUBAI AREA

Site	Area of Site	No. of Species recorded 1984-88
Saffa Park	84ha.	225
Khor Dubai	300ha.	82
Zabeel Water Treatment Plant or Fish Farm	10ha.	157
Jebel Ali Hotel Grounds	35ha.	112
Dubai Sewage Works	25ha.	103

These sites were toured regularly at the same time of the day (if practical) using a similar route around the site. The frequency of recording days in the field is shown in TABLE II and, with the exception of periods when our annual leave coincided, records were kept of all species present in each major site, at least once every 10 days (but normally every two days).

Prior to July 1984 insufficient data were available for tabulation, and after December 1987 field observations were by CR only.

RICHARDSON, C. & CHAPMAN, J. A. D. 1988. Migration patterns through Dubai 1984-88. *Sandgrouse* 10: 71-80.

TABLE II: NUMBER OF DAYS PER MONTH IN THE FIELD

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1984	—	—	—	—	—	—	3	17	17	17	21	22
1985	17	22	27	28	25	15	21	5	18	24	21	19
1986	19	16	24	20	4	6	18	24	25	19	23	23
1987	24	17	27	24	21	8	19	20	21	24	20	27
1988	30	23	28	24	23	—	—	—	—	—	—	—

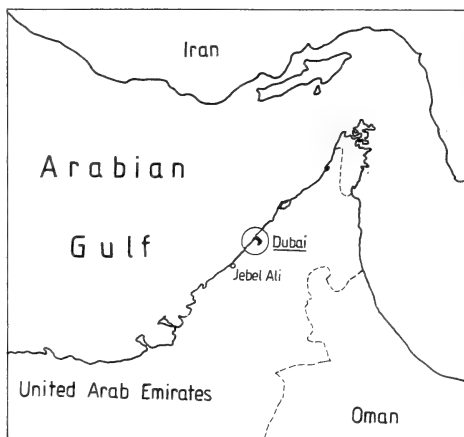


Figure 1: Location of Dubai in the Arabian Gulf.

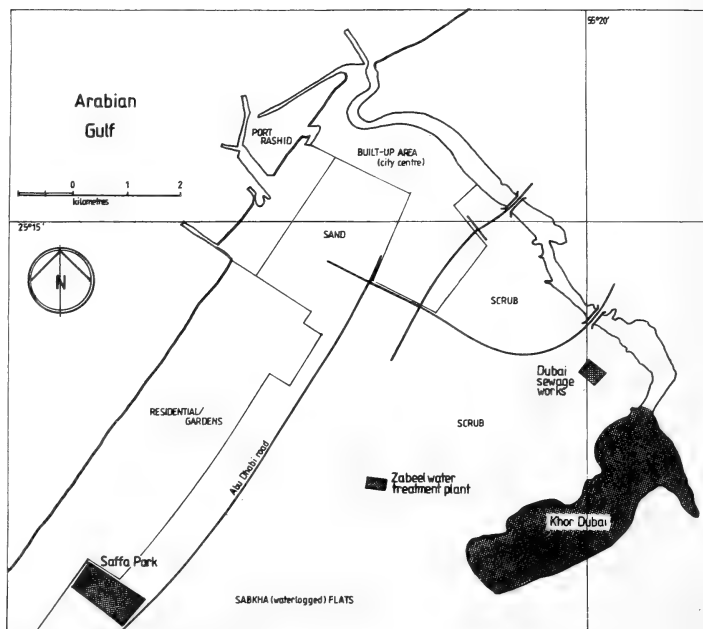


Figure 2: Sites in the Dubai area.

NOTES ON MIGRATION PATTERNS, TABLE III

In TABLE III each month is split into three parts, the first two parts being of 10 days each, the third being the remaining days in the month. These segments could be loosely termed the beginning, the middle and the end of the month.

Observations were continuous from 4 August 1984 until 31 May 1988 except for the following periods when both observers were absent:

12 July 1984 until 3 August 1984

15 August 1985 until 5 September 1985

8 May 1986 until 9 June 1986

KEY

A = 1 bird recorded

B = 2-4 birds

C = 5-9 birds

D = 10-49 birds

E = over 50 birds

Estimating numbers of the more numerous species (e.g. Chiffchaff) at a site on one visit introduced inconsistency in the patterns table, and some guesswork. As a result we have shown an asterisk *. This has also been used when no accurate count was made for other reasons.

Note: One Cattle Egret was present in Saffa Park from late December 1985 to late April 1986. One also occurred there 1986-87 and 1987-88, but it was not established if it was the same bird returning each year.

Note: Black-winged Stilt was found to be breeding on the east coast of the UAE in April 1988. This appeared to follow regular sightings since early July 1987. It was absent from the Dubai area during its 1988 breeding period.

Note: Although Collared Pratincole was not recorded in Dubai in spring 1988, we did observe it on the UAE east coast late April to early May.

Note: Whimbrel regularly winters in neighbouring areas, within 150 km. of Dubai.

Note: A Common Sandpiper was caught and ringed (distinctively on the left leg above the tarsus) in Saffa Park in November 1984 (P. Holmes). CR recorded it there on 8 April 1985, 18 and 20 October 1985, 3 February 1986, 13 and 15 August 1986, 25 February 1987, 11 March 1987, 25 March 1987 and 21 March 1988.

Note: Hoopoes probably bred in the Dubai area in spring 1988 (two birds observed carrying food for young in suitable habitat, 13 April 1988); probably summer visitors from wintering areas further south. It is not yet established if there is a small resident population.

Note: Grey Wagtails winter in small numbers in the UAE mountain wadis.

Note: Nightingales appear to be potential migrant breeders, following persistent singing and courtship in May 1987 and 1988.

Note: One male Whinchat on 2-23 December 1984, in Saffa Park, was unusual in winter.

Note: Separating Marsh and Reed Warbler in the field proved difficult. We suspect that Marsh Warbler is more common, particularly in spring when it is often in song. The evidence for this is strong, based on numbers of Marsh Warblers ringed in Saffa Park in late spring 1982 (G. Miles) and the report of exceptional numbers of Marsh Warblers recorded in neighbouring Oman in late spring 1988 (Hilary Fry, *Oman Bird News* 4). However, it is likely that Reed Warblers are more common in early spring, i.e. late February-March, from reported ringing activities in Oman (S. Hughes, *Oman Bird News* 4).

Note: One immature Rose-coloured Starling occurred on 4 February 1988 in the Jebel Ali Hotel grounds.

TABLE III: MIGRATION PATTERNS THROUGH DUBAI 1984-88

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Podiceps nigricollis</i> Black-necked Grebe	1984		C D C C	A							A		B B
	1985												B B
	1986	B B											B B
	1987	A C	A A A A							A		A A	B B
	1988	B B	B A A									A B	B A
<i>Ixobrychus minutus</i> Little Bittern	1984												
	1985	A A			A							A	
	1986												
	1987							A					
	1988							B					
<i>Nycticorax nycticorax</i> Night Heron	1984										B A	A A	B B
	1985	A A									A C	D B	B C
	1986	B B	B B B B	B B B	B B B	B B B					A A	B B	C A
	1987	A B	B B								A C	D B	B B
	1988	A B	A	B B	A B	C C	A				B A	D A	B
<i>Ardeola ralloides</i> Squacco Heron	1984							A					A A
	1985												A
	1986		A A A A	A A A	B B B					A			
	1987		A A A	A A A	A A A	A A							
	1988												
<i>Bubulcus ibis</i> Cattle Egret	1984												
	1985		A A A A	A A A	A B B	B B B							
	1986	A A A	A A A A	A A A A	A A A								A A
	1987	A A A	A A A	A A A	A A A							B	A A
	1988	A A A	A A A	A A A	A A A								
<i>Egretta garzetta</i> Little Egret	1984		D D D *		A					A B A	A A A	A A A	A A D
	1985									A A A	A A B	A A A	A A
	1986									A B B	A C C	A C	A A
	1987	A B B	A B B	A						A A A	A A A		
	1988				A					A A A	A A A		
<i>Egretta alba</i> Great White Egret	1984		B C C C	C C	B A A	A A	B	B A B	B	B B A	B	B B	D B C
	1985		A A	C B A	B B A	A A				A A A	A C A	D	D B D
	1986	D C D	C B B	B B A	A A				B A	C C A	A B	D	D B D
	1987	D C D	* D D	D C B	A A A				A	A A A	A B	D	D B D
	1988	D D D			A A A					A A A			
<i>Ardea purpurea</i> Purple Heron	1984				A	A A A	A			B A B	A A A	A A A	A A A
	1985							B B		A	B A A	B B A	A A A
	1986	A			A A	A A A	A			A B A	A A A	A A A	A A A
	1987					A A A				A A A	A A A		
	1988	A		A		A A A				A A A	A A A		
<i>Platalea leucorodia</i> Spoonbill	1984		D D C D	C C	A A		A A B					A A	
	1985												B
	1986	A D	A C	B C C	A B	A C B		B B B	B B C	B	B	A	C
	1987	D D D	D C	D D	D	C D C		B B B	B B C	B		C	D
	1988												
<i>Tadoma tadoma</i> Shelduck	1984		B B A B B	B		A							A
	1985			B									
	1986												
	1987					A A							
	1988			A	A		A A						
<i>Anas penelope</i> Wigeon	1984											A	C D
	1985			B								D B D	C C C
	1986	D B A *		D B							B	D B D	E A D
	1987	B E D	E								B A B	D *	B
	1988	A B A	C A										
<i>Anas strepera</i> Gadwall	1984		C B	C A A								A	B
	1985		B B B	A C A	A A A					A A B	B A A	B B B	B B B
	1986		C C	C B B	B A							B B B	B B B
	1987		B B C	C B B								B B B	B A B
	1988												
<i>Anas crecca</i> Teal	1984		E E E E	E E E	D D								D D D
	1985		E E E E	E E E	E E E								D D D
	1986	D B *	C E E E	E E E	C								E E E
	1987	E E E E	E E E	E E E	D C		B						E E E
	1988	E E E E	E E E	E E E	D C	A							E E E
<i>Anas acuta</i> Pintail	1984										B B D	*	D D D
	1985		E D E E								B B B	D D D	D D D
	1986		A B A D E	E E						A	C D C	D D D	C B A
	1987		D D D	D							D D D	D D D	D D D
	1988		D D E	D A							D D E	D D E	D D E
<i>Anas querquedula</i> Garganey	1984			B D						B D	C D	B A A	A
	1985									C D D	D D	C A	
	1986			A						D C D	B B	A A	
	1987			B						D D C	B B		
	1988			C B						B D	D D	E E A	A

TABLE III: MIGRATION PATTERNS THROUGH DUBAI 1984-88 - continued

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Anas clypeata</i> Shoveler	1984 1985 1986 1987 1988	B B D C C B D C B C	C D B B A D D A D C D	D D E E B	B A A A		A			A A A A B	A A C C B B A C	D D D D B B B B	D D D D B B * A
<i>Aythya ferina</i> Pochard	1984 1985 1986 1987 1988		C D C D D D D D D D	D C B D C B A A							C B A A D	C D B A A A D D D	A D D C D D B D
<i>Aythya nyroca</i> Ferruginous Duck	1984 1985 1986 1987 1988		A A B B A A								B B B C A	B B A A B B	B A B B
<i>Aythya fuligula</i> Tufted Duck	1984 1985 1986 1987 1988		B C B B B D	C C A							B C B C	A A C C A D B C	A B B B B C C
<i>Circus aeruginosus</i> Marsh Harrier	1984 1985 1986 1987 1988		A A A A A A A A	A A A A A A A A	A A A A A						A B B A A A B A	A A A A A A	A A A A A B
<i>Porzana porzana</i> Spotted Crane	1984 1985 1986 1987 1988				A A A A A B	B B B A B B				A A	A A A A		
<i>Porzana pusilla</i> Baillon's Crane	1984 1985 1986 1987 1988		A		A A A		A				A A		
<i>Gallinula chloropus</i> Moorhen	1984 1985 1986 1987 1988			A	A		A				B B A B A A A	A B B B A A A B	A B A A
<i>Fulica atra</i> Coot	1984 1985 1986 1987 1988		D A B A D D D D D D	B C C D D D D B	C C C C B A							A B A C A D A D	B B C C D D D D
<i>Himantopus himantopus</i> Black-winged Stilt See Note on p. 73	1984 1985 1986 1987 1988		B C C C C	A C C A A	A A	A	B	B A D C D D	A A C C	A B A C C	A E C D D	B C B A C	A C C C C
<i>Cursorius cursor</i> Cream-coloured Courser	1984 1985 1986 1987 1988							B B B B B	B B B B C B	B B B B B B			
<i>Glareola pratincola</i> Collared Pratincole See Note on p. 73	1984 1985 1986 1987 1988				A B	B				B B B	C B A A		
<i>Charadrius dubius</i> Little Ringed Plover	1984 1985 1986 1987 1988	A	B C C B B B A B	D D D C C C B A	B B B A A C B A	C C C B C C A A	C D D * * B C	A B D A B A	B A B B C C	** A A B B C B	C	A	B B B
<i>Pluvialis fulva</i> Pacific Golden Plover	1984 1985 1986 1987 1988		D D D E D D E D D D D D	D E D D D * D D	D C C B D D	D D D D	E E D D A			B C A C C C A B	B B C C C C B B	B B C B D D D D	D D D D D D D D
<i>Chettusia leucura</i> White-tailed Plover	1984 1985 1986 1987 1988	B B A	B B B A A		A A					A A A A	A A B B A A	A A B B B B	A B B

