

CORRECTIONS TO *Forktail* 8

The Editorial Committee apologise for a number of errors in Zacharias and Gaston *Birds of Wynaad*.

Species incorrectly listed as new for Kerala:

LARGE HAWK-CUCKOO <i>Cuculus sparverioides</i>	See Baker and Inglis (1930).
RUFF <i>Philomachus pugnax</i>	See Gaston (1979) <i>J. Kerala Nat. Hist. Soc.</i>
WHITE STORK <i>Ciconia ciconia</i>	See Narayanakurup (1989) <i>J. Bombay Nat. Hist. Soc.</i> 86: 239.
BLACK REDSTART <i>Phoenicurus ochruros</i>	See Namassivayan and Sivaprasad (1981) <i>Newsletter for Birdwatchers</i> 21
TYTLER'S LEAF-WARBLER <i>Phylloscopus tyleri</i>	See Harrap and Redman (1990) <i>J. Bombay Nat. Hist. Soc.</i> 86: 460-461.

Species incorrectly listed as new breeding records for Kerala:

BROWN-CAPPED WOODPECKER <i>Dendrocopos nanus</i>	See Betts (1934) <i>J. Bombay Nat. Hist. Soc.</i> 37: 197-203.
BANDED BAY CUCKOO <i>Cacomantis someratii</i>	See Neelakantan (1969) <i>Newsletter for Birdwatchers</i> 9(12): 3.
COMMON MOORHEN <i>Gallinula chloropus</i>	See Neelakantan (1976) <i>J. Bombay Nat. Hist. Soc.</i> 72: 537.
BLACK-WINGED KITE <i>Elanus caeruleus</i>	See Jackson (1971) <i>J. Bombay Nat. Hist. Soc.</i> 68: 107.
LITTLE CORMORANT <i>Phalacrocorax niger</i>	See Uthaman (1990) <i>J. Bombay Nat. Hist. Soc.</i> 87: 139.
LITTLE EGRET <i>Egretta garzetta</i>	See Neelakantan (1986) <i>Keralathile Pakshikal.</i>
GREAT EGRET <i>Casmerodius albus</i>	See Uthaman (1990) <i>J. Bombay Nat. Hist. Soc.</i> 87: 139.
INTERMEDIATE EGRET <i>Mesophoyx intermedia</i>	See Uthaman (1990) <i>J. Bombay Nat. Hist. Soc.</i> 87: 139.
CATTLE EGRET <i>Bubulcus ibis</i>	See Neelakantan (1986) <i>Keralathile Pakshikal.</i>
BLACK-CROWNED	
NIGHT-HERON <i>Nycticorax nycticorax</i>	See Uthaman (1990) <i>J. Bombay Nat. Hist. Soc.</i> 87: 139.
ASIAN BROWN-FLY-CATCHER <i>Muscicapa dauurica</i>	See Jackson (1971) <i>J. Bombay Nat. Hist. Soc.</i> 68: 112-113.

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Raptor migration on Bali, Indonesia

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An account of visible, mostly high-flying, raptor migration in the autumn of 1990 adds to earlier information collected in 1982. In 1990 over 11,000 raptors on 32 days passed eastwards, comprising principally Oriental Honey-buzzards *Pernis ptilorhynchus* and two Asiatic *Accipiter* species, Chinese Goshawk *A. soloensis* and Japanese Sparrowhawk *A. gularis*. It is presumed that this large passage has passed through Peninsular Malaysia and the Greater Sundas, and there is evidence to support this from Malaysia, but virtually none from Indonesia. Their final destination is unknown. These migrants are accompanied by smaller numbers of other raptors, huge numbers of Fork-tailed Swifts *Apus pacificus*, some hirundines and other species.

Following the discovery of an impressive diurnal autumn migration of raptors through Bali, Indonesia, in late October 1982 (Ash 1984), a return visit was made in 1990 to obtain more information on the species involved, their direction of flight, numbers, and possible clues to their ultimate destination. The same area of observation in north-west Bali was visited in October and November 1990, and further observations were made elsewhere in Bali on subsequent days.

