A new species of scops-owl from Sri Lanka

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On 27 February 1995, DHW first heard and made a tape-recording of an unfamiliar owl-like vocalisation at night in Kitulgala Proposed Reserve (P.R.), a rainforest in the wet zone of Sri Lanka. Over the next six years at this site and at Sinharaja Forest Reserve (F.R.), a large rainforest, DHW several times heard this mysterious call, which did not match that of any known Sri Lankan owl, but he was unsuccessful in observing its author. DHW played the tape-recording to other naturalists in Sri Lanka, only one of whom indicated he had heard the same call, but this person had assumed it was an arboreal amphibian. After comparing it with recordings of vocalisations of many Asian owls (in Marshall 1978 and White 1984), DHW believed that the unknown Sri Lankan vocalisation was most similar to that of the Reddish Scops-owl *Otus rufescens*, a species from the Malay Peninsula and Greater Sundas. In late 2000, DHW sent a tape-recording of the mysterious call to PCR, who agreed that the call sounded like an owl but that it did not match any of the species known to occur in Sri Lanka, and was most like *O. rufescens*. The possibility of a new species of owl in a country as well known ornithologically as Sri Lanka (where the last new bird species was described as long ago as 1868) seemed very remote. However, scops-owls are notoriously easily overlooked and some species are cryptically similar.

Eventually, at Sinharaja F.R. on 23 January 2001, DHW was successful in observing well for several minutes a bird in the act of giving this call, and he was also able to show the bird to E. L. Hagen. It was a very small rufous earless owl, quite unlike any other on the island or anywhere in South Asia. DHW then visited Kitulgala P.R. with colleagues, including wildlife photographer Chandima Kahandawala, who on 11 February 2001 obtained numerous excellent photographs of an individual bird from many different angles. From these photographs, we confirmed that the owl is strikingly distinct in numerous characters from any other Sri Lankan species. Among other scops-owls, it appears most similar overall to *O. rufescens*, and yet shows numerous differences from even that species. Although no ear-tufts are visible in life, we initially believed (but could not confirm) that it belonged to the genus *Otus* based on its overall appearance and vocalisations, an opinion that has been borne out by further study (detailed below). When we were certain that it was a new species, a press release resulted in numerous articles in various media, and preliminary papers on the discovery of the owl were published (e.g. Warakagoda 2001a–e).

A study was launched by DHW and colleagues, under the auspices of the Department of Wildlife Conservation (DWLC) and Forest Department (FD) of Sri Lanka, to investigate the status, distribution, biology, ecology and taxonomy of the new owl. Explorations were carried out in rainforests (all such forests in Sri Lanka

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d

Plate. Serendib Scops-owl *Otus thilohoffmanni*, new species (a and c) and Reddish Scops-owl *Otus rufescens* (b and d). Original painting by Dr P. Samaraweera.

being in its wet zone), lower montane forests and montane forests of the wet zone, and moist semi-evergreen and riverine forests of the intermediate (climatic) zone. On 4 August 2001 a male of the species was mist-netted (Fig. 1; see also Appendix) in Morapitiya-Runakanda P.R. for further studies of the taxon's external morphology. It was photographed, ringed, and released at the exact site of capture. Biometrics, descriptions and photographs of this individual were sent to PCR for further comparative studies. Incidentally, this individual was relocated 2.5 years later in apparent good health at the same locality.

Searches at museums with significant holdings of Sri Lankan birds revealed no overlooked specimens of this taxon that could be used as the basis for a scientific description. Given the distinctiveness of the owl, we believe it is unlikely that any such misidentified specimens exist. Therefore it was essential to collect a specimen of the new owl, but we were reluctant to do so at this stage because its population and conservation status were unknown. By May 2002 the results of our project showed that the new owl occurred in at least five different forests, and at least 24 individuals had been detected. Permission to collect a specimen to be designated the type was then applied for and granted by the DWLC and FD. DHW and colleagues obtained the specimen in November 2002 at Morapitiya-Runakanda P.R., a site they had found to hold one of the larger populations known by then. For this distinctive new species, we propose the name:

Serendib Scops-owl *Otus thilohoffmanni*, sp. nov.

Holotype National Museum, Colombo, no. 381, female, from Morapitiya-Runakanda Proposed Reserve (06°29'N, 80°18'E, 100 m a.s.l.), Sri Lanka, collected 9 November 2002 by Deepal H. Warakagoda, Kithsiri Gunawardena, Nanda Senanayake, Udaya Sirivardana and Niran M. C. Caldera. The type specimen was prepared as a full skin and partial skeleton (the skull minus the bill was retained with the skeleton), and tissue samples were preserved from liver, breast muscle and blood.

Diagnosis A small, short-tailed, rather uniformly rufescent scops-owl with eye colour ranging from yellow to orange (according to sex), lacking apparent ear-tufts, with a weakly defined facial disk, and with weak tarsi feathered for less than half their length (Plate, Fig. 1).

The upperparts are almost uniformly rufous marked overall with small, short blackish chevrons, spots and/or bars, but lacking white spots, and the scapular spots are obsolete; the wings and tail have rufous outer webs and mostly blackish inner webs, with broad, evenly spaced, rather weak rufous and blackish bands; the underparts are somewhat paler rufous than the upperparts and fairly uniformly sprinkled with blackish triangular spots; the central belly and undertail-coverts are paler and unspotted. The head is rounded and fairly uniformly rufescent, with white supercilia (conspicuous to weak in live birds according to facial expression); no ear-

tufts; bar-like chevrons on the central crown; a uniform, slightly darker rufous facial disk, devoid of markings and lacking a dark facial disk border; feathers around base of bill concolorous with those of facial disk. The large eyes have yellow to orange irides, with a striking black outer ring. The orange of the iris is concentrated especially in the sides and lower part of the iris, shading to yellow in the rest of the iris. In males the orange is pronounced, the area apparently growing larger with age and eventually covering the whole iris; in the females the iris is entirely or largely yellow with much less orange than in the male. The inner eyelids are black, whilst the bare orbital ring is narrow and pinkish. The cere is fleshy pink and not strongly demarcated from the bill, which is ivory-white in live birds and notably long, narrow and relatively straight for its genus. In live birds, the tarsi and toes are pinkish white, the claws ivory white, all becoming pinker post-mortem. The tarsi, toes and claws are strikingly thin and delicate, the toes appear long, and the claws are relatively straight; less than the proximal half of the tarsi is feathered. In normal postures in life, the wingtips fall slightly beyond the tail tip.

In overall coloration, *Otus thilohoffmanni* resembles several other species, in particular *O. rufescens*, Sokoke Scops-owl *O. ireneae* (rufous morph), Sandy Scops-owl *O. icterorhynchus*, Pemba Scops-owl *O. pembaensis* (rufous morph), Mountain Scops-owl *O. spilocephalus* (rufous morph of races from the central Himalayas through south-east Asia), Flores Scops-owl *O. alfredi*, and White-fronted Scops-owl *O. sagittatus*. Among Sri Lankan species, the only species with which *thilohoffmanni* could be confused is the Sri Lankan race of Oriental Scops-owl *Otus sunia leggei* in the rufous morph.