TABLE III: MIGRATION PATTERNS THROUGH DUBAI 1984-88 - continued

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Calidris temminckii</i> Temminck's Stint	1984									A	C	C	D
	1985	B	B	C	C	A	B			A	B	C	A
	1986	A	B							D	B	A	B
	1987									A	A	A	A
	1988		A	B	A	A	B			A	A	C	B
<i>Philomachus pugnax</i> Ruff	1984									B	C	B	C
	1985			B						D	D	D	D
	1986		A	B	A	D	A	B		B	C	C	B
	1987	A	D	D		B	A	C		B	A	B	B
	1988		B	B	D	B	B	D		C	C	D	D
<i>Gallinago gallinago</i> Snipe	1984									A	B	B	C
	1985	A	A	B	A	A	A	A		B	B	B	B
	1986	B	A							A	A	A	A
	1987		C		A	B	B	B	B	A	C	C	B
	1988	A	A	B	C	B	A	A		B	A	C	C
<i>Numenius phaeopus</i> Whimbrel	1984									D	B	C	C
	1985					A		B	D	A	B	B	B
	1986									A	A	B	B
	1987					B			A		B	B	B
	1988									A	B	B	B
<i>Tringa erythropus</i> Spotted Redshank	1984									A	B	A	A
	1985			C		D	C	B					A
	1986									B	C	B	A
	1987										A	A	A
	1988	A	A	B		B	B						A
<i>Tringa stagnatilis</i> Marsh Sandpiper	1984												A
	1985			C								A	A
	1986				A					B	A	B	B
	1987	C	A	B						A	A	B	B
	1988				A					B	A	B	B
<i>Tringa nebularia</i> Greenshank	1984	A	E	E	E	E		D		A	A	E	A
	1985	D		E	E	E	*	E	A	B	B	D	E
	1986		A	E	D	E	B	D	*	A	B	C	B
	1987	A	A	B	A	A	B	A	D	*	A	B	B
	1988	A	A	B	D	A	A	B	A	D	*	A	B
<i>Tringa ochropus</i> Green Sandpiper	1984	B		A	A	A	A	B		A	A	B	C
	1985			A	A	A	A			A	A	B	C
	1986			A	A	A	A			A	A	B	C
	1987	D	A	A	A	A	A			A	A	B	C
	1988	B	A	A	A	A	A			A	A	B	C
<i>Tringa glareola</i> Wood Sandpiper	1984									B	A	A	A
	1985	C	C	C	B	A	A	A		C	C	B	B
	1986			B	A	A	A			A	B	B	B
	1987			A	A					B	B	B	B
	1988	A				B	A			B	B	B	B
<i>Actitis hypoleucos</i> Common Sandpiper	1984								A	C	C	*	*
	1985	*	B	C	C	*	C	B	B	C	C	C	C
	1986	B	C	B	*	B	B	B	B	B	B	B	B
	1987	B	C	B	B	B	B	B	B	B	B	B	B
	1988	C	B	C	B	B	B	C	C	B	B	A	
<i>Phalaropus lobatus</i> Red-necked Phalarope	1984									B	C	A	B
	1985								B		B	A	A
	1986									B	B	A	A
	1987									A	B	C	B
	1988					A							
<i>Chlidonias hybridus</i> Whiskered Tern	1984												
	1985								B		A		
	1986									A			
	1987												
	1988	B	B	B	A	C	B	A	C	B	B	C	C
<i>Chlidonias leucopterus</i> White-winged Black Tern	1984												
	1985									A	A		
	1986									B			
	1987										B	D	C
	1988	A	A									C	A
<i>Streptopelia turtur</i> Turtle Dove	1984												
	1985												
	1986					C	A	B	B	B	B	A	B
	1987					B	B	B	B	B	B	B	B
	1988					A	A	A					
<i>Cuculus canorus</i> Cuckoo	1984									A	B	B	A
	1985										A	A	A
	1986					A	B	B	A				
	1987					A	A						
	1988											A	

TABLE III: MIGRATION PATTERNS THROUGH DUBAI 1984-88 – continued

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Merops superciliosus</i> Blue-cheeked Bee-eater	1984				A A D		B A		B	* B B B	B D C D		
	1985									B D D	C B		
	1986									A D			
	1987		A					A		A A D B			
	1988						B						
<i>Merops apiaster</i> Bee-eater	1984									E * * *	B		
	1985				D D D					D B D C			
	1986				B D					C E A			
	1987				B A				A A	D			
	1988				A		A						
<i>Coracias garrulus</i> Roller	1984									A B B A	B A	A	
	1985			A	A B B B	B A B A	A A	A A		A B B B	B A B A		
	1986			A	B B B B	B B B B				A B B B	B A B A		
	1987					D B			A	A B B A	B A B A		
	1988				A B	B							
<i>Upupa epops</i> Hoopoe	1984									B * * *	* A A A	* A A A	A B B B
	1985	A A	C C C	D D D	D D B	A			B A A B	C C B B	C C B B	A A B A	A B B B
	1986	B B	B B C	D D C	D B B				A A A C	C C C C	C C B B	B B B A	A B B B
	1987	B B	A B	B B B	B B B	C C B	C	B B B	A A C C	C C C C	C C B B	B B B A	A B B B
	1988	C A	B D	A B C	D B A	B							
<i>Jynx torquilla</i> Wryneck	1984								A		A A		A A
	1985			A									
	1986			A A							A	A	
	1987												A
	1988	A		A	A						A		
<i>Calandrella brachydactyla</i> Short-toed Lark	1984							A					
	1985												
	1986			B						B C C B		B	
	1987									D D			
	1988			A									
<i>Alauda arvensis</i> Skylark	1984		D D *	D D D	D							A D D *	E C D D
	1985		D D D	D D C	C							D D D	D D D *
	1986		D D D	D D C	C							B C D D	D D D
	1987		D D D	D D C	C							C D D	D D D
	1988		D D D	D D C	C							C D D	D D D
<i>Riparia riparia</i> Sand Martin	1984									B B * C	* A A		A
	1985				B B A B		A			C D * A	A A		
	1986				A A B					B D D A			A A
	1987				B B			A		B A B D	D	B	C A
	1988	C				A A							
<i>Hirundo rustica</i> Swallow	1984									C B C D	C B B D		A
	1985		A	C	B B C	C B D	D B	A C D C	C B C D	D * B B	B D C	C B A	
	1986				A A B	B B B	B C	B A A	C B B D	* C C C	B B B	B B A	
	1987				B A B A	B B B	B C		B B C D	* C C E	B B B	B B A	
	1988	A	A		B A B A	B B B	A C		B B C D		B B B	C C C	
<i>Delichon urbica</i> House Martin	1984									* A B			
	1985		B	B	A			A B		A			
	1986		A		A								
	1987											A	
	1988		B										
<i>Anthus novaeseelandiae</i> Richard's Pipit	1984											B	
	1985				B A A A	A					A		
	1986											B C A	B
	1987	B A	B B A	B B								A	
	1988												B
<i>Anthus campestris</i> Tawny Pipit	1984									A A C	* B D	D D D	E D B
	1985				D D D	D B B				A B C	B D D	D D D	D D *
	1986				D D D	D B B	A			B B C	C D D	E * D	C B C
	1987				B C C	B B A				B B C	D C	E D D	D D C
	1988				C C B	B				D C C	D C	E D D	D D C
<i>Anthus trivialis</i> Tree Pipit	1984									A B B	B B B		A
	1985				B B D	D D B				A B D	C D B		
	1986				C A B	B B B				C C C	B B B		
	1987				C C A	B B B				B B D	C B B	B A A	B
	1988				A D B	A	A						
<i>Anthus pratensis</i> Meadow Pipit	1984									A	A B C	B * B	B B B
	1985		A	D	B B C	C A					A	B A C	B C C B
	1986	A D C	A A	D C C	C C A	A							
	1987		A	A	C C A	A							
	1988		A D								B		B A
<i>Anthus cervinus</i> Red-throated Pipit	1984												
	1985	C C B	* A C	C C D	D E D	B B					B A A	B B B	B * D
	1986			D	B B B	B B				C	A C	B B B	B C C
	1987				B A C	B D B							D B C
	1988	E E D	D D		B A C	B C A						C	D E E D

TABLE III: MIGRATION PATTERNS THROUGH DUBAI 1984-88 - continued

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Anthus spinoletta</i> Water Pipit	1984	* A	B	A B								B *	C * C
	1985	A										B B A	B
	1986	C		C								B	B
	1987			B B								B C D	D D
	1988	D D											D D
<i>Motacilla flava</i> Yellow Wagtail	1984								B B	* * A	A B *		
	1985		A		C B D	E E C	D B			B C D	* B A		
	1986		B		B B	A B D				A C E			
	1987	A	A	A	A A	B B	C D B	A A		B D B	E D	D C B	B A A
	1988	B B A	A	A	D B	A A A							A A A A
<i>Motacilla citreola</i> Citrine Wagtail	1984												A A A
	1985		A A	B B	A A	A							A A
	1986		B B	A A	A B					A			A A
	1987		A		A B					A A B B A		A B	B C B B
	1988	B A B A	B B D										
<i>Motacilla cinerea</i> Grey Wagtail	1984									A B			
	1985		A		A	B						A	
	1986	A			A	A							
	1987				A B	B					A	A B	
	1988				A	A							
See Note on p. 73													
<i>Motacilla alba</i> White Wagtail	1984												
	1985	* E	E	E	E	D	C	B		A	C	D	E
	1986	C D	E * D	D D	D C	B A	C B	A			B C	* C	* D
	1987	E * *	* * E	* * E	* * A	A	A				A	D	E
	1988	D D C	D C D	D C	B C	B C	C A				A D E	E D	E D E
<i>Cercotrichas galactotes</i> Rufous Bush Chat	1984												
	1985				A A			A					
	1986				A B								
	1987				A			A					
	1988						A A						
<i>Luscinia megarhynchos</i> Nightingale	1984												
	1985				A	A	A A						
	1986				A A	B			A A	A			
	1987				A	A	A B A						
	1988			A		A A	B						
See Note on p. 73													
<i>Luscinia svecica</i> Bluethroat	1984											A C C	C B B B
	1985	A A	A B	C B	B A	A B A						A B	B B B *
	1986	B C	B B	B B	B A	A B						A B	A B A B
	1987	A A	B A	B A	A A					A		A A	B A B B
	1988	A A A A	A B	A A A									
<i>Phoenicurus ochruros</i> Black Redstart	1984											A D B	* A A A
	1985		B D	D B	A A	B B A						A A	A A A
	1986	A A A A	A A A	A A C								B A B A	A A B A
	1987	A A A A	B	A A		A						A A A	A A A
	1988	A A A A	A A										
<i>Phoenicurus phoenicurus</i> Redstart	1984												
	1985				B E	E D	C A					A	
	1986				B B	A C C	D						
	1987				B C	D C B		A					
	1988				A D	A B D	B A A						
<i>Saxicola rubetra</i> Whinchat	1984												A A A
	1985					A B A	A A			A		A	
	1986				B	A A	A						
	1987				A A	A							
	1988		A			A							
See Note on p. 73													
<i>Saxicola torquata</i> Stonechat	1984											B B B	A A B
	1985	A B A	A B B	B A A	A A							A A A	A
	1986	B	A	A								B B	A A A
	1987	B	A									B	A A B
	1988	A A A	B									B	A A B
<i>Oenanthe isabellina</i> Isabelline Wheatear	1984												
	1985	A A A	A A	A	B B	B B			B A B	A A	A A	D A B	B A B
	1986	B A B	A	B A B	A A	A A			C B B	A B B	B B B	B B B	B A
	1987	B A A		B A A	A A	A A			B C C	B B B	B B B	B C A	* B
	1988	B A B	B A	A A					A B C	B B	B A C	A D B	C B
<i>Oenanthe oenanthe</i> Wheatear	1984												
	1985				B C	D B	A A		A			B D	B A
	1986				A A	A						A	
	1987			A	A A							A	
	1988			B B	B A	A				B A A			
<i>Oenanthe pleschanka</i> Pied Wheatear	1984												
	1985				B A	A A							
	1986		A A	A B	A B						A		
	1987			A C	A								
	1988			A B	A								