In 1982 raptors, together with large numbers of some other species, starting each day 2-3 h after sunrise, arrived in north-west Bali from the direction of Java. They continued on over Bali on an E/ESE course. The main raptors involved were Oriental Honey-buzzards *Pernis ptilorhynchus*, Japanese Sparrowhawks *Accipiter gularis* and Chinese Goshawks *A. soloensis*.

Non-raptors in greatest numbers were Fork-tailed Swifts *Apus pacificus* and Blue-tailed Bee-eaters *Merops philippinus*. The species involved consisted of birds originating in eastern Asia, and most must have passed over Java, and possibly much of Sumatra, before reaching Bali. Few remain on Bali and their ultimate destination is unknown.

Evidence from Peninsular Malaysia (Wells 1990a and b) shows there is a large northerly return passage in the spring across the Malacca Straits. Presumably included here are birds which travel south through Peninsular Malaysia in autumn, and perhaps others which have moved south into Indonesia on other routes. The main species involved in Peninsular Malaysia are also Oriental Honey-buzzards and sparrowhawks. There seem to be no other observations on raptor migration throughout the whole of Indonesia, so that the information from Bali is of considerable interest in demonstrating the existence of a large, previously unrecognised passage into the eastern sector (Wallacea) of the archipelago. There are in fact extremely few previous records at all of these raptors from Bali, and there is no evidence that they spend their non-breeding season there in any numbers.

Counts of over 11,000 raptors on 32 days in 1990 confirmed that the same three species which occurred in 1982 were again the principal ones involved; that the passage was in good progress, but had not reached its peak by 9 October; that most migration was at a very great height; and that passage was eastwards to areas for which there was no, or very little, previous knowledge on the species.

LOCALITY AND METHODS

The observation site used from 9 October - 9 November 1990 was in the western corner of the beach, close to the fringing mangroves, at Teluk Terima (8°09'N 114°32'E), in Bali Barat National Park. It provided excellent, unrestricted views from SW-NW towards Java, on which its prominent eastern volcanos were clearly visible over the intervening forested hills of Prapat Agung on Bali. To the north and north-east there were open views over the bay, and from south-west through south and east the forested mountainous spine of Bali was conspicuous.

Scattered early morning arrivals of migrants mostly flew low. As thermal activity increased during the day, so did the height of migration, and many raptors could be found only by constantly scanning the sky, preferably using clouds when present for a pale background against which they might be discerned more easily. Sunrise was within a few minutes of 06h00 local time throughout. There was only little passage during the first three hours after sunrise, so that the observers' time of arrival at the observation site was planned for c. 08h30. The period between dawn and this time was spent along the flight route so that any early movement could be seen. Binoculars of 9x and 10x40 were used constantly by my wife and myself, joined by Victor Mason during the period 3-9 November, a 30x telescope occasionally, a compass at times for following flight directions, and large scale compass direction lines marked out on the beach - along which the flight routes of birds flying nearby could be sighted.

Identification

With good views there was no great difficulty in identifying the three main species involved, Oriental Honey-buzzard and the two sparrowhawks. The latter were often very difficult to separate when flying high, and particularly when in flocks which were sometimes mixed. Often the only clue that Chinese Goshawks were present was when the white underwing coverts of a turning bird caught the sun. For this reason an unknown proportion of the birds recorded as Japanese Sparrowhawks may have been Chinese Goshawks, but the figure is probably low, because the ratio of the figures for definite Japanese Sparrowhawks compared with definite Chinese Goshawks are

similar to those for the total Japanese Sparrowhawk figures compared with Chinese Goshawks. It is possible that other similar species, such as *Besra Accipiter virgatus*, if they occurred, could have been overlooked. Other species, including some of uncertain identification, are also discussed in the species accounts below.