Otus thilohoffmanni differs from *ireneae* (rufous morph) in its pale (vs. dark) bill and claws; lack of ear-tufts (vs. short but distinct ear-tufts); more profuse rictal and other facial bristles, and less defined facial disk; darker, less bright rufous overall coloration; lack of black streaks on the forehead and upperparts; much weaker, more rufous wing banding; blackish inner portions of remiges and rectrices; lack of weak fine dark barring below; and mostly unfeathered tarsi (vs. feathered to toes). It differs from *icterorhynchus* in lacking ear-tufts (vs. having long, prominent, upstanding ear-tufts), having almost uniform forehead and crown (vs. 'frosted' white forehead and crown-sides), having longer facial bristles and less distinct facial disk rim, lacking white diamond-shaped spots above, lacking prominent white scapulars with black tips, lacking prominent white banding on wings, having more and larger black spots on underparts, and lacking white spotting on breast and white barring on lower underparts.

Differences from *pembaensis* (rufous morph) include the much smaller size of *thilohoffmanni*; lack of ear-tufts; lack of black border around facial rim; darker, more rufous, more uniform facial disk; near lack of pale scapular spots; lack of fine dark shaft-streaks and pale barring below; more distinctly barred uppertail surface, much smaller, pale bill; much less extensively feathered, weaker tarsi; and paler, weaker toes.

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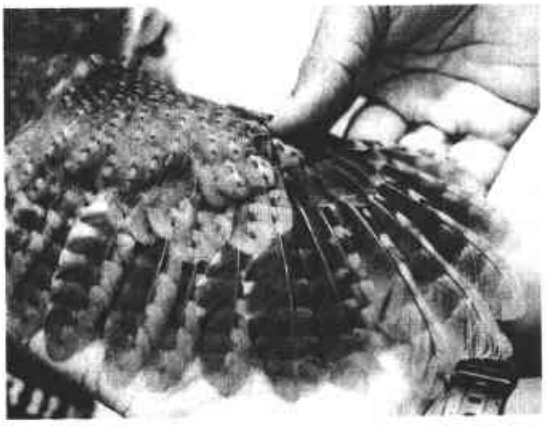

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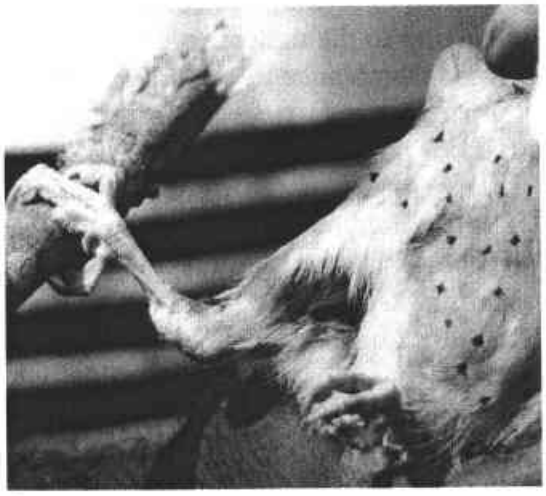

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Fig. 1a–e. Photographs of male of *Otus thilohoffmanni* captured on 4 August 2001 in Morapitiya F.R. (a) face, (b) upperparts, (c) right upperwing, (d) right underwing, (e) underparts, tarsus and toes (Chandima Kahandawala).

Differences from *alfredi* include the orange eye of males (vs. yellow); paler, less orange-yellow bill; shorter facial bristles and more compact plumage texture (vs. long soft bristles and softer, fluffier overall plumage in *alfredi*); more uniformly rufous face (vs. prominent white-'frosted' forehead and supercilia and darker patch around eye in *alfredi*); presence of black chevrons on upperparts; lack of diamond-shaped spots on nape collar; obsolete scapular spots (vs. strong brown and white spots in *alfredi*); lack of white banding in wing; much more uniform underparts that lack the white patterning and vermiculation of *alfredi*; black spots below (lacking in *alfredi*); and much less heavily and extensively feathered tarsi.

Differences from *spilocephalus* (rufous morph of continental races) include lack of ear-tufts, near lack of scapular spots (white with black tips in *spilocephalus*), more uniformly rufous upperparts with narrow chevrons and other bar-like marks (vs. large dark brown spots on crown, distinct pale-spotted nape collar, and more irregularly barred upperparts in *spilocephalus*), much more uniformly coloured and patterned underparts (vs. mostly very finely vermiculated, with irregular white spots and chevrons below in *spilocephalus*, with more solid-coloured dark breast patches and white patches in centre of belly and vent, and a lack of black spots); tarsus much less heavily feathered (vs. nearly entirely feathered in continental races of *spilocephalus*).

From *sagittatus*, *thilohoffmanni* differs in its much smaller size (especially the much shorter tail); much plainer face pattern; dark eye patch; mostly whitish, finely vermiculated facial disk with prominent dark brown border; lack of ear-tufts; brighter, paler rufous upperparts (darker, more maroon-chestnut in *sagittatus*); lack of pale arrowhead-shaped marks on upperparts and presence of black chevrons above; near lack of scapular spots (buffy and irregularly marked but prominent in *sagittatus*); plainer underparts pattern lacking vermiculation on breast and with stronger blackish spotting below; and much less extensively feathered, much weaker tarsi. From *O. sunia leggei* (rufous morph), it differs in lacking the prominent ear-tufts, and in lacking dark streaking and white barring to the underparts.

The only species that bears a sufficiently close resemblance to *O. thilohoffmanni* in external morphology to warrant detailed comparisons is *O. rufescens* of Malaysia and the Greater Sundas. The following results from direct comparisons by PCR of the type specimen of *thilohoffmanni* with 11 specimens of *O. rufescens* (one at USNM, four at AMNH, and six at BMNH [all acronyms are explained in the Acknowledgements]), and comparison with photos of ten adult specimens of *rufescens* at NNM and another at ZMA (*rufescens* is itself scarce in collections and few specimens exist beyond those examined in this study). Among the specimens of *rufescens* examined, only minor variation exists in colour and pattern, although it has been considered to have rufous and brown morphs (König *et al.* 1999). The type specimen of *thilohoffmanni* is very similar in colour and pattern to all ten living individuals of the species thus far observed by DHW and colleagues, and it seems most likely that the species lacks colour morphs. All other known scops-owls are more dissimilar in appearance to *thilohoffmanni* than are the above.

TABLE 1

Skin measurements (in mm) of type specimen of *O. thilohoffmanni* and similar species. Measurements taken of live bird by DHW are included below those of the type; where two measurements are presented, these are of left then right sides respectively. L = length, d = depth, w = width, P = primary (numbered from outer primary inward), s = shortfall (distance from wingtip).

Data on *O. alfredi* from Widodo *et al.* (1999) and PCR (unpubl. data); data on *O. pembaensis* from Rasmussen *et al.* (2000).

