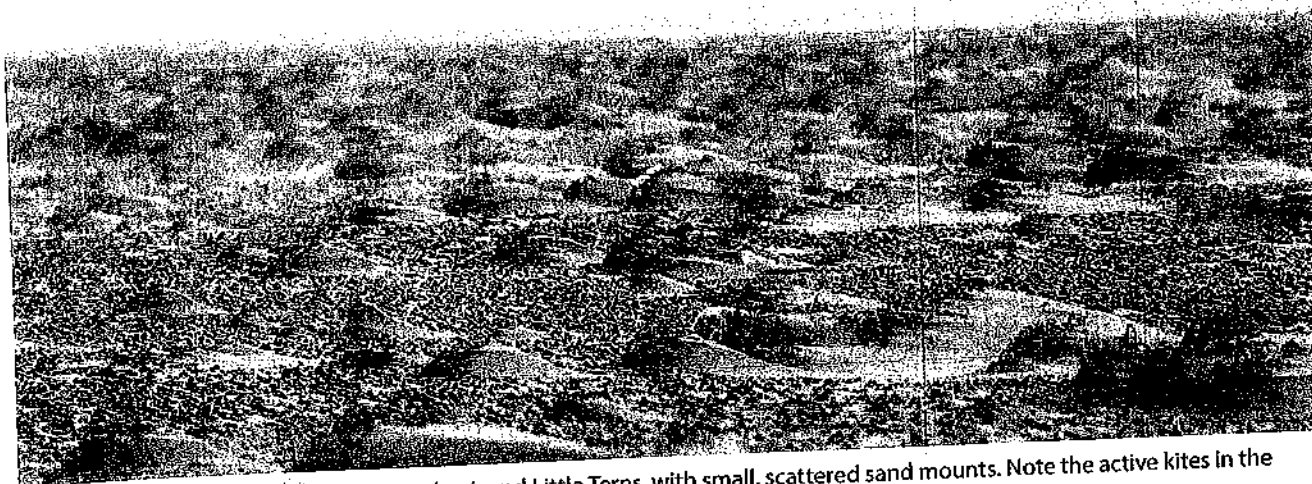




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Plate 3. General nesting habitat of Saunders's and Little Terns, with small, scattered sand mounds. Note the active kites in the background.

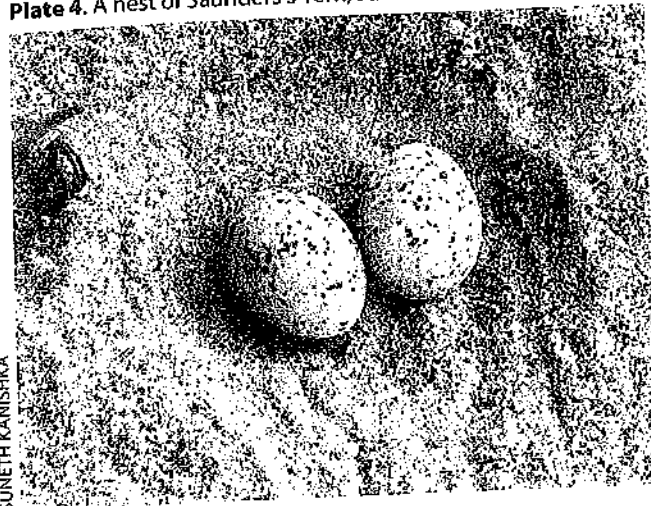
total area of the available habitat at the base of Sand Island I (0.26 km^2), were 29 and 12 nests respectively. We also observed several more courting pairs of both species in another area, approximately 1 km away, in the middle of Sand Island I.

The total nest density within the colony was 157.0 nests/km^2 , whereas the nest density of Saunders's and Little Terns was 109.9 nests/km^2 and 47.1 nests/km^2 respectively. The intra- and interspecific distances between nests are shown in Table 1. The number of eggs per nest varied from 1–2 in Saunders's Tern and 1–3 in Little Tern (Table 2). The dimensions of eggs for the Saunders's ($n = 18$) and Little Terns ($n = 6$) were 31.9 mm ($\pm 0.99 \text{ mm}$) $\times$ 23.6 mm ($\pm 0.84 \text{ mm}$) and 31.1 mm ($\pm 0.62 \text{ mm}$) $\times$ 23.5 mm ($\pm 0.78 \text{ mm}$) respectively. In one Saunders's Tern nest which had only a single egg on 22 May 2018, we observed a second egg the

next day. In another instance, a Little Tern nest which had a single egg and a chick on 21 May 2018 was found with two chicks the next day. The absence of chicks reported (see Table 3) is likely to be a result of the survey method and timing. Intensive nest surveys were conducted early in the breeding season, before eggs typically hatch. Transects completed later in the season, however, might have been less successful in locating nests, as chicks often walk away from the nest when disturbed, and are better camouflaged than eggs. As we were unable to record the exact number of chicks that were present in the colony during the study period, no conclusion could be made on hatching success.