METEOROLOGY

No special facilities were available for recording weather conditions. Normally the meteorological situation remained fairly constant during the day once a pattern had become established. The changes which took place, usually due to increases in thermal activity and unimportant changes in wind strength, were between 09h00 and 10h00, more or less coinciding with the onset of migratory activity. During the 32 days of observation the wind was between S and W (180-270°) on 30 days, of which on 18 days it was from 181-225° and on 12 from 226-270°. On one day it blew from 175°, and on another from 280°. Averaging these figures provides a mean wind vector of approximately 221° (=SW'S). Wind speed assessed on the Beaufort scale varied from force 1-6 with a mean of 3.1.

Cloud cover was more difficult to assess, and a subjective mean daily figure was estimated on a scale of 1-10; values were mainly low and produced a mean of 2.5, which correctly indicated that generally there was little cloud. Usually there was more cloud inland over the mountains and less over the sea.

RESULTS

Raptor occurrences

Of over 11,000 raptors counted on 32 days the three species, Oriental Honey-buzzard, Japanese Sparrowhawk and Chinese Goshawk accounted for 10,945 (99.4%) (Table 1). These, together with the other species noted, are discussed here:

ORIENTAL HONEY-BUZZARD *Pernis ptilorhyncus*

A total of 2,186 birds passed on 31 days, 10 October - 9 November. The largest number was 391 (18% of the total for this species) on 27 October (77/h). Earliest morning arrivals were at 08h30 and the latest at 14h00, so that passage was during 2.5 - 8.0 h after sunrise. Peak movement occurred in the quarter hour period 10h15-10h30 (4.25-4.50 h after sunrise), when of the total birds seen 12% passed over, and 82.5% of birds were seen 09h15-12h15 (3.25 - 6.25 h after sunrise). 75% of all Oriental Honey-buzzard passage occurred from 19 October - 3 November.

Table 1. Summary of movements of three species, Oriental Honey-buzzard *Pernis ptilorhynchus*, Japanese Sparrowhawk *Accipiter gularis* and Chinese Goshawk *A. soloensis*, at Bali Barat, 9 October - 9 November 1990

	Oriental Honey-buzzard	Japanese Sparrowhawk	Chinese Goshawk	Totals
Total	2,186	7,835	924	10,945
Days of passage	31	32	31	32
Period of passage	10.10-9.11	9.10-9.11	10.10-9.11	9.10-9.11
Best date	27.10	19.10	20.10	19.10
n	391	1,278	189	1,575
%	18	16	20	14
hourly rate	77	313	60	384
Earliest and latest passage	08h30-14h00	07h30-13h45	08h15-12h30	07h30-14h00
Hours after sunrise	2.5-8.0	1.50-7.75	2.25-6.50	1.50-8.00
Peak movement/0.25h hours after sunrise	10h15-10h30	10h00-10h15	09h30-09h45*	10h00-10h15
% of species total	12	17	16 & 17*	15
Main movement: hours after sunrise	09h15-12h15	09h30-11h45	08h45-10h30	09h30-11h45
% of species total	86	92	83	86
Main passage dates	19.10-3.11	10-20.10	13-25.10	10-27.10
%	75	73	79	81

* There was a second ¼ hour period at 10h30-10h45 with similar numbers

[EASTERN MARSH-HARRIER *Circus spilonotus*

A large brown harrier, brown above and below, with a large white rump, flew east at 09h50 on 12 October. Possible species were immature Pied Harrier *C. melanoleucos*, adult Swamp Harrier *C. approximans*, or Eastern Marsh-Harrier. Identification was not determined, but following my experience with the latter in the breeding season of 1991 this species seems most likely.]

CHINESE GOSHAWK *Accipiter soloensis*

A total of 924 birds occurred on 31 days, 10 October - 9 November, the largest number being 189 (20% of the total for this species) on 20 October (60/h). First arrivals in the morning were at 08h15 and the latest at 12h30 (2.25-6.50 h after sunrise). Peak movements were in the quarter hours of 09h30-09h45 and 10h30-10h45, when 16% and 17% of the birds seen passed over, and 83% of birds occurred 08h45-10h30 (2.75-4.50 h after sunset). 79% of Chinese Goshawks occurred from 13-25 October.