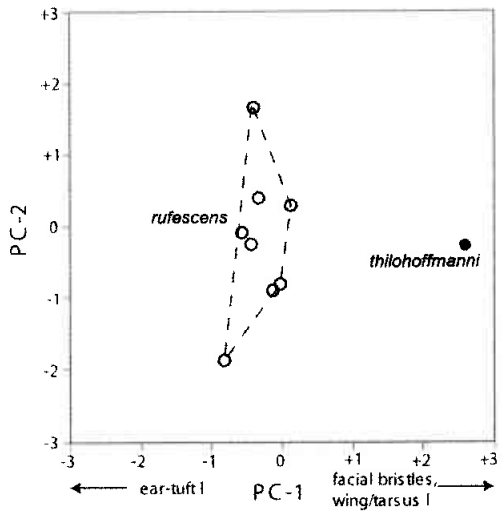
Species	Culmen 1 from cere	Maxilla d at cere	Rictal bristle l	AuricularBristle l	Ear-tuft l	Wing l	Tail l	Tarsus l	Tarsus proximal w	Tarsus distal w	Unfeathered tarsus	Digit 2 (toe) l	Digit 2 claw l	Hallux claw l	P1l	P1s	P2s	P3s	P4s	P5s	P6s	P7s	P8s	P9s	P10s
Type of *thilohoffmanni*	12.9	7.1	24.8	17.1	23.2	129	63	27.7	5.4	6.2	16	23.7	11	8.1	54	37	19	6	1	0	1	6	13	18	24
Live *thilohoffmanni* (DHW)	---	6.5	13.1	---	---	140, 135	66	33.8 (x2)	---	---	23.5, 19.2	---	11, 11.3	8.7, 9	---	---	---	---	---	---	---	---	---	---	---
rufescens	13.8	7.3	18.0	14.0	27.5	123.7	65.0	24.8	5.7	6.6	5.9	21.4	11.0	9.1	50.4	36.8	17.8	5.4	1.0	0.4	2.6	5.0	10.1	15.1	21.8
SD	0.5	0.2	1.7	1.3	3.3	3.7	3.3	1.25	0.5	0.7	2.0	1.4	0.8	0.7	2.8	2.3	1.4	2.1	1.2	0.8	3.4	3.7	3.2	3.7	2.6
(n)	(13)	(13)	(13)	(13)	(14)	(12)	(10)	(12)	(10)	(12)	(11)	(6)	(12)	(9)	(7)	(7)	(7)	(8)	(8)	(10)	(7)	(6)	(7)	(7)	(7)
ireneae	10.3	5.8	21.1	19.4	19.7	116	63	21.4	4.8	5.4	3.4	15.7	8.8	8.2	39.0	37.0	18.3	4.7	0.5	0.0	---	---	---	---	---
SD	0.7	0.5	1.2	1.2	1.1	1	2.6	1.5	0.1	0.2	0.6	0.6	0.4	10.6	5.3	3.0	1.5	2.3	0.7	0.0	---	---	---	---	---
(n)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(2)	(3)	(3)	(3)	(3)	(2)	(2)					
icterorhynchus	---	---	16.0	16.3	22.5	122	72	---	---	---	---	---	---	---	55.0	36	15	5	2	0	2	6	11	16	18
balli	12.2	6.8	23.3	15.8	25.5	141.5	72.5	29.6	5.5	6.6	12.3	---	9.9	8.4	60	38	14	5	0	0	3	4	9	24	32
SD	1.3	0.1	2.3	1.0	1.0	0.7	---	0.4	0.7	0.3	0.6	---	0.6	0.4	---	---	---	1.4	0.0	---	---	---	---	---	---
(n)	(2)	(2)	(2)	(2)	(2)	(2)		(2)	(2)	(2)	(2)		(2)	(2)				(2)							
alfredi	12.7	6.9	27.8	---	21.1	149.2	75.4	25.6	6.1	6.4	8.5	---	10.1	8.5	61.4	45.4	23.2	8.2	1.5	0	3.4	10.2	18.0	25.1	34.6
SD	1.1	0.3	1.7	---	1.0	10.0	4.3	1.2	0.4	0.1	1.6	---	0.8	0.4	3.8	4.0	2.0	1.4	1.8	0	2.2	2.6	2.6	2.2	3.0
(n)	(4)	(3)	(4)		(3)	(4)	(4)	(4)	(3)	(3)	(3)		(4)	(3)	(3)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
spilocephalus (continental races)	2.1	5.7	23.3	25.7	25.0	143.0	78.2	30.1	---	5.6	6.4	---	10.0	---	56.8	44.3	19.8	6.9	1.3	0.0	3.5	10.2	18.3	25.1	31.3
SD	0.3	1.5	2.6	2.9	2.9	4.9	3.7	1.4	---	0.1	1.3	---	0.6	---	3.2	3.1	2.6	1.7	1.1	0.2	1.2	1.7	2.1	2.5	2.9
(n)	(4)	(4)	(32)	(21)	(32)	(48)	(13)	(11)		(3)	(13)		(13)		(37)	(38)	(36)	(46)	(38)	(38)	(37)	(3)	(32)	(27)	(26)
pembaensis	---	7.6	21.8	14.4	24.7	151.5	75.0	28.3	---	7.4	4.1	---	10.6	8.9	69.8	33.5	11.0	2.1	0	1.6	7.0	12.8	19.3	26.5	32.3
SD	---	0.3	0.9	0.6	1.0	2.7	1.6	1.3	---	0.2	0.8	---	0.5	0.4	4.2	2.3	1.	0.5	0	0.9	0.6	1.2	1.6	2.3	2.7
(n)		(6)	(6)	(6)	(6)	(6)	(6)	(6)		(6)	(6)		(6)	(6)	(6)	(6)	(6)	(5)	(6)	(6)	(6)	(6)	(6)	(6)	(6)

The bill of *thilohoffmanni* is markedly narrower, less arched, and appears longer and straighter near the tip than that of *rufescens*. The rictal bristles of *thilohoffmanni* are slightly to much longer than those of *rufescens*. The facial disk of *thilohoffmanni* lacks any hint of a dark rim and the feathers are uniform in colour throughout their length (vs. a moderately prominent dark rim to the facial disk, with the facial disk feathers palest immediately proximal to the dark rim in *rufescens*), thus *thilohoffmanni* has a much plainer, more uniform facial pattern than *rufescens*. The feathers of the facial disk rim of *thilohoffmanni* are softer and less stiffened, and diffuse-tipped with slightly lengthened shafts or auricular extensions (vs. stiffened, with straight, compact tips in *rufescens*). The pale supercilium and front of the forehead of *thilohoffmanni* are weaker, more rufescent, and more barred than in *rufescens* (which has very prominent whitish supercilia), and show less contrast with the crown colour and pattern. In *thilohoffmanni*, the feathers that would in other scops-owls be elongated as ear-tufts are essentially undifferentiated, being marked as for adjacent feathers (but perhaps slightly more heavily barred than surrounding feathers), soft and unstiffened, with rounded tips like the adjacent feathers (vs. rather long and pointed, stiff ear-tufts with specialised markings in *rufescens*).