TABLE III: MIGRATION PATTERNS THROUGH DUBAI 1984-88 - continued

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<i>Monticola saxatilis</i> Rock Thrush	1984 1985 1986 1987 1988		A		B B A A A B B A A									
<i>Turdus ruficollis</i> Black-throated Thrush	1984 1985 1986 1987 1988	A	A B B	A							B B A	B A C		
<i>Turdus philomelos</i> Song Thrush	1984 1985 1986 1987 1988	* D D B C B C A A B D C	D D D B B B B C C C C C	D D D D D D A B B D C B	C B B D D B A B B C B B						A A B A A A A B A A B B	C D D B C C B B B B B D	D D C C C C C C C D C C	
<i>Locustella naevia</i> Grasshopper Warbler	1984 1985 1986 1987 1988				A A A A A A A A									
<i>Acrocephalus schoenobaenus</i> Sedge Warbler	1984 1985 1986 1987 1988			A	A A A A A A A	A A A A				B B	A A			
<i>Acrocephalus palustris/scirpaceus</i> Marsh/Reed Warbler See Note on p. 73	1984 1985 1986 1987 1988			A A A A	A * A A	* A B A D A E A C	D A A C C			A	A A B A			
<i>Acrocephalus stentoreus</i> Clamorous Reed Warbler	1984 1985 1986 1987 1988	A A	A A A		A A A	A A				B A A A B A	A A A A A A A A	A A A A	A A A A	
<i>Acrocephalus arundinaceus</i> Great Reed Warbler	1984 1985 1986 1987 1988			A		A				A A A B A	A A		A	
<i>Hippolais pallida</i> Olivaceous Warbler	1984 1985 1986 1987 1988				A A A A	A * A A A C	C D D D C A			A A A B B * A A	A A A A A A B A			
<i>Sylvia mystacea</i> Ménétries's Warbler	1984 1985 1986 1987 1988		A	A A A A A A A A A	A A A A A A A								A	
<i>Sylvia hortensis</i> Orphean Warbler	1984 1985 1986 1987 1988	A A A A	A A A A A A A A	B A B B A A A	B B A A A	A							A * B A A A A A	
<i>Sylvia communis</i> Whitethroat	1984 1985 1986 1987 1988		A A	B A A A A	A B A A A	B B B A A				A A A B A A	A A A			
<i>Sylvia atricapilla</i> Blackcap	1984 1985 1986 1987 1988				A B B A B B B B B A B A	B B B B B B B B B								
<i>Phylloscopus collybita</i> Chiffchaff	1984 1985 1986 1987 1988	A D B B B D * * * C C C	B B B B * D * C * C C D	D E E D D D * D B D	D B * D B B E E * C B B	B * B A * A B B					A	B * * A B C B B C	* B C * B B * D * D C D	C C C B * D B D B
<i>Phylloscopus trochilus</i> Willow Warbler	1984 1985 1986 1987 1988				A A B A A A A B A C B	B * B * * B B B A				A A				

TABLE III: MIGRATION PATTERNS THROUGH DUBAI 1984-88 - continued

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Muscicapa striata</i> Spotted Flycatcher	1984 1985 1986 1987 1988				A B C D A	B A A B D C B A C C B				A A A A B B A B C A B A	A A A A A A C B A C A B	A	
<i>Ficedula semitorquata</i> Semi-collared Flycatcher	1984 1985 1986 1987 1988				A B A A A								
<i>Oriolus oriolus</i> Golden Oriole	1984 1985 1986 1987 1988					AB A AB A A			A	B D B B B D			
<i>Lanius isabellinus</i> Isabelline Shrike	1984 1985 1986 1987 1988	A A A B C B B C B B B C	B B A C C C C C B C C B	C D B D D D C C C C C B	C D C C B C C C B C B A	C A C A B A B A				A A A B B A B B A A	B A A B B C B B C B B C	D C B C B C C B C C B C	A B C B B B C A C C B C
<i>Lanius collurio</i> Red-backed Shrike	1984 1985 1986 1987 1988				A B B B A A	B B A							
<i>Lanius minor</i> Lesser Grey Shrike	1984 1985 1986 1987 1988				A A A A A	B B A A							
<i>Lanius senator</i> Woodchat Shrike	1984 1985 1986 1987 1988			A A A A A A A A	A B B								
<i>Lanius nubicus</i> Masked Shrike	1984 1985 1986 1987 1988				A B A B A	A A A				A			
<i>Sturnus vulgaris</i> Starling	1984 1985 1986 1987 1988		D D D D D D B D D C D A	D D D D D D D E D A	B A A	A A A A					A A A	B C D C D D B A D	D B E D C D C
<i>Sturnus roseus</i> Rose-coloured Starling See Note on p. 73	1984 1985 1986 1987 1988					A				C C B B A A	A A C A		
<i>Emberiza hortulana</i> Ortolan Bunting	1984 1985 1986 1987 1988				B B A	D D C B A				A A A A		A	

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NOTES ON SOME BREEDING BIRDS OF THE UNITED ARAB EMIRATES

by

Ghassan Ramadan-Jaradi

The geographical area covered by the United Arab Emirates (U.A.E.) was for a long time little explored ornithologically (Meinertzhagen 1954). However, recently, a check-list of the birds of the Arabian Gulf States which includes the United Arab Emirates was published (Bundy & Warr 1980). During the field-work I undertook regularly between July 1977 and December 1981 in the U.A.E. when I collected data on my thesis and less regularly afterwards, I gathered new data on the distribution of breeding birds (Ramadan-Jaradi 1984 and 1987) and I found some new breeding species. For migrating and wintering species, see Ramadan-Jaradi (1985). I present these new data in the following list.

The United Arab Emirates constitute a largely desert country, situated at the south-eastern part of the Arabian Peninsula. Large gravel plains cover half of its area and sand dunes cover a further third. There are also inland and coastal salt pans (sabkha) as well as a mountain region extending 80 km. in length and 30 km. in width (highest point: 2,400 metres a.s.l.).

THE SPECIES LIST (MB: migrant breeder; RB: resident breeder)

Butorides striatus

Green-backed Heron (RB)

I found a nest with an incubating or brooding adult in April 1981 in a mangrove on the eastern coast near Khor Khalba (Fujajrah): this is the first breeding record for the U.A.E. (Ramadan-Jaradi 1984).

Torgos tracheliotus

Lappet-faced Vulture (RB)

Breeding confirmed: two nests (one contained an egg and the other was empty) were found in Acacias in January 1983 south-west of Jebel Hafit. The birds are presumed to be of the *negevensis* subspecies (Bruun 1981, Bruun *et al.* 1981).

Buteo rufinus

Long-legged Buzzard (RB)

The first breeding record was found in 1983 when I located a nest about 70 km. northwest of Al Ain in a *Leptadenia pyrotechnica*: the nest contained two eggs on 13 March.

Aquila chrysaetos

Golden Eagle (RB)

Nestlings were brought to the Al Ain Zoo (in 1978, 1981, 1983, 1985, 1986 and 1987) and were said to have come from nests in *Prosopis* trees; this strongly suggests breeding. Breeding was found recently in Oman (Gallagher & Brown 1982).

Hieraetus fasciatus

Bonelli's Eagle (RB)

I found an occupied nest on a cliff of Jebel Hafit early in February 1980: this constitutes the first breeding record for the U.A.E.

Alectoris chukar

Chukar (RB)

Over 1,500 captive-bred birds (possibly of the *cypriotes* subspecies) were taken from Al Ain Zoo in 1982 and released near Al Ain, in Abu Samra and Rima roadside plantations. A few of the survivors were recorded breeding.

RAMADAN-JARADI, G. 1988. Notes on some breeding birds of the United Arab Emirates. *Sandgrouse* 10: 81-84.

*Chlamydotis undulata***Houbara (RB)**

Modern falconry is probably the main reason for this species' dramatic decline. Fragments of an egg shell and up to three one-month-old individuals were seen in late April 1982 among a small protected population which exists in the south-eastern part of the U.A.E.

*Charadrius dubius***Little Ringed Plover (RB)**

I found a nest containing three eggs in April 1980 on the Faydah ponds near Al Ain.

*Hoplopterus indicus***Red-wattled Lapwing (RB)**

At least two breeding records: a family with two young in July 1979 and a nest with three eggs in April 1980 on Faydah ponds near Al Ain.

*Sterna saundersi***Saunders' Little Tern (MB)**

Breeds on the coast and on islets (I recorded it on Sir Bani Yas and Abu Al Ayad).

*Pterocles lichtensteinii***Lichtenstein's Sandgrouse (RB)**

Breeding recorded: an adult with a two-week-old chick in May 1982 at Chouab Al Ghaf near Hafit.

*Pterocles coronatus***Crowned Sandgrouse (RB?)***Pterocles senegallus***Spotted Sandgrouse (RB?)**

Commonly observed near drinking points all the year round on the Faydah ponds near Al Ain but I failed to confirm breeding for either species.

*Pterocles exustus***Chestnut-bellied Sandgrouse (RB)**

I recorded three nests, each with two eggs in early May 1982 on bare ground at the foot of Jebel Hafit.

*Psittacula krameri***Ring-necked Parakeet (RB)**

Introduced in considerable numbers in 1976 : breeds commonly in palm groves and wooded gardens in several localities (Abu Dhabi, Dubai, Al Ain, Sharjah, Ras Al Khaymah and Fujajrah). In 1986 the species was considered as a pest in palm-groves and hundreds were then shot throughout the whole country by official edict.

*Tyto alba***Barn Owl (RB)**

Breeds in and near mountains in areas of palm plantations and old buildings.

*Athene noctua***Little Owl (RB)**

I collected some evidence of breeding around Jebel Hafit near Al Ain and I also saw it rather commonly in the northern part of the U.A.E. (Sharjah and Fujajrah) and in the alluvial plains and sand dunes of the interior. This bird seems to me much more abundant than suspected by Bundy and Warr (1980).

*Apus pallidus***Pallid Swift (RB)**

Nests in small colonies on the coast (in old watch-towers on the western cliffs on the eastern side).

*Halcyon chloris***White-collared Kingfisher (RB)**

Adults with food were seen entering a hole in a tree in the mangrove of Khor Khalba on the eastern coast near the border with Oman.

*Eremopterix nigriceps***Black-crowned Finch Lark (RB)**

Breeds locally on sand dunes with a relatively dense vegetation coverage. I found nests with

eggs in May. Also occurs on stony habitats where some vegetation is present and on irrigated grassy flanks of highways.

Pycnonotus cafer

Red-vented Bulbul (RB)

Escaped birds recorded (Bundy & Warr 1980). One fledgling was found on the ground at the Al Ain Zoo following a storm in May 1984.

Acrocephalus stentoreus

Clamorous Reed Warbler (MB)

Breeds in small numbers, locally in mangroves and in salicomia near Abu Dhabi and Khor Khalba. Breeding activity was observed between late April and mid July (territorial singing males, apparent pairs, food-carrying, etc. In the mangrove of Abu Dhabi two newly fledged young were seen on 13 May 1986; this was the first confirmation of breeding.

Turdoides squamiceps

Arabian Babbler (RB)

Occurs on wooded slopes with *Acacia tortilis* and *Prosopis cineraria*. Prefers thorny trees for breeding and pastures and irrigated areas for feeding.

Corvus splendens

Indian House Crow (RB)

Restricted to the eastern part between Dibba and Khor Kalba and on the western coast north of Ras al Khaymah (between Ash Sham and Dhayah), also in Dubai (Pilcher 1986). Only occurs near human settlements.

Corvus ruficollis

Brown-necked Raven (RB)

Widely distributed. Nevertheless absent from the plains and the coasts of the eastern part where it seems to be replaced by the previous species.

Acridotheres tristis

Common Mynah (RB)

About 400 birds were released in 1976 in Abu Dhabi and Al Ain. The use of pesticides by the Horticultural Section in Al Ain reduced their numbers considerably.

Acridotheres ginginianus

Bank Mynah (RB)

This species has also been introduced. It survives in cities, especially in Abu Dhabi, where a colony of about 100 birds exists.

Euodice malabarica

Indian Silverbill (RB)

I found this species nesting late in February 1987 in the huge aviaries of bustards at Al Ain Zoo. I also observed it on the east coast and in Ras al Khaimah (north-western part of the U.A.E.) but without breeding evidence.

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SOME OBSERVATIONS IN SOUTH YEMEN IN 1984 AND A SELECTED BIBLIOGRAPHY OF THE REGION

by

J. S. Ash

INTRODUCTION

I was in the People's Democratic Republic of Yemen, referred to here throughout as South Yemen, from 18-30 November 1984 investigating problems associated with the large number of Indian House Crows *Corvus splendens* in Aden. During this period some incidental observations were made on other species of birds, mostly in the Aden area, but also during brief visits to Little Aden on 20th, Lahej on 23rd, Zingibar and Abiyan on 25th, and to Mukalla, Fowah wadi, Shahir and Ash Shihr in the Hadramaut on 27th.

Few ornithological observations have been made here in recent years, so that the 1984 observations are presented for the benefit of future observers interested in any changes which may have taken place. The following localities referred to in the systematic list are in the Aden area: Crater, Abiyah beach, Causeway, Dar Musabein, Slave Island, Bir Ahamed, Daar Saad and Hiswa (although the latter is often referred to separately from Aden itself). All other localities are outside the Aden area, and will mostly be familiar to readers of the existing ornithological literature.

One outstandingly interesting area resulting from sewage outflow at Hiswa is of recent origin, and is presumably of a temporary nature. Prolonged flooding for some time (two to three years?) had formed a large area of rich marshland; further observation than I had time for would undoubtedly be rewarding. A further new site is the refuse tip at Dar Musabein, which attracts many scavengers.