JAPANESE SPARROWHAWK *Accipiter gularis*

This species was greatly in excess of the Chinese Goshawk, in the proportion

of 8.4:1.0, but the latter was more concentrated during the middle part of the observation period (see below under that species). As noted already, separation of these two species was often difficult so that comparisons should be regarded with caution. A total of 7,835 birds identified as this species made it the commonest raptor seen, on all 32 days 9 October - 9 November. The largest number was 1,278 (16% of the total for this species) on 19 October (313/h). Earliest morning arrival was at 07h30 and the latest at 13h45 (1.50-7.75 h after sunrise). Peak movement occurred in the quarter hour period 10h00-10h15 (4.00-4.25 h after sunrise), when 17% of the birds seen flew over, and 92% of birds passed from 09h30-11h45 (3.30-5.75 h after sunrise). 73% of all Japanese Sparrowhawks passed from 10-20 October.

GREY-FACED BUZZARD *Butastur indicus*

Single birds flew east at 10h35 on 27 October, at 10h20 on 31 October, and at 11h35 on 6 November. All showed patterned underparts, unlike the uniformly pale underparts of the Rufous-winged Buzzard *B. liventer*, which is the only other likely species. There is no previous record for Bali, and this northern breeder is regarded by MacKinnon (1990) as a rare straggler to Java.

BONELLI'S EAGLE *Hieraaetus fasciatus*

A bird flying east at 09h10 on 14 October agreed with the description of this species and the many I have seen in Europe and North Africa, including having long white 'headlights' on the leading edges of the wings, and the pale eyes; however, the underwing coverts were whitish without any indication of a dark bar.]

RUFIOUS-BELLIED EAGLE *Hieraaetus kienerii*

An immature, moulting into adult plumage, flew east with other migrant raptors at 08h40 on 26 October. There are two previous records from Bali (Ash 1984). Possibly these are wanderers from Java, where it is apparently a rare resident (MacKinnon 1990). All sightings at Singapore have been during raptor passage seasons (Wells 1990b), and there are one or two records of apparent migrants, or birds accompanying migrants of other species, in the Malay Peninsula (Dr D. R. Wells *in litt.* 8 December 1991).

CHANGEABLE HAWK-EAGLE *Spizaetus cirrhatus*

The following 10 birds were considered at the time to be, with some misgivings, this species, as they passed through with other eastward flying migrants: one on 10, 11 and 19 October, two on 18 October and 2 November, and three on 22 October, and other more or less similar birds were seen. Plumage often resembled that of some Oriental Honey-buzzards, but flight, wing-shape, and wing position in flight differed, which helped to distinguish them from this otherwise rather similar species. However, some individuals with fawn or cinnamon underwings were certainly not Oriental Honey-buzzards, nor apparently this species either.

PEREGRINE FALCON *Falco peregrinus*

One flew east high at 09h30 on 28 October.

In addition, a few other species were seen: single Ospreys *Pandion haliaetus* on 8 days, 11 October - 7 November, could have been one or more individuals based in the area; seven Brahminy Kites *Haliaeetus indus* sightings on six days, 9 October - 8 November, could have been local birds; one or two White-bellied Fish-Eagles *Haliaeetus leucogaster* on eight days, 10 October - 6 November, were on a direct flight, presumably from Java; single Black Eagles *Ictinaetus malayensis* on four days, 12 October - 9 November, were presumed to be local birds.