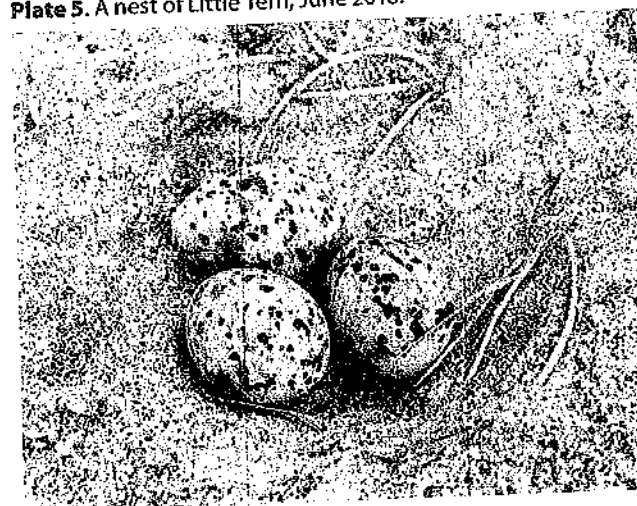
The colour and patterns observed on the eggs are congruent with existing descriptions (Wait 1931, Baker 1935, Henry 1998): the eggs of

Plate 4. A nest of Saunders's Tern, June 2018.



SUNETH KANISHKA

Plate 5. A nest of Little Tern, June 2018.



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Table 1. Distances between nests of breeding Saunders's and Little Terns on Sand Island I in 2018 and 2019.

Nest pairs	Minimum distance (m)	Maximum distance (m)
Saunders's–Saunders's Tern	18.39	653.99
Little–Little Tern	109.66	382.81
Saunders's–Little Tern	21.00	709.03

Table 2. Summary of the observed nests within the two successive breeding seasons (2018 & 2019) of Saunders's and Little Terns on Sand Island I.

Species	Nest no.	Nest morphometry (mm)			No. of eggs	No. of chicks
		Length	Width	Depth		
Saunders's Tern	ST1_2018	81.7	76.1	23.0	2	–
	ST2_2018	108.4	90.5	–	2	–
	ST3_2018	86.1	81.8	–	1	–
	ST4_2018	75.3	61.8	19.2	2	–
	ST5_2018	69.6	44.3	8.7	2	–
	ST1_2019	73.3	50.0	6.7	2	–
	ST2_2019	78.1	71.2	11.6	2	–
	ST3_2019	82.5	69.0	20.6	2	–
	ST4_2019	92.5	72.9	23.0	1	–
	ST5_2019	–	–	–	1	–
	ST6_2019	–	–	–	2	–
	ST7_2019	–	–	–	1	–
	Mean $\pm$ SD	83.1 $\pm$ 11.75	68.6 $\pm$ 14.66	16.1 $\pm$ 9.30	2	–
Little Tern	LT1_2018	–	–	–	–	–
	LT2_2018	92.0	91.8	15.3	3	–
	LT1_2019	78.7	68.0	–	3	–
	LT2_2019	91.3	91.1	32.4	–	2
	LT3_2019	–	–	–	1	–
	Mean $\pm$ SD	87.3 $\pm$ 44.09	83.6 $\pm$ 43.25	23.9 $\pm$ 16.21	2	2

Saunders's Tern were mostly sandy in colour with brown blotches and lines (Plate 4), whereas the eggs of Little Tern were olive-green/grey with larger brown spots (Plate 5). Courtship and feeding behaviour of these two species was also observed throughout the breeding activity, but no difference between the two species was noted. The density of Saunders's and Little Terns counted within the study plot was 65 individuals/km² and 170 individuals/km² respectively. The total density of the two species (including *Sternula* terns that could not be positively ascribed to species) was 267 individuals/km². The maximum number of individuals counted at any given time was 74 Saunders's and 106 Little Terns. Ten shorebird and seven seabird species were recorded in the area during our surveys (Appendix 1); among them, we observed a single nest of the resident subspecies of Kentish Plover *Charadrius alexandrinus seebohmii* within the tern colony.

Observations at Sand Islands III, IV and VII

Few *Sternula* terns were found breeding on Sand Islands III and IV, although detailed observations and sampling were not carried out due to logistic constraints. A large breeding colony of four species of other endangered seabirds was found on Sand Island V, comprising (with numbers of individuals observed in parentheses): Brown Noddy *Anous stolidus* (10), Bridled Tern *Onychoprion anaethetus* (c. 2,500), Common Tern *Sterna hirundo* (c. 250) and Great Crested Tern *Thalasseus bergii* (c. 6,000).