SYSTEMATIC LIST

Socotra Cormorant *Phalacrocorax nigrogularis*. Up to 30 frequently off the crater end of Abiyan beach. Fowah wadi beach, two.

Green-backed Heron *Butorides striatus*. Aden area: fairly common, one to four most days.

Cattle Egret *Bubulcus ibis*. Aden area: common, up to 200+ daily. Lahej: one. Zingibar: common.

Western Reef Heron *Egretta gularis*. Aden area: very common (hundreds). Mukalla: common.

Little Egret *Egretta garzetta*. Aden area: few only. Hiswa: one. Mukalla: c.10. Shahir: one.

Grey Heron *Ardea cinerea*. Aden area: common. Mukalla: several.

Black-headed Heron *Ardea melanocephala*. Hiswa: one on 21 and four on 30 November. There are two previous records from South Yemen. (S. J. L. Hill and J. Hulbert). There is also a record of at least one in South Oman (Gallagher & Woodcock 1980), and one in North Yemen in December 1982 (Brooks *et al.* 1987), being the only other records from Arabia.

Hamerkop *Scopus umbretta*. Lahej: unoccupied nest found, 23 November.

Glossy Ibis *Plegadis falcinellus*. Aden area: 60 at Hiswa and 75 over the causeway on 30 November. Mukalla: 16 on 27 November. Only one previous record.

Spoonbill *Platalea leucorodia*. Aden area: few only; one to five several times from the causeway.

Greater Flamingo *Phoenicopterus ruber*. Aden area: abundant; probably several thousands. Mukalla: 10. Shahir: c.10. Hiswa: 500.

ASH, J. S. 1988. Some observations in South Yemen in 1984 and a selected bibliography of the region. *Sandgrouse* 10: 85-90.

Pintail *Anas acuta*. Hiswa and Causeway: up to 11 often.

Black Kite *Milvus migrans*. Aden area: common, but stated to be less frequent in urban areas than previously, possibly due to harassment by Indian House Crows. Fairly common to very common at Dar Musabein tip, Zingibar, Gaar, Mukalla area, Fowah, and Ash Shahr. Shahr: one.

Egyptian Vulture *Neophron percnopterus*. Very few in the Aden area, except for c. 100 at Dar Musabein refuse dump. Lahej: one.

Short-toed Eagle *Circaetus gallicus*. Singly at Slave Island on 23 November and Hiswa on 30 November. Three previous records.

Marsh Harrier *Circus aeruginosus*. One at Dar Musabein and four or more at Hiswa.

Pallid Harrier *Circus macrourus*. Hiswa: one on 30 November.

Accipiter sp. Gaar (Abiyan): a small *Accipiter* on 25 November with a 'squared' tail and very dark colour suggested Sparrowhawk *A. nisus*.

Long-legged Buzzard *Buteo rufinus*. Aden: one captured an item of prey in a rocky area in the town on 25 November and was immediately mobbed by c. 200 Indian House Crows. Little Aden: one on 20 November. Lahej: four on 23 November. Hiswa: one on 30 November. Few previous records.

Spotted Eagle *Aquila clanga*. Slave Island: singly on 18 and 23 November. Hiswa: three in one tree at dawn on 30 November had apparently roosted there; by 0800 hrs. they were active in the air and were joined by others arriving from the northwest, presumably from a roost-site, until there were 15-20 in the area. At one time there were eight together at a kill made by one of them in the marsh. I spent much time in attempting to identify these birds in the field, and later from field sketches and notes, and concluded that most, if not all, were Spotted Eagles. Some identified as this species characteristically had 'square' wing tips, short rounded head and neck; all dark below with pale (whitish) crescent between black primary tips and the carpal spot; rounded tails. Those in juvenile plumage with two pale bars on the upper wing together with, in at least some, a white trailing edge did not present the same problem in identification. The preference for swamp- and marsh-land was also typical of a Spotted Eagle but, because of identification difficulties, perhaps the non-juvenile records should be treated with reserve. There are two previous records. I had no certain records of Steppe Eagle *Aquila nipalensis*. I suspected at first that the birds identified as Spotted Eagles were going to be Steppe Eagles, but this species was ruled out for every bird seen for which I had sufficient information. Ennion (1962) regarded it as common.

Tawny Eagle *Aquila rapax*. Certain identifications as follows. Aden area: few; singly on four days. Hiswa: five on 30 November. There may have been others, but the possibility of sub-adult Steppe Eagle was not ruled out.

Osprey *Pandion haliaetus*. Common in Aden area; several times four together.

Manchurian Red-footed Falcon *Falco amurensis*. Gaar (Abiyan): an immature, apparently male, on 25 November. At first thought to have been Red-footed Falcon *F. vespertinus*, but clearly identified from field sketch and description as this species having dark mixed brown and slatey upperparts, white cheeks with a small moustache below the eye, very boldly spotted white underparts, and rich buff under tail coverts; legs yellow-orange and a spot of red on the cere. This record is of particular interest in view of the paucity of data on the migration of this species (*vide* Ash & Miskell *in press*). There is apparently no previous published record in South Yemen, but there are a few records from South Oman (*per* F. E. Warr) and S.W. Saudi Arabia (Meinertzhagen 1954).

Peregrine *Falco peregrinus*. One or two on three days. Twice Peregrines ate items of prey high in the air, possibly because of the impossibility of eating on the ground due to the attention of Indian House Crows. Ash Shahr: two on 27 November.

Oystercatcher *Haematopus ostralegus*. Aden area: common in flocks of up to 40.

Black-winged Stilt *Himantopus himantopus*. Hiswa: 300 or more on 30 November. Mukalla: 34 on 27 November.

Avocet *Recurvirostra avosetta*. Hiswa: 100 on 30 November.

Little Ringed Plover *Charadrius dubius*. Mukalla: two on 27 November.

- Ringed Plover** *Charadrius hiaticula*. Aden area: uncommon; maximum 30 per day.
- Lesser Sand Plover** *Charadrius mongolus*. Slave Island: two on 29 November.
- Greater Sand Plover** *Charadrius leschenaultii*. Aden area: few; maximum 10 per day.
- Grey Plover** *Pluvialis squatarola*. Aden area: very common.
- White-tailed Plover** *Chettusia leucura*. Mukalla: one in wadi in town on 27 November. Apparently no previous records.
- Sanderling** *Calidris alba*. Aden area: hundreds on Abiyan beach. Fowah: one.
- Little Stint** *Calidris minuta*. Aden area: one on 22 November. Mukalla: one on 27 November. Hiswa: 20 or more on 30 November.
- Temminck's Stint** *Calidris temminckii*. Mukalla: one on 27 November.
- Curlew Sandpiper** *Calidris ferruginea*. Aden area: very few; maximum 20 per day.
- Dunlin** *Calidris alpina*. Hiswa: one on 30 November was the only record.
- Ruff** *Philomachus pugnax*. Hiswa: 150 on 30 November. Mukalla: 12 on 27 November.
- Snipe** *Gallinago gallinago*. Hiswa: one on 21 and two on 30 November. Mukalla: one on 27 November.
- Black-tailed Godwit** *Limosa limosa*. Hiswa: common, 200+. Mukalla: one on 27 November.
- Whimbrel** *Numenius phaeopus*. Aden area: few; maximum nine per day.
- Curlew** *Numenius arquata*. Aden area: Common. Fowah: one on 27 November.
- Spotted Redshank** *Tringa erythropus*. Hiswa: two on 21 and one on 30 November. Mukalla: four on 27 November. Three previous records.
- Redshank** *Tringa totanus*. Aden area: very common; hundreds. Mukalla: 10 or more.
- Greenshank** *Tringa nebularia*. Aden area: fairly common; maximum 20 per day. Mukalla: at least 10.
- Green Sandpiper** *Tringa ochropus*. Hiswa: one on 21 and 30 November. Mukalla: two on 27 November.
- Wood Sandpiper** *Tringa glareola*. Hiswa: one on 21 and five on 30 November. Mukalla: nine on 27 November.
- Terek Sandpiper** *Xenus cinereus*. Aden area: uncommon; up to 10 a day.
- Common Sandpiper** *Tringa hypoleucos*. Common at Aden and Mukalla.
- Sooty Gull** *Larus hemprichii*. Aden area: fairly common, but more numerous in Mukalla area.
- Black-headed Gull** *Larus ridibundus*. Slave Island: an immature on 23 November.
- Slender-billed Gull** *Larus genei*. Aden area: widely scattered, possibly up to 500.
- Lesser Black-backed Gull** *Larus fuscus*. Aden area: very common.
- Herring Gull** *Larus argentatus*. Aden area: very common.
- Gull-billed Tern** *Gelochelidon nilotica*. Aden area: very common; 200 per day.
- Caspian Tern** *Sterna caspia*. Aden area: very common; 200 per day.
- Swift Tern** *Sterna bergii*. Aden area: very common; hundreds (200 in one flock). Fowah: 100+.
- Lesser Crested Tern** *Sterna bengalensis*. Aden area: uncommon; maximum six per day.
- Sandwich Tern** *Sterna sandvicensis*. Fowah: 100 resting on the beach on 27 November, and many others feeding out at sea.
- Whiskered Tern** *Chlidonias hybridus*. Aden area: three on 30 November. Two previous records.
- White-winged Black Tern** *Chlidonias leucopterus*. Hiswa: six on 30 November.
- Sandgrouse** *Pterocles* sp. Aden area: c. 30 on 19 November. Zingibar: seven on 25 November.
- Red-eyed Dove** *Streptopelia semitorquata*. Lahej: one calling on 23 November.
- Palm Dove** *Streptopelia senegalensis*. Lahej: four or more on 23 November. Gaar (Abiyan): several on 25 November. Mukalla: four on 27 November.
- Short-eared owl** *Asio flammeus*. Aden area: a fresh dead bird at the foot of the Causeway on 30 November.
- Little Green Bee-eater** *Merops orientalis*. Zingibar: a few. Bir Ahamed: one.
- Blue-cheeked Bee-eater** *Merops superciliosus*. Common and widespread except around

Aden; all records appeared to be of the Asian race *persicus*. Hiswa: eight on 21 and heard on 30 November. Between Aden and Lahej: common on 23 November. Zingibar: very common. Fowah: four and a party. Ash Shihr: c. 100 roosting. Slave Island: six flew south on 23 November.

Black-crowned Finch Lark *Eremopterix nigriceps*. Aden area: fairly common. Zingibar: fairly common.

Hoopoe Lark *Alaemon alaudipes*. Aden area: one on 30 November at Bir Ahamed.

Crested Lark *Galerida cristata*. Zingibar: several on 25 November.

Swallow *Hirundo rustica*. A few only at Aden and Zingibar.

Tawny Pipit *Anthus campestris*. Aden area: one at Bir Ahamed on 30 November.

Pipit *Anthus* sp. Aden area: a pipit at the garbage dump at Dar Musabein on 19 November was feeding with White Wagtails. Although highly improbable it looked very like Meadow Pipit *Anthus pratensis* but was only seen briefly and could not be found again to confirm.

Yellow Wagtail *Motacilla flava*. Dar Musabein: one on 19 November. Hiswa: one on 21 November.

White Wagtail *Motacilla alba*. Aden area: only one on 18 November. Dar Musabein refuse tip: 82 on 19 November. Hiswa: 20. A few at Lahej, Mukalla and Zingibar.

Yellow-vented Bulbul *Pycnonotus xanthopygus*. None around Aden. Common at Lahej and Gaar; fairly common at Zingibar, Mukalla and Fowah.

Black Bush Chat *Cercotrichas podobe*. Dar Saad: one. Gaar: one.

Blackstart *Cercomela melanura*. Slave Island: one extremely skulking bird in a bush. Mukalla area: a few.

Wheatear *Oenanthe oenanthe*. Singly on five days at Aden (Crater and Dar Musabein), Lahej, Zingibar and Ash Shihr.

Graceful Warbler *Prinia gracilis*. Aden area: one on 19 November.

Ménétries's Warbler *Sylvia mystacea*. Hiswa: one male on 30 November. Two previous records, including a specimen in the British Museum (Nat. Hist.) (per F. E. Warr).

Isabelline Shrike *Lanius isabellinus*. Singly at Mukalla, Fowah and Hiswa.

Great Grey Shrike *Lanius excubitor*. Aden area: one at Bir Ahamed.

Indian House Crow *Corvus splendens*. Abundant in Aden, where population may number over 50,000, following a dramatic increase since 1982. They have acquired pest status because of the general inconvenience, nuisance and noise they cause; contamination of food and water with faeces and food scraps; fouling of vehicles, buildings and seats with faeces; damage to electric wiring and TV aerials; destruction and damage in fish-drying, fruit-growing, poultry farms (adults and eggs) and calf-rearing; destruction of filled refuse bags, etc. Their threat to public health is considerable through the contamination of food and water with the numerous pathogenic organisms associated with them (Ash 1984). Their increase is considered to be due to the failure of garbage disposal to keep pace with the increased human population, and the removal from the urban environment of goats which previously were responsible for consuming much garbage. The increase in crows is apparently responsible for the decrease in the numbers of breeding small birds, but large birds are also greatly harassed. The species is also common on the outskirts of Aden (e.g. 400 at Dar Musabein tip, and 600 at Hiswa), and has spread inland as far as Lahej, where it is now very common, and probably beyond. It has also colonised further east in Hadramaut to Mukalla (c. 100) in 1978 or 1979, Ash Shihr (15-16) in 1983, where the potential exists for rapid increase, and north along the Red Sea coast of North Yemen (Brooks *et al.* 1987) and Saudi Arabia (per F. E. Warr). Gaar (Abiyan): one only.