MIGRATORY BEHAVIOUR

The first migrant raptor arrivals in the morning were usually flying low, often in flapping flight, and had possibly been roosting locally on Bali. Such early morning activity is unusual, for elsewhere migrant raptors delay take-off until the onset of thermal activity. Apparently birds crossing the Bali Straits, only a short distance away to the west and only 2.5 km wide at its narrowest, awaited thermal activity for assistance. The commencement of thermals was usually indicated by the sight of birds responding to them, followed a little later by the appearance of small puffs of white cloud in the sky. On many days thermal activity soon became intense, enabling birds to ascend very rapidly. On arrival at or near the top of the thermal they were dashed about in a spectacular manner among the whirling shreds of cloud, to such an extent as to provoke some thought about the physical and physiological stresses involved. Birds often shot out of the top of these thermals like darts, to continue on their migration in long very fast glides with partly closed wings towards the next thermal. The whole phenomenon was one of frantic activity, unlike the generally more leisurely ascent and onward progress of migrant raptors seen in the Middle East and Africa.

Height of migration

It was difficult to assess the height of flight. Most birds were obviously very high, and through 10x40 binoculars often became invisible against a blue sky. On Bali, a bird the size of a sparrowhawk could just be seen through 10x40 binoculars at a measured horizontal distance of 4,800 m, and this same bird is likely to be no less visible overhead against a white cloud. Possibly the highest detectable birds at Bali Barat were as high as this. Based, largely subjectively, on watching birds among mountains of known altitudes in Ethiopia, I estimated at an early stage that the higher birds on Bali may have been at over 3,000 m. A visiting glider pilot, accustomed to looking at flying performances in thermals and assessing altitudes, judged that the lower birds

we saw, before they reached the small white clouds, were at above 1,800 m. He could only say that the higher birds were obviously considerably higher than this. Very often birds were within clouds and were seen either descending from below them, or appearing in view as the clouds rose above them. At times flocks of sparrowhawks or long lines of Oriental Honey-buzzards were seen flying out of clouds. On cloudier days it was never known how many birds might be passing unseen within clouds and, at other times, how many might be invisible at extreme vertical range against a blue sky.

Direction of flight

No systematic observations were made, but haphazard observations as time permitted of individual birds or flocks of birds watched until out of sight confirmed that they were passing on two divergent routes, broadly eastwards and south-eastwards (Table 2). Not included in the tabular figures are birds seen flying off about south-east and then turning eastwards on reaching the mountains: possibly all the birds on this south-easterly course eventually turned at the mountains; or otherwise they may have continued along the far side of the mountains, and some may even have reached the south coast of Bali. From observations on 10 November, by which time passage was much reduced at Teluk Terima, at Pulaki (8°09'S 114°41'E), where 21 Japanese Sparrowhawks and two Oriental Honey-buzzards flew east 09h00-10h00, and at Lovina (8°10'S 115°02'E) where seven of eight Japanese Sparrowhawks seen 13h20-13h55 also flew east, it was clear that at least part of the eastward stream continued in that direction. A few observations in the south-east of Bali, including one of four Japanese Sparrowhawks at Ubud (8°31'S 115°15'E) on 11-12 November in a direct south-easterly flight, and of six more, two of which flew north, and one Chinese Goshawk which flew north-east at Suwung (8°42'S 115°14'E) on the south-east coast 14-21 November, suggested that the south-eastward stream from Teluk Terima may reach south-east Bali.

Species	n*	Directions
Oriental Honey-buzzard <i>Pernis ptilorhynchus</i>	3	84° - 98°
	2	125° - 146°
Japanese Sparrowhawk <i>Accipiter gularis</i>	6	90° - 105°
	11	125° - 144°
Chinese Goshawk <i>Accipiter soloensis</i>	4	127° - 144°
Total all species	9	84° - 105° (E'N - E'S)
	17	125° - 146° (SE'E - SE'S)

*The number of observations (n) generally referred to small groups of Oriental Honey-buzzards, but of flocks, often large, of the sparrowhawks.