A large breeding colony of *Sternula* terns was observed on Sand Island VII, comprising c. 250 individuals, with an estimated 100 nests observed at the 200 m point count station; the ratio of Saunders's to Little was roughly 90:10. The breeding density was estimated to be 1,989 individuals/km² (the density of Saunders's and Little Terns was 1,790 individuals/km² and 199 individuals/km² respectively). Extrapolating this density to the

Table 3. Comparison of the densities of individuals and nests of *Sternula* terns on Sand Islands I and VII.

	Density of individuals(individuals/km ²)			Density of nests(nests/km ²)		
	Total <i>Sternula</i> terns	Saunders's Tern	Little Tern	Total <i>Sternula</i> terns	Saunders's Tern	Little Tern
Sand Island I	267	65	170	156.9	109.9	47.1
Sand Island VII	1,989	1,790	199	795.0	716.0	80.0

available habitat area, we estimated the total number of breeding individuals of both species as 300 (270:30 Saunders's to Little). The nest density of both *Sternula* terns was 795 nests/km². According to our estimations, there was a total of 119 nests of both species: 107 of Saunders's and 12 of Little Tern. This makes the colony at the Sand Island VII the largest documented breeding colony of the Saunders's Tern in Sri Lanka. Table 3 compares the density of individuals and nests in Sand Islands I and VII.

Overall population

By extrapolating the measures of density to the total area of suitable habitat on the island chain (Islands I–VIII), we estimate the total population size of *Sternula* terns in the Rama's Bridge Marine NP to be c. 1,427 individuals (including unidentified birds), comprising c. 1,173 Saunders's Terns and c. 233 Little Terns.

Discussion

Potential disturbances and future threats

We identified stray (feral) dogs (Plate 6) and vehicles (Sand Island I) and beach garbage (Plate 7) (Sand Islands I–VII) as potential disturbances to this critical nesting habitat. We observed, on average, four (range 2–8) feral dogs on each day during our observations on Sand Island I in both years. These dogs reside in the area and follow the fishermen to their fishing camps and the navy guards to their

watch-hut for supplementary food. The dogs are highly territorial and defend certain areas from human intruders. During the middle of the day, these dogs live in sandy holes dug by them in the areas where the shorebirds forage, rest and breed. On one occasion, a female dog was found with four pups approximately 300 m away from the nesting site. The dogs forage for dead fish, crabs and eggs and nestlings of breeding birds. Even though preying upon the eggs or chicks of these terns by dogs was not directly observed during this study, four dogs were found roaming the nesting habitat in mornings and afternoons on all the observed days. The terns get highly agitated when the dogs are around, but the low number of terns in the colony, which totalled c. 24 (± 10), seems too few to chase off a group of resident dogs.

Dogs were also found on Sand Island IV, where five were brought on as pets by Navy personnel. Approximately 5,000 pairs of endangered seabirds bred on Sand Island III in 2015 (Seneviratne *et al.* 2015) and Sand Island V in 2019 (present study). Even though no dogs were seen on these islands during our surveys, the possibility exists for dogs to cross the narrow channels between islands and to cause catastrophic damage to these critical seabird colonies. We believe that ground-nesting birds in the Rama's Bridge islands and in the greater Mannar area are, or have the potential to be, severely affected by these feral dogs.

Plate 6. Stray dogs in the colony represent a significant threat, May 2018.



Plate 7. Litter on the beach, June 2018.



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Appendix 1. Complete list of seabirds and shorebirds observed around the nesting habitat of the two *Sternula* terns on Sand Island I, Rama's Bridge Marine NP, Sri Lanka.

Saunders's Tern *Sternula saundersi*
Little Tern *Sternula albifrons*
Great Crested Tern *Thalasseus bergii*
Lesser Crested Tern *Thalasseus bengalensis*
Gull-billed Tern *Gelochelidon nilotica*
Caspian Tern *Hydroprogne caspia*
Whiskered Tern *Chlidonias hybrida*
Eurasian Oystercatcher *Haematopus ostralegus*
Lesser Sand-plover *Charadrius mongolus*

Kentish Plover *Charadrius alexandrinus*
Crab Plover *Dromas ardeola*
Common Sandpiper *Actitis hypoleucos*
Terek Sandpiper *Xenus cinereus*
Curlew Sandpiper *Calidris ferruginea*
Ruddy Turnstone *Arenaria interpres*
Whimbrel *Numenius phaeopus*
Eurasian Curlew *Numenius arquata*