Brown-necked Raven *Corvus ruficollis*. Zingibar: four or more on 25 November.

Fan-tailed Raven *Corvus rhipidurus*. Fowah wadi: c. 30 on 27 November.

Tristram's Grackle *Onychognathus tristramii*. Mukalla: very common.

House Sparrow *Passer domesticus*. Aden area: fairly common.

Rüppell's Weaver *Ploceus galbula*. Hiswa: two on 30 November. Lahej: three nests. Gaar: fairly common and nests seen. Mukalla: 20 or more nests. Fowah: a few and some nests.

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NOTES ON THE SAUDI ARABIAN BIRD COLLECTIONS OF I. M. ABDEL MAGID AND S. HALFAWI IN THE GIZA ZOOLOGICAL MUSEUM

by

Steven M. Goodman and Michael C. Jennings

INTRODUCTION

In the mid-1940s two expeditions were sent to Saudi Arabia by divisions of the Egyptian Ministry of Agriculture for the purpose of collecting vertebrate specimens. The first of these expeditions included members of the Egyptian Zoological Service. They travelled overland, between January and June 1944, across the Sinai, south along the Arabian Red Sea coast almost to the North Yemen border and into portions of central Arabia, including the Jebel Shammar area. The bird material obtained was reported on by Halfawi (1945). The second expedition, organized by the Department of Zoological Gardens and Aquariums, was between 12 December 1944 and 9 June 1945. This group also travelled overland from the Sinai, south along the Arabian Red Sea coast to Jeddah and inland as far as the environs of Al Madinah and Taif. The vertebrate collections were summarized by Abdel Magid (1947).

As cited in the two expedition reports, material brought back to Egypt included forms poorly known from the Arabian Peninsula and in a few cases previously unrecorded. However, in the ensuing years the whereabouts of these collections was unknown and the validity of several important records could not be verified. In late 1985 while SMG was examining the Egyptian bird holdings of the Giza Zoological Museum (GZM), Giza Zoological Gardens, Cairo, portions of both the Halfawi and Abdel Magid collections were discovered. Dr. Mervat Morcos and SMG subsequently re-sorted, re-identified and catalogued these Arabian collections. Of the specimens reported by Halfawi (1945), a total of 205 non-passerines (of the original 220) and 160 passerines (of 170) were found and registered. For the Abdel Magid material 123 non-passerines and 202 passerines were catalogued, compared to the 132 and 213, respectively, reported in his 1947 paper. A portion of the balance of both collections is housed in the Egyptian Ministry of Agriculture Zoological Museum, Dokki, Cairo, but this material could not be examined. (A third collection of specimens taken by M. F. Hussein of Cairo University whilst resident in Riyadh, Saudi Arabia, between 1963 and 1964 (Hussein 1965), was not located.)

The complete (revised) catalogue of the GZM Arabian collection was turned over to MCJ, coordinator of the Atlas of the Breeding Birds of Arabia project. These collections are important in view of the localities visited (especially central Arabia and the extreme southwest) and the period of collection, and it was our original intention to publish in English a complete review of this material. However, since the majority of it will be included eventually in the Atlas and because a larger portion can be gleaned from Halfawi (1945) and Abdel Magid (1947), we detail here only those records that were incorrectly reported in the original papers, those that were enigmatic and subsequently verified, and those that are of special interest. All specimen numbers cited are from the GZM register. Localities at which the birds were collected and routes taken by Halfawi and Abdel Magid are shown in *Figure 1*.

SYSTEMATIC LIST

Ciconia abdimii

Abdim's Stork

An adult female (B759) was collected at Abu Arish (16°59'N, 42°49'E) on 15 May 1944. This is the only known specimen record from Saudi Arabia (Gallagher 1986).

GOODMAN, S. M. & JENNINGS, M. C. 1988. Notes on the Saudi Arabian Bird Collections of I. M. Abdel Magid and S. Halfawi in the Giza Zoological Museum. *Sandgrouse* 10: 91-96.

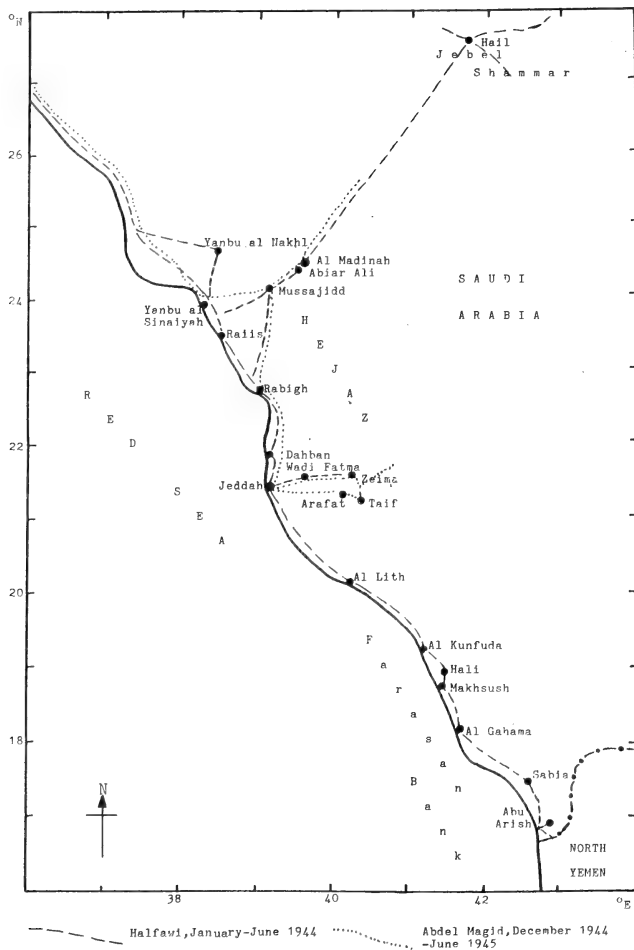


Figure 1: Position of places mentioned in the text and routes of Halfawi and Abdel Magid.

Platalea leucorodia

Spoonbill

An adult male was taken at Al Gahama (18°01'N, 41°40'E) on 12 May 1944 (B873). The specimen was referred by Halfawi (1945) to *P. l. leucorodia*, the form breeding in the Palearctic. However, its wing and exposed culmen measurements are closer to *P. l. archeri*, the subspecies nesting along the African shores of the Red Sea, including Egypt, than to *P. l. leucorodia* (TABLE I).

Gyps rueppellii

Rüppell's Vulture

Halfawi (1945) reported a male of this species was taken at Makhsush (18°40'N, 41°15'E) in May. In the GZM there are two specimens of Griffon Vulture *G. fulvus*, a female (B1123) and an immature male (B1122) taken at Makhsush on 11 May 1944. The male was clearly misidentified by Halfawi, and this means that the status in Arabia of *G. rueppellii* is in question, there being only one specimen record (in the British Museum (Natural History)), for which collecting details are questionable, and some unsubstantiated sight records (Jennings *in prep.*).

TABLE I: COMPARISON OF ARABIAN *PLATALEA LEUCORODIA* SPECIMEN WITH THE MEASUREMENTS OF *P. L. ARCHERI* AND *P. L. LEUCORODIA*.

	wing	exposed culmen
Al Gahama specimen male, B873	358	187
Male <i>P. l. leucorodia</i> ¹	range 386-412 mean 394 n=13	195-231 213 n=15
Sexes combined <i>P. l. archeri</i> from Egypt ²	range 322-353 mean 342 n=8	145-179 156 n=8
Sexes combined <i>P. l. archeri</i> from southern Red Sea and Somalia ³	range 330-360 n=?	145-170 n=?

¹From Cramp & Simmons (1977).

²From Goodman & Storer (1987).

³From Neumann (1928).

Torgos tracheliotus

Lappet-faced Vulture

Halfawi (1945) reported a male taken in March along the Al Madinah-Hail road, but the specimen was not located in the GZM collection. It has only become clear in the last decade that this species is widespread and not uncommon as a breeding bird in central Arabia (Jennings & Fryer 1984).

Numida meleagris

Helmeted Guineafowl

Adult females were collected by Halfawi at Abu Arish on 19 May 1944 (B748) and at Hali (18°45'N, 41°20'E) on 25 May 1944 (B749). The latter bird is the most northerly specimen record for Arabia, although there have been observations near Al Kunfuda (19°10'N, 41°05'E) (Gasperetti & Gasperetti 1981). The range in Saudi Arabia is now limited to the extreme southwest (Jennings *in prep.*) and the populations of Hali and Al Kunfuda may no longer be extant.

Limicola falcinellus

Broad-billed Sandpiper

A male collected at Jeddah (21°28'N, 39°10'E) on 10 April 1945 (B1545) and identified by Abdel Magid (1947) as a Broad-billed Sandpiper is actually a Dunlin *Calidris alpina*.

Streptopelia roseogrisea

African Collared Dove

Halfawi collected several specimens north of Jeddah including a female at Mussajidd (24°05'N, 39°05'E) on 11 April 1944 (B808), a male at Raiis (23°33'N, 38°33'E) on 17 March 1944 (B811), and a male at Rabigh (22°45'N, 39°00'E) on 16 March 1944 (B807). These are the most northerly records of this species in Arabia. In more recent years the African Collared Dove has not been recorded at these localities. It is not clear if this apparent range contraction is related to the dramatic range expansion of the Collared Dove *S. decacoto* which in the last two decades has spread from northeastern Arabia across the region and reached Yanbu al Sinaiyah (24°55'N, 38°10'E) in 1984 and Jeddah in 1987.

*Streptopelia lugens***Dusky Turtle Dove**

Halfawi (1945) reported that a male Dusky Turtle Dove was collected at Makhsush in May 1944. This specimen was not found in the GZM collection, although there are two male Palm Doves *S. senegalensis* taken at Makhsush on 11 May 1944 (B814, B815). The occurrence of the Dusky Turtle Dove (generally a higher altitude species) in late spring at Makhsush seems unlikely, although there are records from the Tihama in North Yemen in April and October-November (Cornwallis & Porter 1982; Brooks *et al.* 1987) and the extreme southwest of Saudi Arabia in January (Jennings 1981).

*Clamator jacobinus***Jacobin Cuckoo**

Halfawi collected a female at Sabia (17°10'N, 42°33'E) on 16 May 1944 (B929). The species is rare in southwest Saudi Arabia and the date suggests that the bird may have been a local breeder.

*Clamator glandarius***Great Spotted Cuckoo**

Three specimens were collected at Zeima (21°35'N, 40°06'E) by Abdel Magid in late January 1945: males on 24th (B1468) and 31st (B1467) and a female on 30th (B1466). There are few records of this species from Arabia and it appears to be an erratic migrant throughout the area. These three records suggest that it may winter locally in western Arabia.

*Ammomanes cincturus***Bar-tailed Desert Lark**

Halfawi procured two at Bir Amra, near Yanbu al Nakhl, on 6 February 1944 (B1082-3). This species appears to be rare in western Arabia.

*Oenanthe finschii***Finsch's Wheatear**

A male collected at Abiar Ali (24°25'N, 39°31'E), in the northern Hejaz, on 31 March 1945 (B1398) and identified by Abdel Magid as a Finsch's Wheatear is actually a Black-eared Wheatear *O. hispanica melanoleuca*. The re-identification of this specimen means that there are no verifiable records of Finsch's Wheatear from the central latitudes of western portions of the Arabian Peninsula.

*Oenanthe moesta***Red-rumped Wheatear**

Abdel Magid (1947) reported that a female Red-rumped Wheatear was taken at Arafat (21°28'N, 40°10'E) on 16 January 1945. A specimen in the GZM (B1407) labelled *O. moesta* and fitting all of the above collection information is a Red-tailed Wheatear *O. xanthopyrma*. The re-identification of the Abdel Magid specimen means that there is now only one specimen record of the Red-rumped Wheatear (in the British Museum (Natural History)) from central Arabia (Jennings *in prep.*).

*Sylvia melanocephala***Sardinian Warbler**

On 24 January 1945 an adult male (B1369) was collected at Zeima. Abdel Magid (1947) referred the specimen to *S. m. norrisae*, a subspecies confined to the Faiyum of Egypt. The bird was compared to a series of *norrisae* and to a few specimens of *S. m. melanocephala* and *S. m. momus* in the GZM. The Arabian bird is distinctly whiter on the underside and darker on the upperside than any of the Faiyum material and approaches the plumage coloration of *S. m. momus*. Excluding material of *S. m. mystacea* which is now considered a distinct species. (Ménétrières's Warbler), the Abdel Magid bird is apparently the only known specimen of Sardinian Warbler from Saudi Arabia (Jennings 1981) – although in recent years there have been several well documented winter sight records in the west of the country.