The feathers of the upperparts of *thilohoffmanni* entirely lack whitish subterminal triangles (vs. prominent and generally distributed whitish subterminal triangles from the crown to the rump in *rufescens*). The general colour of the upperparts is distinctly more uniform and more rufous above in *thilohoffmanni* than in *rufescens* (in which most specimens are dark warm brown above, although a few have more rufous-brown upperparts, and thus are intermediate in colour between typical *rufescens* and *thilohoffmanni*). The scapular spots present in almost all species of scops-owls (at least as adults) are obsolete in *thilohoffmanni*, in which the scapulars are only slightly paler rufous than the surrounding feathers, and are similarly marked to the surrounding feathers (vs. rufous-buff but fairly distinct and heavily marked scapular spots in *rufescens*).

The wings of *thilohoffmanni* have a great deal of black proximally and on the inner webs (vs. rufous-brown in *rufescens*), and the wing banding of *thilohoffmanni* is comprised of even-width, rather weak rufous-buff bands alternating with narrowly dark-outlined rufous bands (vs. moderately to boldly, broad-banded dark brown and narrower buff wing-bands in *rufescens*). The undersurface of the outer primaries of *thilohoffmanni* is blackish except for the outer webs and tips, whilst the bases of the inner primaries are more boldly banded (vs. the entire undersurface of the remiges being rather boldly banded with broad dark and narrow pale bands in *rufescens*). The primary-coverts and alula are blackish except at their very tips, and are markedly and contrastingly different from the surrounding feathers in *thilohoffmanni* (vs. coloration and banding similar to the surrounding feathers in *rufescens*).

The throat of *thilohoffmanni* is weakly marked, mostly with fine dark barring and only extremely fine dark streaking (vs. distinctly dark-streaked in *rufescens*). The ground colour of the underparts of *thilohoffmanni* is a somewhat colder, less



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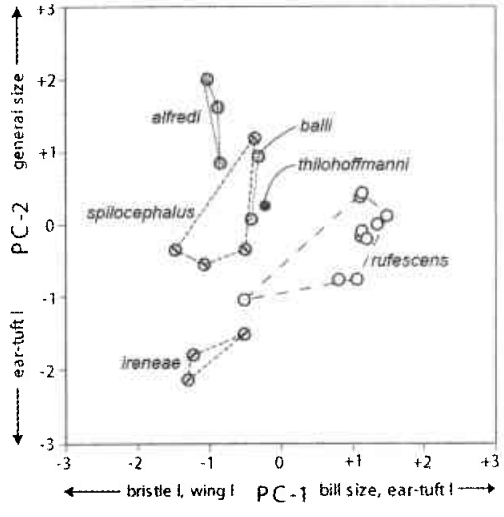

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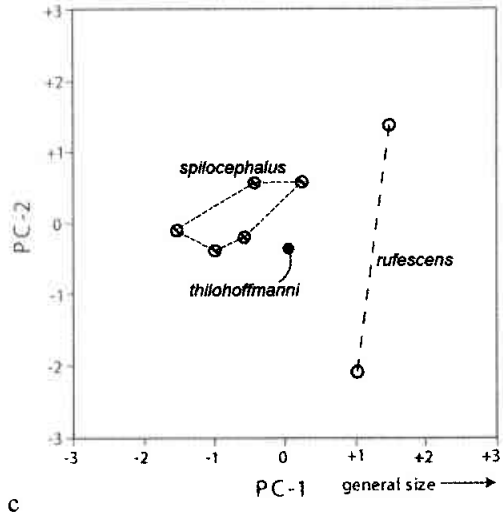


c

Fig. 2a–c. Graph of loadings for individual specimens from principal components analyses (PCAs) for (a) skin measurements for *Otus thilohoffmanni* and *O. rufescens* only; (b) skin measurements for *O. thilohoffmanni* and other related species; and (c) skeletal measurements for *O. thilohoffmanni* and two related species.

yellowish rufous than that of almost all specimens examined of *rufescens* (one specimen of *rufescens* had darker and browner underparts than the others, but these were still more ochraceous than *thilohoffmanni*). The feathers of the underparts of *thilohoffmanni* have very weak pale shaft-streaks (vs. usually fairly marked pale shaft-streaks in *rufescens*), and the dark subterminal spots of the underparts feathers are mostly shorter, less extensive proximally on the feather than in *rufescens* (which usually has large squared spots below, offset by slightly paler areas), with a stronger hint of a dark cross-bar near the tip. On the breast and lower throat some markings take the form of short bars or chevrons rather than spots.

The tail of *thilohoffmanni* is more rufous, with nearly equal-width dark and rufous bands (vs. dark brown in *rufescens* with narrow, widely spaced pale bars). The bases of the inner rectrices and most of the other rectrices of *thilohoffmanni* are largely black (vs. brown and like the rest of the tail in *rufescens*).

The tarsi of *thilohoffmanni* are less than half-feathered (vs. almost entirely feathered in *rufescens*). The podotheca (skin of the toes) of *thilohoffmanni* is smooth on its uppersurface, whilst that of *rufescens* is rougher and more heavily

TABLE 2

Results of factor analyses of external measurements of *O. thilohoffmanni* with (a) only *O. rufescens* (see Fig. 2a) and with (b) several other species (see Fig. 2b). Variable abbreviations as in Table 1.

	a			b	
Variable	PC 1 loadings	PC 2 loadings	PC 3 loadings	PC 1 loadings	PC 2 loadings
Culmen 1 from cere	-0.32	0.22	0.85	0.76	0.54
Maxillad at cere	-0.39	-0.78	0.46	0.74	0.34
Rictal bristle l	0.97	0.03	0.05	-0.75	0.62
Auricular l	0.83	-0.05	-0.02	---	---
Ear-tuft l	-0.65	0.70	0.06	0.77	0.26
Wing l	0.62	0.32	0.61	-0.47	0.8
Tail l	-0.12	0.95	-0.09	---	---
Tarsus l	0.65	0.23	0.11	---	---
Variance explained	3.15	2.19	1.35	2.50	1.59
Percent of variance explained	39.33	27.36	16.89	50.09	31.74
t-square for *thilohoffmanni*	6.86	---	---	0.09	---
Probability for *thilohoffmanni*	0.26	---	---	0.96	---

armoured. The general feather texture of *thilohoffmanni* is softer and fluffier (vs. stiffer and harsher in *rufescens*). In overall size and structure, *thilohoffmanni* is similar to *rufescens* (Table 1) but slightly smaller and more delicately built, with a longer wing, a longer but weaker tarsus, and a slightly longer digit 2 (the longest toe). In a principal components analysis (PCA) of external measures (Table 2a, Fig. 2a) in which only *thilohoffmanni* and *rufescens* were included, the two were separated on PC-1, which was primarily a contrast axis between longer facial bristles, wing length, and tarsus length vs. longer ear-tufts. PC-2 was significant but did not separate the two species, as specimens of *rufescens* showed wide variance on this axis. However, in a PCA that included external measures of several species of similar owls (Table 2b, Fig. 2b), *thilohoffmanni* was very similar both to continental *spilocephalus* and to *balli*, and separated only weakly from *alfredi* and *rufescens*. In this model, PC-1 was primarily a contrast axis between bill size and ear-tuft length vs. facial bristle length and wing length, and *thilohoffmanni* is essentially intermediate in these characters between *rufescens* vs. all the other included taxa.