FIELD STUDY

Brown Noddy *Anous stolidus*: first breeding record in Sri Lanka

SAMPATH S. SENEVIRATNE, VIMUKTHI WEERATUNGA, THILAK JAYARATNE & DEVAKA WEERAKOON

Introduction

The three *Anous* noddy species are pelagic, rather enigmatic seabirds with a pan-tropical distribution. Brown Noddy *A. stolidus* and Lesser Noddy *A. tenuirostris* are breeding residents in the Indian Ocean (Gochfeld & Burger 1996, Rasmussen & Anderton 2012). The Brown Noddy is a medium-sized, chocolate brown tern with a distinctive grey-white crown, black lores contrasting with the silvery-white forehead, and a contrasting white ring around the black eye (Plate 1). It is slightly larger than the closely related but much darker, longer-

billed and more contrasting pale-capped Black Noddy *A. minutus*. The Lesser Noddy, the smallest noddy in the region, is paler and greyer in overall appearance and its white-grey crown grades evenly into the grey sides of the face whilst the grey lores blend into the pale forehead (Harrison 1985, Gochfeld & Burger 1996, Rasmussen & Anderton 2012). Brown and Lesser Noddies are regular but rare visitors to Sri Lanka (De Silva 1979, Rasmussen & Anderton 2012, Warakagoda *et al.* 2012), but they have not previously bred here, with the Indian Lakshadweep islands and the Maldives the closest known breeding colonies (Rasmussen & Anderton 2012). Here we document the first confirmed nesting of the Brown Noddy in Sri Lanka.

Plate 1. Facial and crown pattern of breeding Brown Noddy *Anous stolidus*, Sand Island III, September 2014.



Brown Noddy breeding record, Sand Island III, Adam's Bridge, Sri Lanka

Adam's Bridge is a chain of limestone and sand shoals lying between the south-east coast of Tamil Nadu state, India, and Mannar island off the north-west coast of Sri Lanka. About nine islands form this 'bridge' on the Sri Lankan side and the third island west of Mannar island, Sand Island III (9.067°N 79.633°E), is probably the most important for breeding seabirds in Sri Lanka. This 4 ha island is an important breeding site for seabirds including Sooty Tern *Onychoprion fuscatus*, Bridled

Plate 2. Pre-breeding courtship display of Brown Noddy, Sand Island III, Sri Lanka, September 2014.





Plate 3. Nest of a Brown Noddy on the ground, Sand Island III, September 2014.



Plate 4. Brown Noddy nest lined with mollusc shells, Sand Island III, September 2014.

Tern *O. anaethetus*, Little Tern *Sternula albifrons*, Saunders's Tern *S. saundersi*, Roseate Tern *Sterna dougallii*, Common Tern *S. hirundo* and Greater Crested Tern *Thalasseus bergii*, some of which are very rare for Sri Lanka.

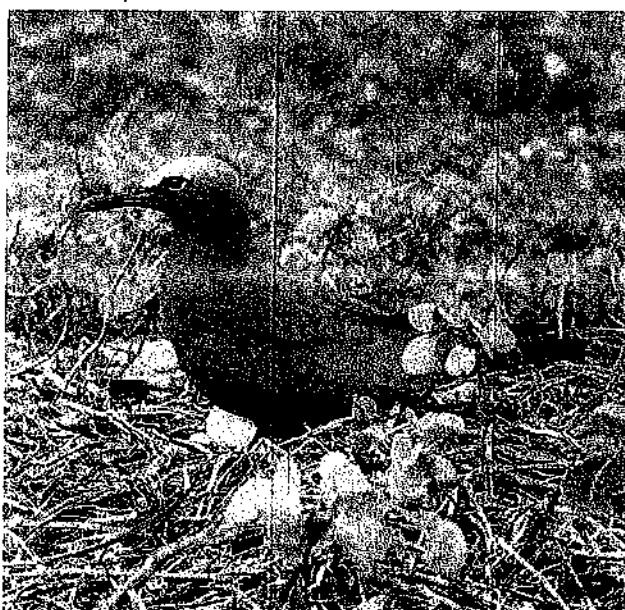
In July and August 2014 we observed 21 to 25 Brown Noddies roosting on vegetation and on the ground on Sand Island III. Although several performed courtship displays by flying low above the ground, carrying small sticks in their bills and chasing each other (Plate 2), no definitive signs of breeding were observed at this time. Our observations paid off on 6 September 2014, when birds were seen to be incubating (Plates 3–5). Four Brown Noddy nests with eggs were observed and other pairs were continuing courtship activities. All four nests were on a low sand-dune covered with coastal vegetation including Goat's Foot *Ipomea pescaprae*. Three nests were on the slope of the dune, the other on flat ground, forming a loose cluster, separated from each other by 5–10 m. Bridled Terns had bred in the same part of the island about a month previously and the fledging of their chicks might have enabled the noddies to occupy the area. About 5,000 pairs of Greater Crested Terns were still breeding on other parts of the island.