*Sylvia melanothorax***Cyprus Warbler**

A male taken at Abiar Ali on 17 February 1945 (B1361) was correctly identified by Abdel Magid (1947). This is the only record of this species for the Arabian Peninsula.

*Sylvia hortensis***Orphean Warbler**

Halfawi (1945) listed a female taken at Dahban (21°55'N, 39°07'E) in April as an Orphean Warbler. He noted that this specimen had a shorter bill and was distinctly greyer than typical *S. h. crassirostris*. A specimen in the GZM (B1099) labelled *Sylvia hortensis* and taken at Dahban on 25 April 1944 is clearly a Barred Warbler *S. nisoria*.

*Ploceus (Hyphantornis) bojeri***Golden Palm Weaver**

Halfawi (1945) reported that a female of this East African weaver was collected at Sabia. This specimen is housed in the GZM. As already suggested by Griffiths (1973) the bird is an Arabian Golden Sparrow *Passer euchlorus*, a common breeding resident along the Tihama (Jennings 1981).

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SUMMARY

Bird specimens obtained during the mid-1940s in Saudi Arabia by the Egyptian zoologists I. M. Abdel Magid and S. Halfawi are reviewed. This material contains unique specimens for Arabia, although several identifications mentioned in the original expedition reports were incorrect.

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THE OSTRICH IN OMAN

by

M. D. Gallagher

INTRODUCTION

Three whole but very old eggs of the extinct Arabian race of the Ostrich *Struthio camelus syriacus* have been found in the Sultanate of Oman in the last thirteen years. Two were apparently in the place where they were laid, the third, together with a broken egg, was probably also where it was laid. Fragments of eggshell are not uncommonly found, apparently in association with sites of ancient habitation. The Ostrich is also known in Oman from rock art. Notes on these finds are given here, to supplement previous reports by Walker (1981) and Jennings (1986), and to encourage further research in Oman.

WHOLE EGGS

The first egg was found by a beduin Omani of the Bait Kathir tribe on 2 March 1979, half buried in sand southeast of Ramlat Rakhawt (Rakhoth, Rakhut etc.) at 18°31'N 51°59'E in northwestern Dhofar, the southern province of Oman. It was brought to G. Dawson at Thamanit, where F. J. Walker examined it (Walker 1981). It was subsequently passed to R. H. Daly, Adviser for Conservation, who presented it to the Oman Natural History Museum (Accession No. ONHM 210, 24 March 1985), with the details given above.

The egg weighs 220 grams, and the measurements (by Vernier-gauge callipers) are 132 × 105 mm. The egg is unbroken, and the general colour pale fawn. On one side is a glossy patch approximately 80 × 80 mm, consistent with it having been exposed and polished in a similar fashion to the patina or varnish found on undisturbed desert stones. There is a little gloss in an irregular area on the opposite side, perhaps the remains of the original gloss. Both ends are very pale, and the remainder is pale, with paler spotting and pitting consistent with wear.

The second egg was found on 4 April 1985 by Mohammad Salem Muhad Bait Ruwas, who was in a vehicle on the steppe north of the dunes of Ramlat Jadilah, in 'Urqa al Hadh, at 18°50'N 54°15'E, also in northwestern Dhofar. It was given to Captain D. Macsween, who was following in another vehicle, but despite careful packing the petrified contents became detached and broke through one side of the egg. It was temporarily repaired with adhesive tape, and presented to the Oman Natural History Museum (Accession No. ONHM 326, 9 May 1985), where it was weighed, measured, repaired and put on display.

This egg weighed 257 grams, including the detached contents (63 grams), and the tape, and it measures approximately 143 × 114 mm. The general colour is dark fawn with paler spots and is slightly glossy, except for one side, where there is an un glossed pale fawn patch 70 × 80 mm. It is noteworthy that in neither instance was the presence of other eggs reported (nor perhaps were they suspected by the finders).

Two large eggs (one of which was broken) were found together by W. Foxton (*in litt.* and *pers. comm.*) on 17 February 1975, partly buried by sand and gravel, near a small hill and an old army camp at Marboosh, also in Dhofar, at 17°02'N, 53°32'E. This place is on a broad, dry, gravel plateau on the northern part of Jabal Qamr at 950 metres altitude. The plateau is a watershed, draining gently northward through shallow, sandy, and vegetated wadis, then through 10 km. of low hills, to reach broader, sandy wadis and the plains and dunes of the steppe. One such system is Wadi Ghadun; another is Wadi Aydim, which is over 1,000 yards (914 metres) broad at its mid-course (Thesiger 1946).

It is quite conceivable that the birds penetrated these well-vegetated wadis towards the mountains (as in Africa: Cramp & Simmons 1977), and so reached the plateau. The possibility

that the eggs were placed there by people is unlikely. The eggs, near a small hill, were in a situation similar to that described to H. St. J. B. Philby and mentioned by Jennings (1986: 457) which would allow one bird to stand sentinel on the hill whilst its mate incubated. Foxton's Baluchi companions did not recognise the eggs and thought that they belonged to a snake. The whole egg was taken to a camp at Raysut, from which it later disappeared; the broken egg was left untouched.

EGGSHELL FRAGMENTS

Without supporting evidence the finding of fragments of Ostrich eggshell should not in itself be taken as evidence of the occurrence of Ostrich at the place of finding, nor, therefore, as reliable evidence of former distribution (Jennings 1986; Gallagher 1988). However, some published and unpublished reports are mentioned below, as a contribution to our knowledge of the Ostrich in Oman.

The "many fragments" of petrified eggshell, which Bertram Thomas (1932: 147) picked up during his journeys in southern Oman were probably associated with human use, as nowhere does he describe these fragments as broken eggs. However, the Ostrich had lived here, for during his crossing of the steppe south of the Rub'al Khali (Empty Quarter) in winter 1930/31 he reported that "Members of my party had shot ostriches here, and I had picked up fragments of petrified egg-shell, but it would seem that firearms and the pursuit of unenlightened self-interest by the Badu have extinguished the ostrich, at any rate in the eastern marches I traversed." (Thomas 1931b: 214).

Writing of his previous winter's journey Thomas (1931a: 15) reported that "The ostrich is extinct except in the far southwest, in the Sa'ar habitat where they were once plentiful, and specimens are still occasionally seen." However, Wilfred Thesiger, in his equally meticulous description of the animals encountered during his travels in the Sa'ar country in late 1947 (Thesiger 1959a), omits all mention of the Ostrich, for, as he says later, it had been extinct in southern Arabia for more than 50 years (Thesiger 1959b).

During the Oman/Royal Geographical Society Wahiba Sands Project the author found several small fragments of Ostrich eggshell, the largest being 27 × 27 mm, on firm level sand between high shifting dunes near Al Mintirib at 22°23'N 58°52'E on 17 December 1985. They were on a site of ancient habitation, attributed by C. Edens (*in litt.*), who saw the site later, as mid-Holocene, based on lithics. Other fragments, found by Edens near the east coast of the Wahiba Sands at 21°12'N 58°56'E, were "associated with a mélange of non-descript lithic debitage and Islamic pottery and other debris" (Edens *in litt.*). Mr Edens' specimens are with Prof. Dr. W. Büttiker for radiocarbon dating, together with some fragments which the latter reported (*in litt.*) as found on raised sabkha just south of Bilad Bani Bu Ali (22°01'N 59°19'E) early in 1986.

Amongst many other reports of fragments found in Oman are some from sites in the Fasad area of Dhofar (18°27'N 53°06'E; P. A. Smith *in litt.*; Pullar 1974). The author has been unable to trace any reports of the finding of Ostrich eggshell in graves in Oman.

However, the practice of burying egg containers in graves on Bahrain, Arabian Gulf, was noted by Ibrahim (1982). He found three in fragments and was able to reconstruct two of them. The end of each had been cut off, suggesting their use as containers, and one bore traces of a painted decoration. Fragments of eggshell, also presumably buried as containers, have been found in other late 3rd/early 2nd millenium B.C. grave-mounds on Bahrain by previous workers (Ibrahim 1982). Eggshell fragments have also been reported from archeological sites in Qatar, ranging in date from mid-Holocene to recent Islamic (Edens *in litt.*; De Cardi 1978).

These findings prove the use of Ostrich eggshells as containers and grave goods in the region, but also, in the case of Bahrain at least, show that the containers were used in countries without a population of wild Ostriches; they were "certainly on occasions transported great distances from the nest site" (Jennings 1986: 454-455).

ROCK ART

The depiction of Ostriches in rock art, using the 'pecking' technique (Preston 1976), is known in northern Oman, and although not providing evidence of distribution, it at least demonstrates an awareness of the bird. Unfortunately, no rock art can be dated accurately; furthermore, the principal sites appear to be confined to exposures of rock suitable for this art form, which requires smooth, hard, dark rock capable of being pecked by a stone or metal implement, to leave small white scars. Most favoured are the smooth slabs of highly indurated Cretaceous limestone, which is limited to Jabal al Akhdar. Rock art is found less often on ophiolites and metamorphic limestones in other parts of the northern mountains.

At least four examples of Ostriches in rock art are known in Oman. One is in Wadi Sahtan, near Fasha (23°20'N 57°19'E; site 14 in Clarke 1975; site 4 in Preston 1976; illustrated on p.22 in Jäckli 1980). Another is of a single bird at Wadi Hijir (23°14'N 57°01'E), near Wadi Bani Kharus, photographed by the author in March 1988. A third is at Wadi Tanuf (23°03'N 57°28'E), near Nizwa, kindly brought to my attention and photographed by Mrs J Cain. Crane-like birds, which are probably Ostrich, are at Amlah, Wadi al Ayn (23°08'N 56°54'E; site 23 in Preston 1976; illustrated on p. 24 in Jäckli 1980).

The first two sites are amongst mountains clearly unsuited to Ostrich. The sites at Tanuf and Amlah are on the border between the mountains and the open gravel plains, which drain to the interior sandy desert; both of which appear to be suitable to Ostrich now.

DISCUSSION

The discovery of three whole but very old eggs in separate sites in northwestern Dhofar, reported here, is further proof of the occurrence of Ostrich long ago. Thomas spoke with men who remembered the birds, but by the time of Thesiger's travels in Oman "ostriches had been extinct in southern Arabia for a very long time, certainly for more than twenty years" (Thesiger 1946: 134). He was later to revise this to "more than fifty years", as already mentioned.

A retainer of HM Sultan Qaboos bin Said, on seeing some Ostriches received into the zoo at Seeb from Botswana in 1975 or 1976, was heard to say to him "I remember seeing birds like these in the dunes north of Mughshin when I went there with your father and Mr Wendell Phillips in the 1950's" (R. H. Daly *in litt.*) If the observer was not mistaken (and it is now impossible to trace him) this will be the latest known record of Ostriches living in the wild in Arabia. The journey (but not the Ostrich) is related by Wendell Phillips (1971, map p. 206) as northward from Dauka 144 km. to Khasfah, which is 87 km. WNW from Mughshin. The party left Khasfah on 5 March 1956 (Phillips 1971: 216). There are several places of this name or similar, but according to the *Times Atlas of the World* (1977) and the *Gazetteer of Oman* (USBGN, 1983) this Khasfah is in Oman at 19°45'N, 54°19'E.

An earlier report by Colonel Miles (1919) is imprecise, saying that "The ostrich is now found to the north and west, but is extinct in the eastern part: according to Parsons, ostrich feathers were sold in the Muscat market." The origin of this is probably Miles (1877), which is based on information received during a visit to Buraimi in 1875, and which would seem to indicate that the Ostrich had occurred in northern Oman, that is, along the eastern border of the Empty Quarter. Conditions there are generally similar to those in northwestern Dhofar, and are apparently suitable for the bird.

To have survived in these arid lands, where perennial vegetation is present but often desiccated during extensive droughts, the Ostrich would certainly have been nomadic, as in Africa (Cramp & Simmons 1977; Brown *et al.* 1982; Jennings 1986), and as is the Arabian *Oryx Oryx leucoryx* for similar reasons.

It would seem logical and probable that the Ostrich once occurred along the entire border of the Empty Quarter in Oman, wherever vegetation was suitable. It probably occurred on the Jabal Qamr plateau, but is unlikely to have occurred in semi-enclosed areas such as the Batinah coast or on the narrow plains on the east and north of the Wahiba Sands (sites of eggshell fragments mentioned here).

In addition to the distribution records cited by Jennings (1986), evidence of the occurrence of Ostrich in the dunes at the base of the Qatar peninsula, west of Buraimi, is provided by the report of an egg found there "recently" and shown to G. M. Lees during a visit to Shaja wells, 45 km. WSW of Doha in 1925/26 (Lees 1928).

Although it has been assumed that there was only one race of Ostrich in Arabia, *syriacus*, Jennings (1986) has shown that there were two populations; it is therefore possible that the South Arabian population was subspecifically distinct (C. H. Fry, *in litt.*).