Table 2. Flight directions of raptors over Teluk Terima, Bali

DISCUSSION

In 1982 there were observations on seven days, 17-26 October, with a total of 615 raptors (Ash 1984). In 1982 and 1990 observations were in the same area but at different sites. In these years Japanese Sparrowhawks were the most numerous species with 56% and 71% respectively of the raptor total. Interestingly, Oriental Honey-buzzards were in similar proportions in the two years at 19% and 20%, but Chinese Goshawks at 25% in 1982 were much lower in 1990 at only 8%. In the period 17-26 October in 1990 the Chinese Goshawk proportion was higher at 14% (645 in a total of 4,614 birds), but still well below the 1982 figure. Whether this indicates a real reduction in numbers remains to be seen.

The Chinese Goshawk is regarded as an occasional winter visitor to Java, and is also recorded for Bali, and Japanese Sparrowhawks are regular passage migrants to Java and Bali, according to MacKinnon (1990). In fact, there are no records of Chinese Goshawks as winter visitors to Bali, but there are for Japanese Sparrowhawks (although perhaps the possible confusion with Besra has not always been borne in mind). MacKinnon (1990) also refers to a short-crested race of Oriental Honey-buzzard occurring as an occasional winter visitor to Java, but from Bali there are no such records. East of Bali this group of three migrant species is virtually unknown. All are essentially non-forest species, so that the rapid deforestation of Java is unlikely to have resulted in forcing them to proceed further east than they would previously have done. An eastward flight would take the species concerned into increasingly savanna-like habitat, not inimitable to any of them. If they proceed as far as New Guinea, presumably they will be obliged to face much longer and more frequent sea-crossings than any they would have had to undertake previously on their journey. It is significant that the only two records of Oriental Honey-buzzard *P. p. orientalis* in the Lesser Sundas east of Bali are dated almost a century ago, from the island of Salayan (6°05'S 120°30'E), south of Sulawesi in November (Hartert 1896), where it may have been overwintering, and from the small island of Kisan (8°05'S 127°10'E), north-east of Timor, in December 1897 (Finsch 1900), where it was presumably over-wintering (White and Bruce 1986).

It is not known what proportion of the migrating raptors entering Bali arrive at Bali Barat: possibly others arrive on other routes. The numbers returning northwards in spring from Sumatra through Peninsular Malaysia, as measured by observations of Oriental Honey-buzzards at Cape Rachado (Wells 1990a), are greatly in excess of those found so far in Bali. For example, Wells found 800+/h Oriental Honey-buzzards returning via the Cape and counted 2,548 on 6 days in spring between 15 February and 2 April, compared with the 2,186 in the Bali study in 31 days, 10 October - 9 November (Table 1). The autumn passage must be more protracted than the

period of observation in Bali suggests. Wells (1990a) reported most intense passage of Oriental Honey-buzzards in the autumn in Peninsular Malaysia was throughout October-November, a total of at least 60 days (compared with the 32 days of observation in Bali).

It is likely that much Japanese Sparrowhawk migration was missed in Bali. The large number of 700 on 10 October at the start of observations suggests this was the case, and Wells found that the intense passage of this species included the last quarter of September extending throughout October. Further observations are needed from Bali to elucidate the situation.

The main requirements in the future are:

- a) continued observations, similar to those at Teluk Terima, should extend over a longer period from mid-September - mid-November.
- b) surveys of the Bali Strait area to investigate the breadth of the raptor flight-line.
- c) survey of the east coast of Bali, especially at Gunung Seraya (8°23'S 115°40'E), to investigate the departure of raptors eastwards.
- d) surveys for visible migration in Java, and on islands east of Bali.
- e) radar surveys would provide much more information, and should be investigated by civil air authorities in Indonesia.

A well-organised cooperative group study would be the ideal method for tackling this highly interesting phenomenon.

My wife accompanied me throughout the survey and helped greatly in spotting passing birds. Victor Mason also helped in a similar way 3-9 November. Dr David Wells provided much valuable data for comparison from Peninsular Malaysia, and the following read an early draft of this paper and made valuable comments for its improvement, for which I thank them: Mrs J. W. Ash, Bas van Balen, Tim Inskipp, Dr Peter Jones, Victor Mason and Dr D. R. Wells.

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