In a PCA of skeletal measurements (Tables 3–4, Fig. 2c), *rufescens* is the largest species (though differences are slight), *spilocephalus* the smallest, and *thilohoffmanni* very like larger individuals of *spilocephalus*. Shape contrasts did not separate the species for the variables measured. Wing shape was measured as shortfalls of each primary from the longest primary in the folded wing (Fig. 3), and this showed that *thilohoffmanni* has a very similar wing shape to *rufescens*; the latter may have a slightly broader inner wing but the samples are too small to be certain. Based on a single specimen, *O. icterorhynchus* shows a similar wing shape to the above species. Members of the *O. magicus* superspecies (shown here are the Seychelles Scops-owl *O. insularis* and the Flores subspecies of Moluccan Scops-

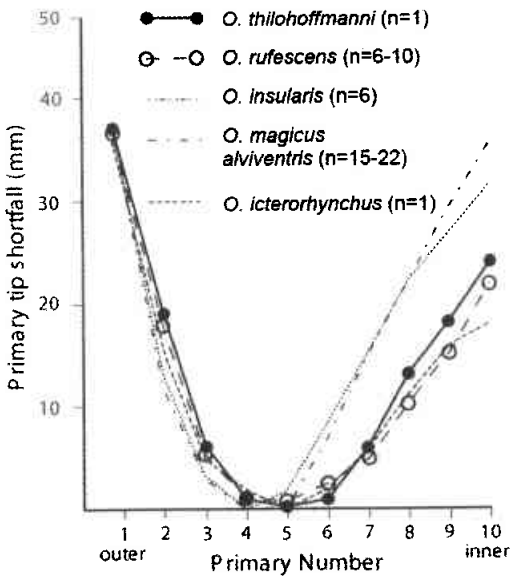


Fig. 3. Wing shape (as measured by shortfalls of each primary from folded wingtip) of type specimen of *Otus thilohoffmanni*, compared with *O. rufescens* and selected other species of scops-owls (mean values shown where n>1). Data for *O. insularis* and *O. magicus albiventris* are from Rasmussen (1998).

Fig. 4. Map of Sri Lanka, showing rainforest tracts from which *O. thilohoffmanni* has thus far been recorded. Dashed line shows inland limits of wet zone. Largest rainforest tract is divided into the western, smaller portion Morapitiya-Runakanda P.R. and the larger, more eastern portion Sinharaja F.R.

owl *O. magicus albiventris*) have markedly narrower inner wings (data for other taxa in Rasmussen 1998 and Lambert & Rasmussen 1998).

Distribution *Otus thilohoffmanni* is endemic to Sri Lanka. It has thus far been found only in lowland rainforests of the south-west quarter of the island within an altitudinal range of 30–530 m (Fig. 4). As of January 2004, the species had been detected in Kitulgala P.R. (06°59'N, 80°24'E, *c.*150 m a.s.l.), Sinharaja F.R. (06°25'N, 80°26'E, *c.*500 m a.s.l.), Morapitiya-Runakanda P.R. (06°29'N, 80°18'E, *c.*100 m a.s.l.), Kanneliya F.R. (06°11'N, 80°22'E, *c.*30 m a.s.l.) and Eratna-Gilimale P.R. (06°45'N, 80°26'E, *c.*100 m a.s.l.).

Description of the holotype (colours from Smithe 1975) Crown rounded, lacking differentiated ear-tufts, colour closest to Raw Sienna (136), each feather with several short, narrow Dark Grayish Brown (20) bars across centre. Forehead and supercilium Cinnamon (30) marked with similar short bars as for crown, the supercilium slightly paler than forehead. Circumorbital area and ear-coverts between Raw Sienna and Chestnut (32), with weak, narrow darker barring overall. Ear-covert feathers lack darker, compact distal ends (e.g. a well-formed facial disk border is lacking) and they also lack elongated feather shafts. Rictal bristles fairly long and abundant, and similar in colour to ear-coverts. Nape slightly paler than

TABLE 3

Skeletal measurements (in mm) of type specimen of *O. thilohoffmanni* and similar species.
L = length, h = height, w = width, d = depth.

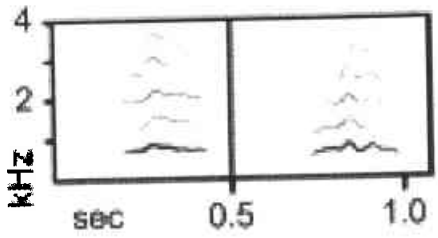
Species	Preorbital roof w	Postorbital roof w	Preorbital rim h	Skull l (minus maxilla)	Max skull w	Max skull h	Supraorbital process w	Humerus l	Humerus distal w	Humerus head + deltoid crest w	Humerus head w/o deltoid crest w	Humerus shaft w	Femur l	Femur proximal w	Femur shaft w	Coracoid l	Coracoid shaft w	Procoracoid + head w	Scapular l	Scapular proximal w	Scapular shaft w
thilohoffmanni	8.2	12.5	3.9	30.3	33.3	21.1	15.3	44.1	7.6	8.2	7	2.9	29.6	5.3	2.3	19.7	1.9	3.3	24.1	4.5	1.5
rufescens	8.7	13.5	4.6	30.5	33.6	22.5	17.5	42.9	7.8	9.4	8.0	3.0	29.2	5.8	2.4	20.3	2.3	4.2	25.4	4.2	1.57
SD	0.85	0.99	0.42	0.14	1.63	0.64	2.62	1.13	0.28	1.2	0.28	0	1.56	0.57	0.07	0.2	0.21	0.42	0.49	0.42	0.11
(n)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
icterorhynchus	---	---	---	30.1	31.6	23.4	---	42.5	---	9.3	7.9	3.2	28.7	5.4	2.2	19.3	2.2	3.57	25.3	4.8	1.6
SD	---	---	---	---	---	---	---	---	---	0.81	0.14	---	1.44	0.14	0.07	0.78	0	0.21	0.15	0.07	0.07
(n)										(3)	(2)		(3)	(2)	(2)	(3)	(2)	(3)	(3)	(2)	(2)
spilocephalus	7.6	11.5	3.3	28.6	31.4	21.6	11.9	40.8	7.4	9.2	7.3	2.7	29.1	5.4	2.3	18.5	2.1	3.6	23.2	4.5	1.5
SD	0.72	0.97	0.19	0.78	0.98	0.86	1.34	0.93	0.25	0.22	0.40	0.13	0.75	0.18	0.15	1.01	0.11	0.16	0.84	0.18	0.0
(n)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)

TABLE 4

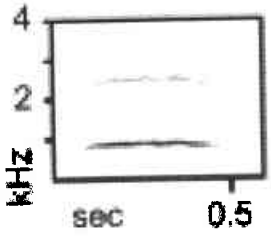
Results of factor analyses of skeletal measurements of *O. thilohoffmanni*, *O. rufescens* and *O. spilocephalus* (see Fig. 2c). Variable abbreviations as in Table 3.