The Brown Noddy nests were in depressions on the ground made by removing debris and placement of small sticks (Plate 3). One was lined with broken mollusc shells (Plate 4). In other parts of its range, nests are made on the ground, on cliffs and in trees and bushes (Gochfeld & Burger 1996). Each nest held a single egg; these were measured using dial calipers: length $\times$ width 55 $\times$ 37, 55 $\times$ 39, 56 $\times$ 38, 57 $\times$ 37 mm. The eggs were slightly elliptical and white in colour with blotches of different shades of brown (Plate 3). At the time of our visit, three nests were occupied whilst the fourth was unoccupied (possibly deserted). At the active nests, one bird brooded the egg while its

partner sat behind it. The non-brooding bird frequently made short flights around the colony. About 20 non-breeding birds were present in and around the colony. SS, a qualified bird ringer, was able to measure an adult Brown Noddy in the colony, which was either exhausted or injured, for later morphometric comparison with specimens collected in Sri Lankan waters and held in the National Museum.

To the best of our knowledge, this is the first Brown Noddy breeding record for Sri Lanka; until now the species has been listed as a rare migrant. Our observations highlight the importance of Adam's Bridge, especially Sand Island III, to the biodiversity of Sri Lanka and the Palk Bay greater marine ecosystem. Management measures to safeguard this important area are urgently required.

Plate 5. Brown Noddy at the nest on a low sand-dune, Sand Island III, September 2014.



Acknowledgements

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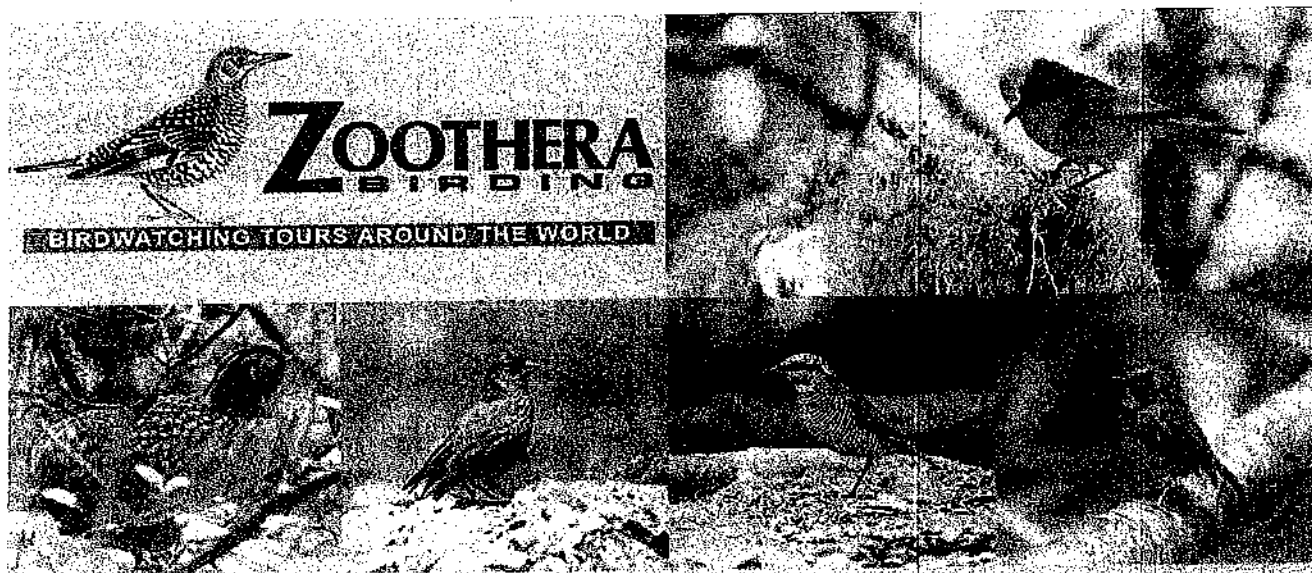
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The breeding range of *apivorus* is from Europe and west Asia east through western Russia and the Caucasus to the River Ob in south-west Siberia; it winters mostly in Africa, south of the Sahara (Orta *et al.* 2020). It is quite possible that birds from the most easterly part of the breeding range could occur as vagrants in South Asia during migration. It can be noted that this individual was recovered almost 30 km out to sea, and it is possible that a few individuals could take a different, more easterly, migration route, thus passing through South Asia. However, unless typical individuals occur here, it is most likely to be overlooked since *ptilorhynchus* is common and widespread and information about the possible occurrence and identification of *apivorus* is lacking. The identification is further complicated by the presence of hybrids and any *apivorus*-type birds seen here would have to be closely scrutinised to confirm the identification. Since this individual from Porbandar could be measured and the wing formula and other details noted, the identification could be confirmed. Thus, this is the first documented record of European Honey Buzzard for India.

Acknowledgements

We are very grateful to Dick Forsman, Andrea Corso and Wouter Faveyts for their input to the identification of this bird. We are thankful to Moditha Kodikara Arachchi for providing details about the Sri Lankan record. We thank the fishermen who turned back to return this injured bird for treatment, thus showing a remarkable commitment towards wildlife.