The measurements of the two Oman eggs, given above, are compared with those for *S.c. syriacus* given by Meinertzhagen (1954), Forbes-Watson (1967) and Walters (1982) in TABLE 1. The Oman eggs thus fall within the reported range of *syriacus*, though the first (ONHM 210) is one of the smallest.

TABLE I. SOME COMPARATIVE MEASUREMENTS OF EGGS OF *S. C. SYRIACUS*.

Source	Length (mm)	Breadth (mm)	Sample
RM(1954)	120-150	100-124	11
F-W(1967)	156	121	
	156	127	
MW(1982)	135-148.5	111.5-122	13
ONHM210	132	105	
ONHM326	143	114	

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SUMMARY

The finding in southern Oman of a second and third whole egg of the extinct Arabian race of the Ostrich *Struthio camelus syriacus* is reported, and additional and corrected details of the first egg are given. The findings of eggshell fragments and the depiction of Ostrich in rock art in Oman are mentioned. It is concluded that neither prove the local occurrence of Ostrich, but that Ostrich probably occurred along the entire Oman border with the Rub' al Khali, from as far north as Buraimi, and probably extending on to Jabal Qamr in the south. An additional report of a whole egg found at the base of the Qatar peninsula provides further evidence of an extension northeastwards of the previously published range.

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THE FOOD HABITS OF THE LITTLE OWL INHABITING WADI EL NATRUN, EGYPT

by

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INTRODUCTION

The Little Owl *Athene noctua* is a resident across much of the Palearctic and in portions of the Middle East and Africa north of the equator. The vast majority of food studies conducted on this species are based on the analysis of regurgitated pellets collected in the Eurasian portion of this owl's range (summarized in Cramp 1985). Few data, however, are available on the food habits of Little Owls inhabiting the desert zones of North Africa. The purpose of this note is to present information on the diet of Little Owls living in the oasis of Wadi el Natrun, Western Desert, Egypt.

THE SITE AND MATERIALS

Wadi el Natrun is a narrow depression located about 90 km. south of Alexandria and 110 km. northwest of Cairo. The oasis is orientated along a northwest-southeast axis and is separated from the Nile Delta by about 40 km. of sparsely vegetated, to barren, desert. Towards the centre of the depression are a series of salt-water lakes.

Two distinct plant communities occur in the oasis: those of the saline flats and lake edges, including extensive reed-beds, and those of the higher, drier and sandy areas. Along the shores of the lakes the ground tends to be sumpy and encrusted with salts; here the dominant vegetation consists of: *Scirpus litoralis*, *Juncus acutus*, *Panicum repens*, *Fuirena pubescens*, *Cyperus* spp., *Phragmites australis*, and *Typha* spp. (Stocker 1927, El Hadidi 1971, Zahran & Girgis 1972). The vegetation of the dry zone varies according to the local physical conditions. *Sporobolus spicatus* is one of the dominant plants in areas with saline soils, and *Nitraria retusa*, *Zygophyllum album*, *Alhagi maurorum*, *Tamarix* spp., *Artemisia monosperma*, and *Panicum turgidum* occur in the upland sandy areas (Stocker 1927; Zahran & Girgis 1972).

On 17 October 1986 owl pellets were collected from the ground on and around a small hillock, about two metres high, in a sparsely vegetated area five and a half km. north of Lake (Birket) el Zugm, Wadi el Natrun (30°25'N, 30°17'E, see Figure 2 in Goodman *et al.* 1986). On visits to the site in 1985 a Little Owl had been observed resting on the ground near the mound, and also on the afternoon the pellets were collected. A burrow had been excavated into the side of the knoll, presumably by a hare *Lepus capensis*, into which the owl disappeared when approached to within 20 metres. Scattered around the pellets were Little Owl feathers.

There are several old specimen and breeding records of the Little Owl in Wadi el Natrun. Recent positive documentation of this species breeding in the oasis is lacking, although local people consider it a common inhabitant (Goodman & Meininger *in press*). There is no evidence that Little Owls travel long distances to hunt (Cramp 1985).

A portion of the mammalian remains reported herein are deposited in the University of Michigan Museum of Zoology.

RESULTS

Remains of the following were recovered from the Little Owl pellets:

GOODMAN, S. M. 1988. The food habits of the Little owl inhabiting Wadi el Natrun, Egypt. *Sandgrouse* 10: 102-104.

Insects

Coleoptera: Tenebrionidae – pronota and heads of at least two individuals; and Scarabaeidae – pronota of at least five individuals.

Scorpion

Arachnida: Scorpionida – claw of indeterminate species.

Reptiles

Gekkonidae: – 12 dentary and five maxilla bones of at least seven individuals.

Birds

Quail *Coturnix coturnix*:– carpometacarpus, ulna, and tarsometatarsus.

Desert Lark *Ammomanes deserti*:– humerus and portion of ulna.

Hoopoe Lark *Alaemon alaudipes*:– carpometacarpus, proximal head of humerus, and distal head of tibiotarsus; and an ulna and portion of humerus similar to that of Crested Lark *Galerida cristata*.

Swallow *Hirundo rustica*:– a humerus compatible with this species.

Pipit *Anthus* sp.:– a pair of matching humeri and one left humerus.

Wheatears *Oenanthe* sp.:– two pairs of carpometacarpi.

Unidentified – numerous passeriform limb and trunk elements.

Mammals

Soricidae: Flower's Shrew *Crocidura floweri* – pair of matching mandibles.

Cricetidae: Gerbils *Gerbillus* sp. possibly Greater Egyptian Gerbil (*perpallidus*) – portions of eight mandibles of at least five individuals; *Gerbillus* sp., possibly Lesser Egyptian Gerbil (*gerbillus*) – portions of eight mandibles of at least five individuals; and Pygmy Gerbil *Dipodillus henleyi* – portions of four mandibles of at least two individuals.

Muridae: House Mouse *Mus musculus* – portions of 26 mandibles of at least 14 individuals.

Dipodidae: Lesser Egyptian Jerboa *Jaculus jaculus* – portions of eight mandibles of at least five individuals.

Unidentified – numerous rodent long bones and cranial fragments.

DISCUSSION

Little information is available on the food habits of the Little Owl in North Africa and the Middle East. Vernon *et al.* (1973) identified remains of a scorpion *Buthus occitanus* and gerbils (*Meriones* or *Gerbillus*) from pellets collected at El Hamra, Tunisia. Scorpion remains have also been found in Little Owl pellets from El Golea (Algeria), Tire (western Turkey) and Haruniya (south-eastern Turkey) (Vachon 1954; Kumerloev 1955). Fragments of at least five families of beetles were recovered from Little Owl pellets collected at El Djem, Tunisia (Anonymous 1974). Mienis (1971) reported remains of a helioid snail *Theba pisana*, elytra of five species of beetles, a mole cricket *Gryllotalpa gryllotalpa*, and an unidentified murid in pellets gathered in Israel.

Except for the Swallow the bird remains reported herein are primarily of ground dwelling species and all the identified remains are of diurnally active species. The birds represented in the identified remains include local breeding residents, migrants, and winter visitors that occur in both the vegetated and desert portions of the oasis (Goodman *et al.* 1986).

The mammal prey fall into two distinct groups: species occurring primarily in desert zones and species living in vegetated areas or close to human habitation. Gerbils, Pygmy Gerbils and Lesser Egyptian Jerboas inhabit sparsely vegetated areas across portions of the Egyptian Western Desert. Some of these rodents are known from the ecotone between barren areas and oasis, but they are essentially desert animals. All of these nocturnally active rodents have been previously collected in Wadi el Natrun (Osborn & Helmy 1980).

The House Mouse occurs in the oasis in a variety of habitats, from reed beds and along lake shores to human habitations. Both commensal and feral populations are known from the area. It is a nocturnal animal.

Flower's Shrew was not previously known from nearer than the Giza area, about 100 km. to the southeast. Specimens have been collected in fields; although little is known about the ecology and habitat requirements of this shrew, it is certainly an animal of vegetated areas (Flower 1932; Osborn & Helmy 1980).

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A NOTE ON THE FEEDING BEHAVIOUR OF GREATER SAND PLOVERS

by

John Palfery

This note is based on occasional observations of Greater Sand Plovers *Charadrius leschenaultii* made between 1980 and 1986 in the environs of Al Khobar on the Arabian Gulf coast of Saudi Arabia where the plover occurs as a passage migrant and winter visitor. Most of the beaches in the area are sandy but the plovers avoided these, preferring to feed on mudflats or beaches of mixed sand and mud. These feeding areas were shared with the far more numerous Lesser Sand Plover *C. mongolus* and with various other wader species.

Greater Sand Plovers fed in all areas of the tidal mudflats and beaches, from the dry zone just below the high tide berm at the top of the beach to the wet mud and the pools along the shoreline and even in the sea itself where they waded up to their bellies in the water; they also fed along the edges of tidal creeks. Fixed individual feeding areas were occupied, some apparently from one day to the next. At some times of year, especially July and August, crabs were abundant in the dry zone at the top of the beach and this was a favourite feeding area of the plovers, the activities of many being confined to it alone; the Lesser Sand Plovers, in contrast, did not venture into this dry area but foraged on the wetter, lower half of the beach. Cramp and Simmons (1983) mention this readiness of the Greater Sand Plover to feed in the dry littoral zone, unlike the Lesser Sand Plover, and vagrant Greater Sand Plovers in Britain have also been noted feeding in drier habitat (Kitson *et al.* 1980; Newman & Vinicombe 1980; Allard 1986). Another minor behavioural difference between the two species in eastern Arabia was that Greater Sand Plovers often fed in tidal pools, unlike Lesser Sand Plovers.

The most frequently noted prey items were crabs. Smaller prey, probably crustaceans and molluscs, were also taken, but were too small to be identified. Less frequently marine worms were taken. This contrasted with the diet of Lesser Sand Plovers which consisted almost entirely of worms, together with occasional smaller prey taken from the surface; they were never seen to take crabs, though these are recorded in their diet (Cramp & Simmons 1983).

Although Greater Sand Plovers may feed in flocks (Cramp & Simmons 1983; Taylor 1982), in eastern Arabia I saw only passage migrants which had stopped over at inland lakes doing so; on the coast they fed singly.

Six different feeding techniques were employed:

- i the typical *Charadrius* stop-run-peck technique. The runs were sometimes short, 1-2 metres, sometimes up to 10 metres. When running the body was carried horizontally with the head hunched between the shoulders;
- ii a long, fast dash of up to 20 metres which appeared to be an attempt to snatch crabs on the surface;
- iii a stealthy, stalking approach in which the plover approached prey slowly and carefully, often crabwise, crossing one leg in front of the other in a slow sideways movement. On reaching a crab burrow, the plover would wait motionless;
- iv the ambushing of prey. The plover stood motionless for several minutes, usually at the entrance of a crab burrow waiting for a crab to emerge;
- v foot trembling. In wet mud plovers sometimes foot-trembled, extending one leg forwards and briefly quivering the foot in the mud. Sometimes the bird stabbed forward with its bill into the mud; I never saw any prey taken on such occasions, but it may have been too small to be visible;
- vi probing. As well as taking prey from the surface, the plovers sometimes probed deeply, inserting the whole bill and then shuffling it around and up and down.

PALFERY, J. 1988. A note on the feeding behaviour of Greater Sand Plovers. *Sandgrouse* 10: 105-106.

Whereas Greater Sand Plovers used a variety of feeding techniques, Lesser Sand Plovers were only seen to feed in the stop-run-peck manner and to probe, although they did not probe as deeply as Greater; Cramp and Simmons (1983) also note a careful stealthy approach to worm holes by Lessers.

The larger crabs were dismembered before being eaten. If the crab was captured in water, it was first carried to dry ground where the plover, holding it by one of its legs, would shake it vigorously until the leg broke off. The leg was eaten, then the crab was picked up again and the process repeated. When the legs and chelae had all been removed, the body was swallowed. Sometimes a crab would be swallowed when only partly dismembered and small crabs were usually swallowed whole. Crabs taken at the mouths of their burrows were carried some metres away before being dismembered and eaten. Other prey items were swallowed immediately.

Greater Sand Plovers have been noted washing prey items (Kitson *et al.* 1980; Newman & Vinicombe 1980; Cramp & Simmons 1983) but I never observed this; nor did I see birds wash their bills after feeding. Some dipped their bills in pools which they passed and one bird ran several times from the top of the beach to the sea, each time dipping its bill in the water repeatedly before returning to forage at the top of the beach; none of these incidents appeared to be associated with the taking of any prey item, however.

Little aggression, either inter- or intraspecific, was noted from Greater Sand Plovers – in marked contrast to Lesser Sand Plovers. Lesser Sand Plovers frequently ran aggressively at Greater; sometimes the latter fled, sometimes they stood their ground, standing erect and flashing the undersides of their wings in the threat display (see Simmons 1953). Only rarely were Greater seen to chase away Lessers. Once a Greater Sand Plover ran at a Kentish Plover *C. alexandrinus* forcing it to flee. On another occasion a Grey Plover *Pluvialis squatarola* chased a Greater Sand Plover which had just captured a small crab but the sand plover successfully eluded it. One act of food-piracy by a Greater Sand Plover was seen: a bird chased a Terek Sandpiper *Xenus cinereus* which had captured a crab; the sandpiper was forced to drop the crab which the plover dismembered and ate.