Variable	PC 1 loadings	PC 2 loadings	PC 3 loadings
Preorbital roof w	0.80	-0.48	0.13
Postorbital roof w	0.81	-0.49	0.10
Preorbital rim h	0.84	-0.47	0.01
Skull l (w/o maxilla)	0.87	-0.25	0.37
Max skull w	0.88	0.27	0.32
Max skull h	0.84	0.31	-0.21
Supraorbital process w	0.85	-0.49	0.10
Humerus l	0.74	0.12	0.58
Humerus distal w	0.88	0.29	0.19
Humerus head + deltoid crest w	0.35	0.74	-0.53
Humerus head w/o deltoid crest w	0.91	0.19	-0.32
Femur l	0.51	0.73	0.35
Femur proximal w	0.67	0.62	-0.29
Femur shaft w	0.67	0.3	-0.28
Coracoid l	0.95	0.001	0.15
Coracoid shaft w	0.68	-0.39	-0.46
Procoracoid + head w	0.71	-0.48	-0.46
Scapular l	0.97	-0.02	0.05
Scapular proximal w	-0.25	0.78	0.33
Scapular shaft w	0.62	0.55	-0.13
Variance explained	11.66	4.20	1.93
Percent of variance explained	58.30	20.99	9.64
t-square for *thilohoffmanni*	5.45	---	---
Probability for *thilohoffmanni*	0.37	---	---

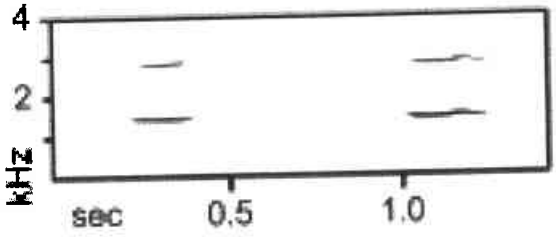
crown and similarly marked. Mantle same colour or slightly more rufescent than crown, the markings darker but more widely spaced. Lower back and rump have weaker, more closely spaced dark bars than mantle. Scapulars Cinnamon with weak, widely spaced dark bars, each with a stronger small dark subterminal mark; edges and tips of each scapular more rufous, closer to Tawny than Cinnamon. Secondary-coverts Antique Brown (37) with very fine pale shaft-streaks and tiny dark spots along the shaft; greater coverts close to Cinnamon with larger, blacker shaft-spots. Alula mottled Antique Brown and Cinnamon on outer webs and extreme tips, grading to Dusky Brown (19) on inner webs. Greater primary-coverts Dusky Brown except for Cinnamon on extreme tips. Outer webs and tips of primaries and secondaries moderately banded with even-width dark and pale bands of Raw Sienna bounded on both sides by narrow Dark Brownish Olive (129) bars, alternating with pale bands between Cinnamon and Buff; these grade on inner webs to Dusky Brown. Upper tail surface Raw Sienna, weakly and incompletely banded Dusky Brown, the bands stronger on outer webs of outer rectrices, the inner webs and basal portions of each rectrix predominantly Dusky Brown. Throat Cinnamon



(a)



(b)



(c)

Fig. 5a–c. Sonograms of territorial songs of (a) *O. thilohoffmanni* (recorded by DHW), (b) *O. rufescens* (recording from Malaysia, by J. T. Marshall, from recording in Marshall 1978), and (c) *O. spilocephalus* (recorded by Pratap Singh, in Himachal Pradesh, north-west India).

with very fine, weak darker shaft-streaks. Breast between Tawny (38) and Cinnamon, with short, narrow, Dark Grayish Brown chevrons overall, larger and more triangular on lower breast. Flanks Cinnamon with triangular Dark Grayish Brown spots overall. Centre of belly between Buff (124) and Cinnamon, and essentially unmarked. Tarsal feathering covers less than half the tarsus and is unmarked Cinnamon, slightly darker on front of tarsus and paler, almost whitish, in rear and near distal edge of feathering. Bill wholly pale, laterally compressed, and not sharply curved, with a rather long hooked tip. Tarsi, toes and claws weak, slender, elongate, and entirely pale.

Specimens Only the holotype is known.

Measurements of the holotype (in mm) Total length (crown to tail tip) *c.*165, culmen (from cere) 12.9, wing 129, tail 63, tarsus 27.7 (see also Table 1).

Voice The song of *Otus thilohoffmanni* (Fig. 5a) is unobtrusive and easily overlooked. It is diagnostic to species when known but so simple in form and so infrequently delivered that it is easy to understand how the existence of the bird was overlooked until recently. In the forest the song has a ventriloquial quality. The female gives a short, piping, musical, tremulous note *pU'U'u* that rises slightly and falls again in pitch, identical notes being uttered in series but each note separated by a considerable pause (frequency of recording by DHW 0.65–0.8 kHz, note length 0.3 seconds, repeated after 15–29 seconds). The male gives a slightly lower pitched, slightly shorter, less tremulous version (frequency of recording by DHW

0.55–0.7 kHz, note length 0.2 seconds, repeated after 22–35 seconds).

Despite its unobtrusiveness, the song of *O. thilohoffmanni* is distinctive and diagnostic. It resembles that of *O. rufescens* (Fig. 5b) more than any other regional scops-owl species; however, the song of the latter is louder, longer, more piping, higher pitched, and less quavering, and the differences are consistent with treatment as separate species. The song of *O. spilocephalus* (Fig. 5c) is an oft-repeated pair of monotonous, short, more bell-like notes, whilst that of *O. alfredi* is still unknown (suggesting that its song must be inconspicuous or atypical for an owl).

Etymology We name the new owl in honour of Mr Thilo W. Hoffmann, who has for so long done much for nature conservation and ornithology in Sri Lanka. Mr Hoffmann was almost single-handedly responsible for saving from destruction the Sinharaja forest, where the owl was first observed.

We chose for the species the common name Serendib Scops-owl, which has already appeared informally in some other publications. 'Serendib' (also rendered 'Serendip') is an ancient name for Sri Lanka. It is the word from which 'Ceylon' and a variety of other words were derived, including the English word 'serendipity', which aptly describes the unexpected and happy discovery of this new owl.

Remarks

Habitat and ecology *Otus thilohoffmanni* has thus far been located only in larger tracts of lowland rainforest, at 30–530 m. All of the localities in which the bird has been observed so far have been disturbed areas with dense, tall secondary growth. The owl appears to be generally rare but common very locally at certain sites.

Otus thilohoffmanni is essentially a nocturnal forest bird of secretive habits. However, it usually commences vocalising at dusk, remaining at its roost until darkness falls. Then it starts flying around exploring for food in the vicinity, vocalising for some time while doing this. It nearly always roosts near the ground (sometimes as low as *c.*1 m), judging from the position of calls at dusk and one observation. The bird's coloration, size and shape camouflage it very well among clumps of drying or dry leaves, or dead fallen leaves, in dense undergrowth consisting of bamboo, viz. *Davidsea attenuata*, *Ochlandra stridula* and *Pseudoxythenanthera monadelpha*, tree ferns *Cyathea* spp., other ferns, creepers and other such vegetation, and it has been observed roosting in such a place. It keeps to cover at all times. From observations it appears that a pair maintains a territory year-round. Vocalisations are more frequent in localities with higher densities of the species. It appears from the distribution of vocalisation types heard and one direct observation that the male and female roost apart.