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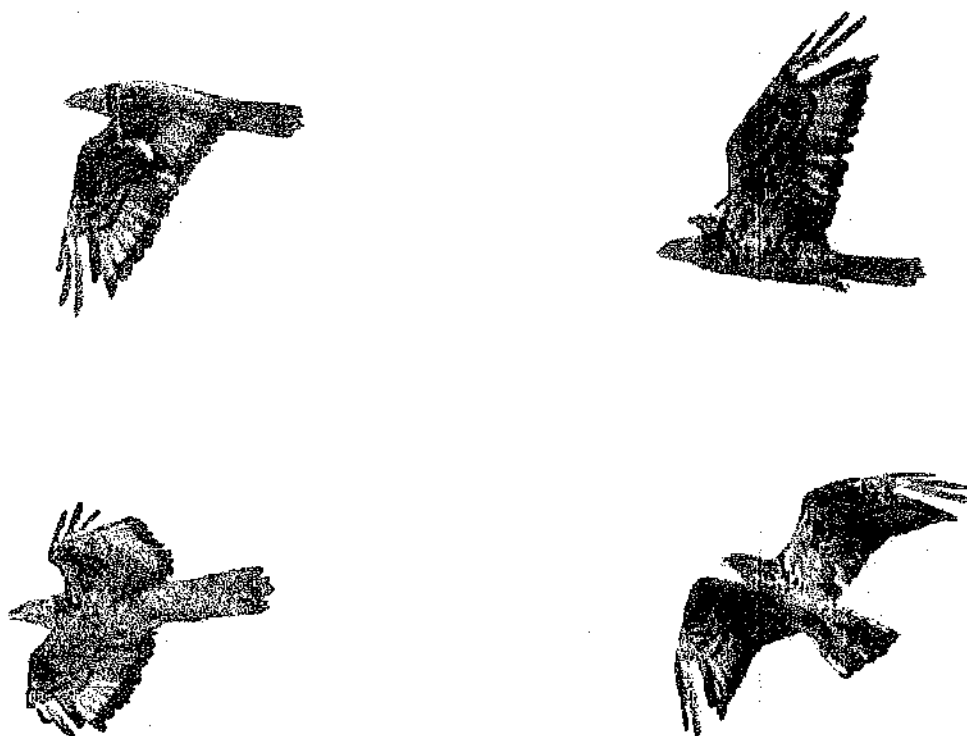
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The first record of European Honey Buzzard *Pernis apivorus* for Sri Lanka

MODITHA KODIKARA ARACHCHI & SAMPATH S. SENEVIRATNE

The European Honey Buzzard *Pernis apivorus* breeds throughout Europe and west Asia and winters in central and southern Africa. The majority of the western breeding population cross the Strait of Gibraltar to Africa, whereas the eastern population mainly pass through the Middle East en route to their African wintering grounds (Ferguson-Lees & Christie 2001). European Honey Buzzard does not overwinter in South Asia and to the best of our knowledge no confirmed records exist of this species in the region (but see pp.128–131). Rasmussen & Anderton (2012) listed it as a hypothetical visitor to Afghanistan.

At 12h08 on 16 December 2019, whilst making waterbird counts at the Vankalai Sanctuary (8.919°N 79.944°E), a Ramsar wetland close to Mannar, a small town in the north-west of Sri Lanka near the Adam's Bridge island chain linking Sri Lanka to India, we observed a medium-sized raptor approaching us from the north-west at a height of about 50 m. It was observed for about a minute as it circled a few times and continued flying purposefully towards the south-east. Its bill remained part open whilst in our view but we did not hear it vocalise (Plates 1–4).



Plates 1–4. European Honey Buzzard *Pernis apivorus*, Mannar, Sri Lanka, 16 December 2019.

The area in which the bird was seen consists of thorn scrub, saltmarsh and mudflats. Using binoculars we confirmed it was a honey buzzard from the small pigeon-like head, size and shape of the bill, long slender neck and long broad tail, but the plumage was quite different from the various Oriental Honey Buzzard *P. ptilorhynchus* colour morphs usually seen in Sri Lanka. We took a series of photographs which we used to identify the bird and later sent to experts for verification. Overall, the bird was a pale to intermediate morph with a greyish head, orange-yellow eye, pale grey throat and pale gorget with greyish blotches and no mesial stripe. The underparts were mainly pale greyish-white with contrasting dark brown bars and blotches, more rufous towards the vent. Both wings were undergoing primary moult, but suggested five fingers in the most distal primaries (Figure 1). The primary moult scores were as follows: feathers p1–p6 (fresh—score 5/5), p7 (developing—score 3/5) and p8–p10 (old—score 0/5). There were prominent black carpal patches on both underwings and a dark terminal band followed by a broad pale band on the remiges; pale areas of the wing were mostly pale grey with fine vermiculations; spots along underwing-coverts formed a few fine dark lines; the tail was grey-white with a broad dark terminal band, whilst two finer dark bands close to the base of the tail created a pale band in the middle of the lower tail; yellow feet and brownish-grey upperparts. The bird was in wing and body moult.