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IDENTIFICATION AND STATUS OF THE PLAIN LEAF WARBLER

by

Jens Eriksen

INTRODUCTION

Prior to my arrival two years ago there were only half a dozen records of Plain Leaf Warbler *Phylloscopus neglectus* in Oman (Oman Bird Record Committee 1988). My first encounter with this species was on 20 November 1986 in open *Acacia* woodlands in the coastal plain and foothills in northern Oman about two km. south of the border with the United Arab Emirates. The bird attracted attention by its song, and song as well as call notes were tape-recorded (see below). Since then, I have seen the species on seven occasions in the last two winters between mid November and the end of February, each time discovering the bird on its characteristic and easily recognisable song and call. This has led me to believe that the species may be overlooked and is perhaps more common than is known at present. Gallagher and Woodcock (1980) also suspected that it might be overlooked. The present paper summarizes the status of the Plain Leaf Warbler and comments on identification with special emphasis on voice.

IDENTIFICATION

My impression of the Plain Leaf Warbler is of a very small *Phylloscopus* warbler recalling a small Chiffchaff *P. collybita*. It lacks obvious field markings although at close range a pale supercilium is noticeable. The colour is olive-brown above, paler below with black legs and bill. There are no wing bars and no traces of yellow or green. It is very active, constantly flicking its wings. Hollom *et al.* (1988) describe it as "unmistakable with its Goldcrest-like size and proportions". I do not find size and shape alone to be distinctive especially if there are no other small birds nearby for direct comparison. Rather, the voice – either song or call – combined with other characteristics mentioned above should provide a definite identification.

VOICE

The Plain Leaf Warbler is very vocal in winter in Oman. The call notes and even the song are uttered at short intervals as the bird moves around in thorny bushes. The song is a high pitched warble of one second duration. It begins with two distinct notes followed by a phrase in which a lower pitched middle section followed by an ascending note is noticeable (Figure 1).

The call heard in Oman in winter is a surprisingly harsh, low pitched "churr" or "chiip" (Gallagher & Woodcock 1980; Hollom *et al.* 1988), recalling a House Sparrow *Passer domesticus*, but deeper. This call is repeated very often, but does not carry as far as the song and is therefore less noticeable. Nevertheless, once heard it is quite distinctive, and I have on several occasions discovered the bird by this call.

HABITAT

The Plain Leaf Warbler breeds at 2,000-3,000 metres in sparse mountain scrub (deciduous or evergreen) with scattered trees (Hollom *et al.* 1988). In winter it is found at lower elevations. I have seen it in Oman in winter in open *Acacia* woodland from sea level in northern Oman to about 1,000 metres in the foothills of Jabal Akhdar.

ERIKSEN, J. 1988. Identification and status of the Plain Leaf Warbler. *Sandgrouse* 10: 107-109.

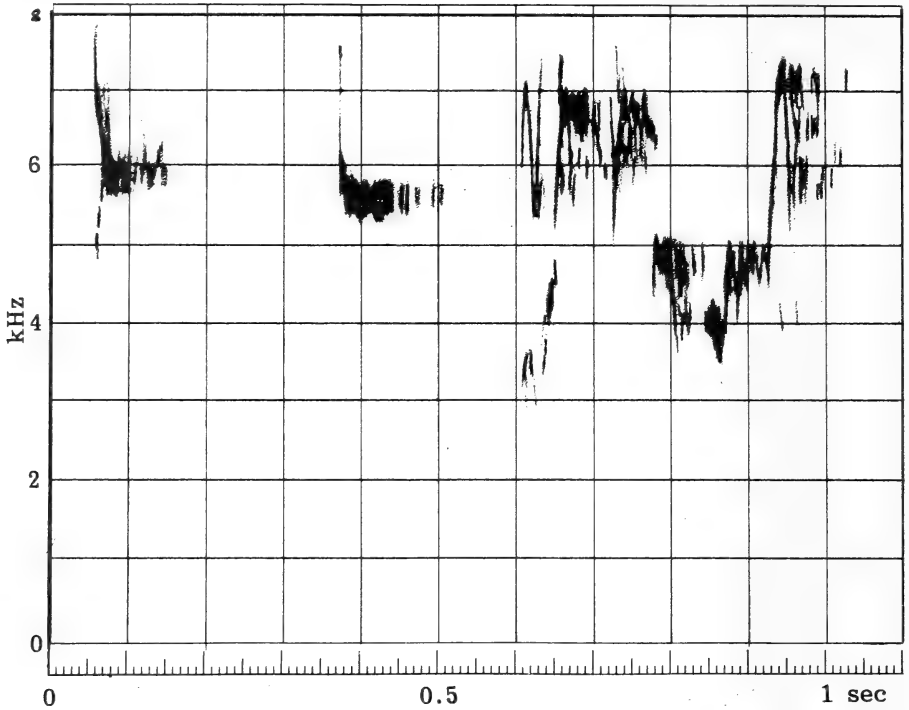


Figure 1: Song of Plain Leaf Warbler recorded 20 November 1986 in north Oman. Sonagram recorded at the Department of Biology, Sultan Qaboos University, on an instrument supplied by Kay Elemetrics Corp.

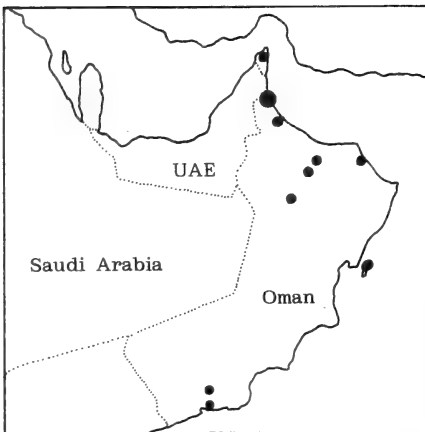


Figure 2: Locations of records of Plain Leaf Warbler in Oman, based on the index card system of the Oman Bird Record Committee, 1988. The large spot in north Oman refers to several separate records.

DISTRIBUTION

The breeding area of the Plain Leaf Warbler is the mountainous areas of southwest, south central and northern Iran and adjacent USSR east to Kashmir (Ali & Ripley 1973, Hollom *et al.* 1988). The species winters in much the same countries as it breeds. However, it descends to lower altitudes in winter reaching the Gulf coast in Iran and the west Himalayan foothills. The distance from the nearest breeding area in Iran to northern Oman is about 200 km.

STATUS

Although the Plain Leaf Warbler in Oman is officially listed as a scarce winter visitor (Oman Bird Record Committee 1988) I have, in fact, found the bird on every visit between mid November and the end of February to the *Acacia* woodland just south of the UAE border. The locations of the Oman records are shown in *Figure 2*.

In adjacent states the Plain Leaf Warbler has been recorded in the UAE and possibly also in Qatar and North Yemen (*per* F. E. Warr). It is a vagrant to Jordan (Hollom *et al.* 1988). There are four recent accepted records from Dubai between 2 December 1987 and 4 March 1988 (C. Richardson *pers. comm.*). Other UAE records between November and March are from Ras Al Khaimah, Khawr Fakkan, Dhaid and Al Ain (*per* F. E. Warr).

In summary, I believe that the Plain Leaf Warbler is a regular winter visitor in small numbers to suitable *Acacia* woodland and scrub between sea level and 1,000 metres above sea level in the eastern part of the Arabian peninsula. It is best identified by voice in combination with its diminutive size and plain coloration.

ACKNOWLEDGEMENTS

The author wishes to thank Aysha Al Khayat for producing the sonagram in *Figure 1*. Thanks also go to F. E. Warr for supplying information on the Plain Leaf Warbler from Arabian States other than Oman, to Colin Richardson for information from Dubai and to David Foster for records from Oman. Finally, critical comments on the manuscript from David Foster, Hilary Fry and Michael Gallagher are acknowledged.

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WATER CHEMISTRY, BLEACHED PLUMAGE AND SUMMER OCCURRENCE OF BOREAL SPECIES ON VAN GÖLÜ, TURKEY – A CONNECTION?

by

H. D. V. Prendergast and P. S. A. Allday

The June records of four species seen by us (and by K. E. Vinicombe in 1977 and N. E. van Brederode in 1978) on Van Gölü in eastern Turkey (East Region) were understandably described by Beaman (1986) as "surprising". The species, Red-throated Diver *Gavia stellata*, Black-throated Diver *G. arctica*, Long-tailed Duck *Clangula hyemalis* and Goldeneye *Bucephala clangula*, all have a boreal circumpolar distribution, by far the most southerly breeding populations of any of them in the Western Palearctic being the isolated ones of Goldeneye at c. 47°N in the U.S.S.R. and at 49°N in Czechoslovakia; none of the other species breeds below c. 53°N (from maps in Cramp & Simmons 1977). As winter visitors to Turkey the Red-throated Diver is "very rare" (and coastal), the Black-throated Diver is "widespread and common" on the nearest part of the Black Sea coast to Van Gölü, the Long-tailed Duck is a vagrant and the Goldeneye "has been recorded from the East" (Region) (Beaman 1986). Although notable, the June occurrence of all these species at Van Gölü (38°N) (see Beaman 1986 for full details) may not, we propose, be entirely coincidental.

All the birds we observed had very bleached plumage, the bleaching effectively reducing coloration to a range encompassing whites and very pale browns; the patterns of the normal plumages, however, remained apparent. Both divers were in winter plumage and we were able to identify the duck down to age and sex: at least two immature male and one female Long-tailed Duck and one first summer male and two female-plumaged Goldeneye. A behavioural link between all these birds was the fact that, unusually for such aquatic species, they were all ashore for some of the time that we were observing them. We suggest that the birds may have been encountering water-proofing difficulties and were therefore pulling themselves ashore in a manner analogous to that of oiled seabirds. If, as a result, the birds were in poor condition, this might explain why they had delayed departure for breeding grounds in the north.

The high alkalinity (pH 9.9: Irion 1973) of the water of Van Gölü (compared with the usual range of pH 8.0-8.4 for the sea) might be the cause of the bleached plumages, especially if the birds had had a prolonged stay (overwintered?) on the lake. Although our hypothesis does not explain why the plumages of the very few other waterbirds on the lake itself (notably Black-necked Grebes *Podiceps nigricollis*) were not similarly bleached, it may be supported by the apparently quite normal plumages of another essentially boreal species, Velvet Scoter *Melanitta fusca*, which we observed on the nearby fresh-water lakes of Nemrut Dag (where it has bred: Beaman 1986) and Nazik Gölü (our observations in Beaman 1986).

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DESERT WHEATEAR KLEPTOPARASITIZING ANTS

by

Per Alström and Hans Schekkerman

On 3 October 1985, at Eilat, Israel, a first-winter male Desert Wheatear *Oenanthe deserti* was seen to rob large desert ants of their prey. The ants were returning to their nests in a bare sandy field, holding prey (small moths and larvae) above their heads. The wheatear flew at an ant, landed by it, and simply snatched the larva it was carrying without taking the ant. This behaviour was seen on three occasions within one half hour's observation. Only one bird was involved.

We have found reference to Starlings *Sturnus vulgaris*, House Sparrows *Passer domesticus* and Brown-headed Cowbirds *Molothrus ater* kleptoparasitizing digger wasps *Sphex ichneumoneus* in the USA (Ristich 1953, Brockmann 1980).

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CORRECTIONS

Sandgrouse 8, 1986

Page 97. *Notes on the birds of Oman*. Delete entry for Pheasant-tailed Jacana *Hydrophasianus chirurgus*; this breeding record has been withdrawn (per M. D. Gallagher).

Sandgrouse 9, 1987

Page 60. *Status of birds in North Yemen*. Caption for Plate 6 should read 'Photograph N. J. Redman'.

NOTES TO CONTRIBUTORS

The Editorial Committee of *Sandgrouse* will consider for publication original papers in the English language which contribute to the body of knowledge of the birds of the Middle East, their distribution, breeding biology, identification, conservation, etc. The Middle East for this purpose includes Turkey 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 to the Arabian peninsula and the Palearctic limits in the Sudan and Ethiopia in the south.

Submissions will be considered on the understanding that the work has not been previously published or offered for publication to any other journal.

Submissions should be in duplicate and must be typewritten on one side of the paper only and with double spacing. The approximate position of figures and tables should be indicated in the margin. Authors should consult a recent copy of *Sandgrouse* and follow the conventions in use for section headings, tables, captions, references, dates, abbreviations, etc. A full-length paper should include a summary not exceeding 5 per cent of the total length.

The scientific names of the birds mentioned should follow Voous, K. H. 1977. *List of Recent Holarctic Bird Species*. B.O.U., London.

Figures and diagrams should be drawn in black ink on white paper or board and should follow the proportions in previous *Sandgrouse* issues. Good quality colour or black and white photographs are welcomed.

Authors will normally receive galley proofs of their papers; these should be corrected and returned to the Editor without delay. Textual changes cannot be made at proof stage under any circumstances.

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