Our observations suggest that for about the first two hours after dark *O. thilohoffmanni* hunts for prey in the undergrowth. It has been seen capturing and consuming beetles and moths, and analysis of stomach contents of the type specimen revealed the partly digested legs, head and elytra of three beetles

TABLE 5

Qualitative osteological characters of type specimen of *O. thilohoffmanni* and other *Otus* species. L = length, w = width, h = height. Species/species groups that share characters with or are very similar to *thilohoffmanni* indicated in boldface type.

		Characters													
Species	n	Interorbital roof w (anterior vs. posterior)	Supra-orbital process l	Post-orbital process w	Post-orbital process direction	Temporal groove bridge	Lateral production of external rim of otic capsule vs. postorbital process	Angle of otic capsule external vs. internal rims	Cranial flange of otic capsule	Lateral rim of preorbital	Humerus shaft distal expansion (relative to rest of shaft)	Bicipital crest lateral expansion	Coracoid	Scapula	Sternal keel h
thilohoffmanni	1 partial	**much narrower**	**inter-mediate**	**very broad**	**much more caudally**	**unbridged**	**less produced**	**angle very shallow**	**much thinner**	**moderately inflated**	**very slightly expanded**	**little expanded**	**very slender**	**very slender**	**weakest, shallowest**
rufescens	2	**much narrower**	**rather long, spiky**	**very broad**	**somewhat more caudally**	nearly to very narrowly bridged	**less produced**	**angle shallow**	**much thinner**	**most inflated**	**slightly expanded**	**little expanded**	**fairly slender**	**very slender**	**weak, shallow**
spilocephalus	5	**much narrower**	small	fairly broad	**somewhat more caudally**	nearly to very narrowly bridged	**less produced**	**angle shallow**	**much thinner**	**moderately inflated**	**slightly expanded**	**little expanded**	**fairly slender**	**very slender**	**weakest, shallowest**
bakkamoena sensu lato	several	**much narrower**	very long, spiky (usually)	fairly broad	slightly more anteriorly	nearly to broadly bridged	more produced	**angle shallow**	**thin, somewhat variable**	**moderately inflated**	moderately expanded	**little** to moderately **expanded**	**fairly slender**	somewhat thicker	slightly to much deeper
icterorhynchus	1 full, 2 partial	**much narrower**	small	much less broad	more anteriorly	**unbridged**	more produced	angle very deep	---	**inflated**	moderately expanded	moderately expanded	heavier	fairly slender	moderately deep
scops	several	equal-width	small	much less broad	more anteriorly	broadly bridged	much more produced	angle moderate to deep	thick	not inflated	moderately expanded	moderately expanded	**fairly slender**	slightly thicker	moderately deep
rutilus	4	equal-width	small	much less broad	---	narrowly bridged	more produced	angle deep	thick	**inflated**	expanded	moderately expanded	heavier	---	---
insularis	1 partial	equal-width	---	---	---	---	more produced	angle deep	thick	not inflated	---	---	heavier	---	shallow
flammeolus	several	equal-width	small	much less broad	much more anteriorly	very broadly bridged	much more produced	angle shallow	thick	not inflated	moderately expanded	**little expanded**	heavier	very slender	relatively very deep
Megascops spp.	several spp.	equal-width	small	less broad	slightly to distinctly more anteriorly	moderately to broadly bridged	much more produced	angle moderate to deep	thick	slightly inflated	broadly expanded	moderately to broadly expanded	**fairly slender** to heavier	slightly to distinctly thicker	robust, very deep

(Scarabaeidae), which had been consumed on the night of capture. The species is able to exploit this feeding niche of the forest during this time, as it then has no nocturnal bird as a competitor. The sympatric nocturnal Ceylon Frogmouth *Batrachostomus moniliger*, which hunts the same food, roosts as low but flies to higher levels to feed. The sympatric, partially diurnal, endemic Chestnut-backed Owlet *Glaucidium castanonotum* hunts at low levels in daylight and higher levels nocturnally. Both these species probably become the new owl's competitors later in the night, when it begins to explore higher levels for the same prey.

When *O. thilohoffmanni* hunts in the undergrowth it often perches easily on thin angled and vertical twigs and stems of plants, the most readily available perches at this level. The small, weak legs and toes may be an adaptation for this light-bodied bird to use such perches. After feeding at this level it usually flies somewhat higher to rest, sometimes for a prolonged period, on a branch that is horizontal or nearly so. When resting it often assumes a 'relaxed' position, which is a rather hunched posture with eyes partially closed and feathers somewhat fluffed. After resting it resumes feeding, now at a higher level, between the undergrowth and subcanopy. Its vocal activity peaks again during the last two hours before dawn.

In rainforests of the wet zone *O. thilohoffmanni* replaces the Indian Scops-owl *O. bakkamoena*. The latter avoids wet forests and occurs in wooded habitats outside these, even around human dwellings. Compared with the two forest species mentioned above, other nocturnal birds occurring sympatrically with *O. thilohoffmanni* are rare in this habitat. These are: Bay Owl *Phodilus badius assimilis*, Forest Eagle-owl *Bubo nipalensis*, Brown Fish-owl *Bubo zeylonensis*, Brown Wood-owl *Strix leptogrammica*, Brown Hawk-owl *Ninox scutulata* and Jungle Nightjar *Caprimulgus indicus*. Amongst these the Bay Owl also exploits the same levels of forest vegetation and may be encountered hunting for the same prey, but its diet is broader, and the species appears to be much rarer. Brown Hawk-owl is another possible competitor, but it is quite local and rare in Sri Lankan rainforests, and it is sympatric to a much greater degree with the Indian Scops-owl. The other three owls seek larger prey, and the nightjar explores the high canopy in its brief hunting forays to the forest.

Systematic relationships Although *Otus thilohoffmanni* lacks ear-tufts, we initially believed it to be a member of the genus *Otus* (*sensu lato*) based on its general appearance and obvious resemblance to *O. rufescens*. Nevertheless, we could not readily detect external characters diagnostic of the large, highly variable genus *Otus*, even when restricted to the Old World members, now recognised as generically distinct from most New World members, which have been separated by recent authorities as *Megascops*. However, we were able to confirm the allocation of *O. thilohoffmanni* to the subfamily Striginae (which contains mainly the ear-tufted genera *Otus* and *Bubo* and their close relatives, and the non-tufted *Strix*) as opposed to the Surniinae (in which most non-tufted owls fall, including, among small owls, the genera *Glaucidium*, *Athene*, and *Ninox*) by the lack of a triangular dorsal

process on the jugal bar. Presence or absence of this process is considered diagnostic to subfamily within the Strigidae (Ford 1967), and observations during our study are consistent with Ford's conclusions regarding this osteological character.

Although *O. rufescens* seems to be the most similar species to *thilohoffmanni* in external appearance, numerous differences exist that suggested the relationship might not be particularly close or the resemblances might even be convergent. These include the very different upperparts pattern, the different facial disk structure, and major differences in ear-tuft development, bill shape, and tarsal and foot characteristics. *Otus spilocephalus*, despite its many plumage differences even in the extreme rufous morph, is however more similar in certain external structural characters to *thilohoffmanni* than is *rufescens*, such as the pattern of the upperparts, its soft plumage and well-developed facial bristles, its weak, unarmoured toes, a similar wing-banding pattern, and its tendency to have blackish bases to the flight feathers (but much less markedly so than in *thilohoffmanni*).