Since almost all other honey buzzard species are sedentary or are not strong migrants (Ferguson-Lees & Christie 2001), the only possible confusion species in Sri Lanka is the Oriental Honey Buzzard, which is a breeding resident with a migratory

population augmenting their numbers in winter (Rasmussen & Anderton 2012, Warakagoda *et al.* 2012). One of the main characteristics that we used to distinguish this bird from Oriental Honey Buzzard was the prominent, extensive, dark carpal patches, a distinctive feature of the European Honey Buzzard (Ferguson-Lees & Christie 2001, Rasmussen & Anderton 2012). Oriental Honey Buzzard lacks this feature or very rarely has them in the form of a small spot in the carpal area (Ferguson-Lees & Christie 2001, Rasmussen & Anderton 2012). The presence of only five fingers on the wings of European Honey Buzzard rather than the six of the Oriental Honey Buzzard is also a reliable feature to separate the two (Ferguson-Lees & Christie 2001, Rasmussen & Anderton 2012), but since the bird was in primary moult we are cautious in depending on that feature. However, when the emerging primary (p7) is projected it is apparent that the bird has only five fingers (Plates 1–4, Figure 1). The grey face suggests that it was a male and the orange-yellow eye rather than a dark red eye as in male Oriental Honey Buzzard also supports its being a European Honey Buzzard (Ferguson-Lees & Christie 2001, Rasmussen & Anderton 2012). In the male European Honey Buzzard the distinct tail bands (dark terminal band and two thinner dark bands at the base of tail) are echoed on the wings in the form of a dark terminal band, a broad pale band inside that and then a dark trailing line along the coverts (Ferguson-Lees & Christie 2001, Rasmussen & Anderton 2012). The Oriental Honey Buzzard either has several dark bands separated by pale bands of the same width on the secondaries or un-matching patterns on tail and wing. Almost all adult Oriental Honey Buzzards and some juveniles have a mesial stripe

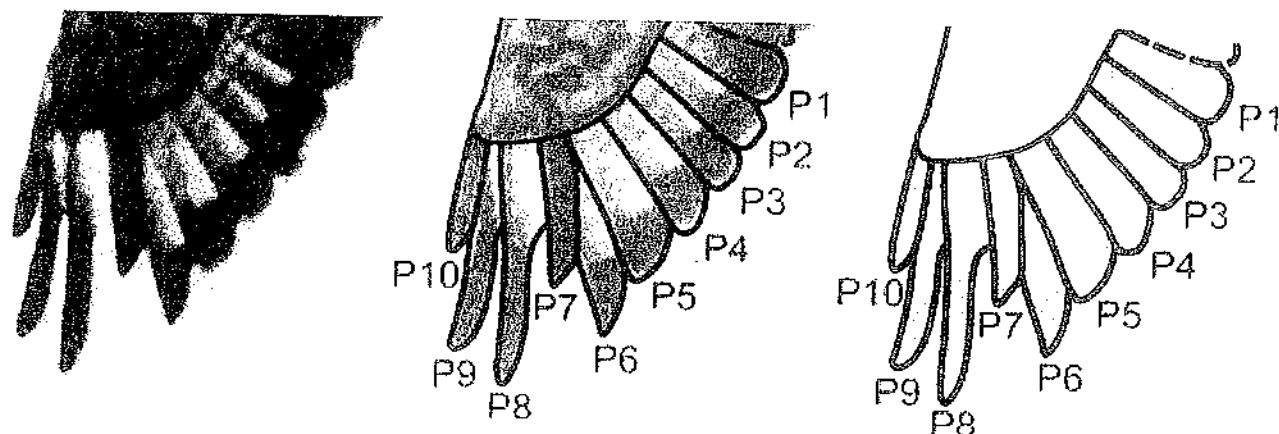


Figure 1. The right wing of the bird showing the ten primary feathers (p1 to p10) with five fingers (p6 to p10; note p7 emerging).

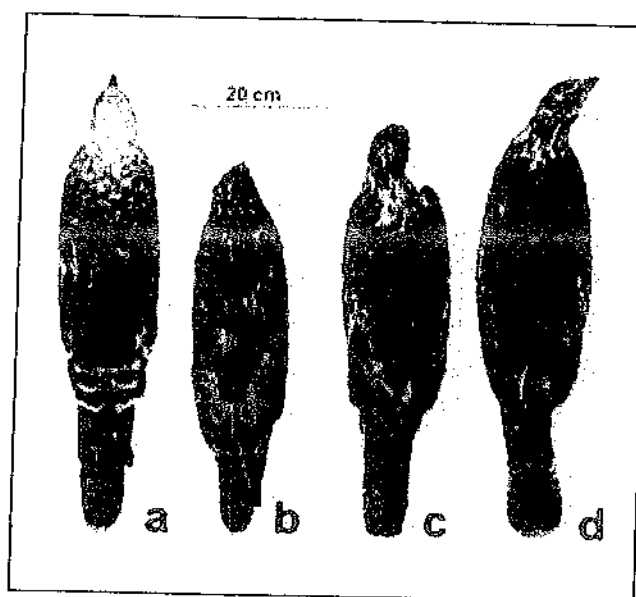
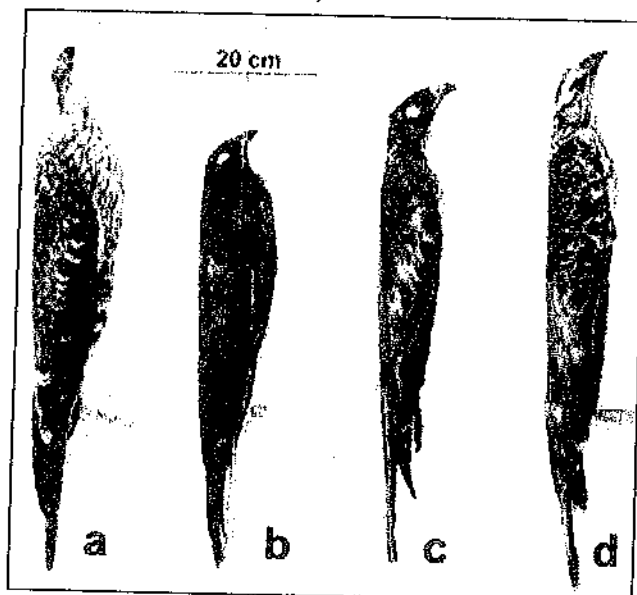
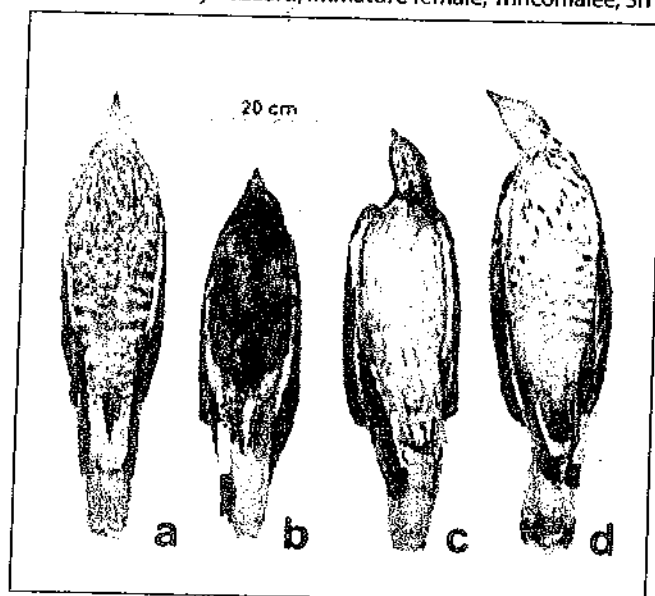
Plates 5–7. Comparison of study skins of *Pernis* honey buzzards at the Natural History Museum, Tring, UK.

a. European Honey Buzzard *P. apivorus*, male, Portmahomack, Ross-shire, Scotland (collected 18 September 1913).

b. European Honey Buzzard, female, Wahn, near Cologne, Germany (collected 17 September 1924).

c. Oriental Honey Buzzard *P. ptilorhynchus*, immature female, West Province, Sri Lanka (collected 3 August 1876).

d. Oriental Honey Buzzard, immature female, Trincomalee, Sri Lanka (collected 9 November 1874).



and a dark gorget. Those juvenile Oriental Honey Buzzards which lack these can be separated from European Honey Buzzard by the banding on the tail and wings. All pale/intermediate European Honey Buzzards lack a dark mesial stripe or gorget (Ferguson-Lees & Christie 2001), as in this bird. Considering all these plumage characteristics collectively, we conclude that the bird was a male European Honey Buzzard.

This is the first record of the European Honey Buzzard in Sri Lanka. Prior to 2019 it had not been recorded from South Asia, except for a sight report from Afghanistan in 1978 (Rasmussen & Anderton 2012), two sight records of probably the same bird in 2012 from Diego Garcia, Chagos Archipelago, British Indian Ocean Territory (Carr 2014) and several records from the Seychelles, further west, closer to East Africa (SBRC 2018). During migration, eastern populations of European Honey Buzzards fly to Africa over the Middle East and may overlap with the Central Asian Flyway (Ferguson-Lees & Christie 2001, Galbraith *et al.* 2014, BirdLife International 2019). This overlapping may cause