Osteological comparisons (Table 5) further confirmed the correct generic placement of *O. thilohoffmanni*. Further study is needed of more material to enable reconstruction of the phylogenetic relationships of *thilohoffmanni*, but based on overall similarity and lack of significant differences, we are now confident that it is indeed closely related to *rufescens*, and may be its sister species. However, most of these osteological similarities are also shared with *O. spilocephalus* (and probably with other similar taxa for which skeletal specimens are not available, such as *O. balli* and *O. alfredi*), and in external and skeletal proportions, *thilohoffmanni* is more like these taxa than any are to *rufescens*. All other groups of scops-owls (for which skeletons were available) differ in several osteological characters from *thilohoffmanni*, *rufescens* and *spilocephalus*. Thus the question of the sister taxon to *thilohoffmanni* may not be resolvable until DNA-based phylogenetic analyses can be carried out. We are planning such studies but are greatly hampered in this by the lack of material for most of the related taxa and the scarcity of museum specimens, especially recent ones. We can, however, state with confidence that *O. thilohoffmanni* is one of the more distinctive bird species endemic to Sri Lanka, and that it must have had a fairly long separate evolutionary history on the island.

The juvenile (mesoptile) plumage of *O. thilohoffmanni* remains unknown. That of *O. rufescens* (based on an NNM specimen) is almost uniform rich rufescent brown, with a weakly defined dark facial disk rim, and very vague, almost obsolete dark barring, strongest on the hindcrown and upper mantle. However, the juvenile (mesoptile) plumage of rufous-morph continental races of *spilocephalus* is more heavily but still vaguely barred dark and pale over its generally rufous downy plumage. Thus, the juvenile of *rufescens* resembles the adult of *thilohoffmanni* even more strongly than does the adult (except for the downy texture of its plumage), and the juvenile plumage of *thilohoffmanni* may well be similar to that of one of these species.

Conservation As of January 2004 *c.*45 individuals of *Otus thilohoffmanni* are known from the five sites listed above, each of which is one of Sri Lanka's few large remaining rainforests. Each is a protected area administered as a Forest Reserve (F.R.) or Proposed Reserve (P.R.) by the Forest Department of Sri Lanka. The species apparently requires a large, fairly intact area of rainforest of a certain size and richness, yet to be quantified and accurately described. It has not been found in rainforests smaller than 8.2 km² in extent. A number of such remnant patches are scattered in the wet zone, and several of these were unsuccessfully surveyed by DHW and colleagues. Of the forests where the species is so far known to occur, its strongholds are the Sinharaja and Morapitiya-Runakanda reserves, which are contiguous and may be considered as effectively one tract.

We believe there are more individuals of *O. thilohoffmanni* living in these five forests than the 45 detected so far. However, from the data gathered the species occupies a quite restricted range within Sri Lanka. The total extent of these five forests is *c.*230 km². This can be considered the extent of occurrence of the species as known so far. The initial survey has now investigated *c.*60% of wet-zone forests out of a total area of such forests estimated at *c.*2,200 km² in 1995 (Legg & Jewell 1995). Based on present knowledge we would therefore propose for *O. thilohoffmanni* the IUCN Red List Category 'Endangered' (EN), as it meets criteria B.1.a, B.1.b, B.2.a and B.2.b (and possibly also C.2.a and D) (IUCN 2001).

It has long been believed that the composition of the avifauna of Sri Lanka is well known compared to that of other Asian countries. In 1951 W. W. A. Phillips, one of the foremost authorities on the island's avifauna and a resident of Sri Lanka for three decades, stated that it was 'most improbable that a bird entirely new to science could now exist in Ceylon' (as the country was known then) (Spittel 1951). Indeed, very few bird species new to science have been discovered anywhere in South Asia in the past few decades; the others are the morphologically cryptic Nepal Wren-babbler *Pnoepyga immaculata*, which had previously been collected but not recognised as distinct until its vocalisations were studied (Martens & Eck 1991); the enigmatic Sillem's Mountain-finch *Leucosticte sillemi*, still known only from two specimens collected in 1929 and not recognised as distinct for many years (Roselaar 1992); and the Nicobar Scops-owl *Otus alius*, which was first collected in 1966 but misidentified as *O. sunia*, then attributed to (but not formally described as) a race of the widespread *O. magicus*, until it was recognised and described as a full species (Rasmussen 1998). Thus, *Otus thilohoffmanni* is unique among the birds of South Asia in having been totally overlooked by collectors and other field naturalists alike until its discovery by DHW on the basis of its unfamiliar vocalisations.

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APPENDIX

Methods developed during this study for mist-netting and viewing small owls.

Movable mist-net method. On 4 August 2001 DHW, Kithsiri Gunawardena and Chandima Kahandawala attempted to capture an individual of *O. thilohoffmanni* at Morapitiya-Runakanda P.R using mist-nets in the standard manner. Several nets were drawn across posts struck in the ground. They were laid to intercept the bird when flying in different directions within a part of its territory. Each set of nets (across each pair of posts) covered a height of *c.*1.5–8 m. The owl was coaxed into these by playback of the species' vocalisation. In several attempts the bird was seen first on one side of a net and soon after on the other, somehow evading it.

It was then suggested by Chandima Kahandawala that mist-nets to cover the same height range be set up across two posts not embedded in the ground but each steadied by one person, and the system moved towards the owl sideways along a path while listening to it in the dark (when the bird responded to playback). This method soon proved successful.

It was difficult to move the heavy posts used on that occasion and maintain tautness in the nets to prevent their loops around the poles from slipping, while staying silent in darkness. A pair of stiff and strong but light posts in several sections that can be assembled quickly was designed and constructed by Niran Caldera. The height of the nets can be varied before or after the system is set up. The loops engage small projections on the posts. Whilst they do not slide down when the posts are slightly slackened on the move, a net can be lowered quickly by prising the loops off with a light, suitably shaped rod. This system was used on 9 November 2002 at Morapitiya-Runakanda P.R. in taking the type specimen and brought success easily. We believe this method will be useful for researchers attempting to capture small owls and other related nightbirds in the dark.

Rim method of lighting. Artificial light is essential for nocturnal observations in studying the behaviour of *O. thilohoffmanni*. In the initial stages of the project it appeared that the bird was discomfited when the brighter centre of the beam of light was directed toward its face for more than several seconds. To avoid this problem, DHW and colleagues began to aim the beam slightly away so that a less bright outer circle of light fell on the bird for prolonged viewing. They observed that the bird then exhibited no discomfort. This was indicated by it reverting to its normal behaviour in chasing after and feeding on insects, flying about normally and perching in its 'relaxed pose' after feeding well. The same response was seen in other nocturnal birds observed in forests during the project. We found that the use of artificial light in this manner does not greatly disturb the normal nocturnal activities of nightbirds.

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