SUBSPECIATION IN THE RUFOUS OWL *NINOX RUFA* (GOULD)

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SUMMARY

Mason, I. J., and R. Schodde. 1980. Subspeciation in the Rufous Owl *Ninox rufa* (Gould). Emu 80: 141-144. Geographical variation in size and in colours of plumage is analysed in *Ninox rufa*. Australian populations are re-grouped in three subspecies, one pale and large in north-western Australia (nominate *rufa*), one pale and small on Cape York Peninsula (to which the new name *meesi* is given) and one dark and of medium size in north-eastern Queensland south of Cape York Peninsula (*queenslandica* Mathews). All subspecies are re-described.

INTRODUCTION

The Rufous Owl *Ninox rufa* is restricted to pockets, galleries and edges of rainforest throughout its range across northern Australia and lowland New Guinea. Thus, its distribution in Australia is fragmented and the isolated populations have diverged subspecifically.

The species was last revised in 1964 by Mees who recognized three subspecies in Australia: nominate *rufa* in north-western Australia, *queenslandica* Mathews from the central eastern coast of Queensland between Mackay and Rockhampton and *marginata* Mees, which was described as new from north-western coastal Queensland between Cape York Peninsula and Cardwell. This division of populations in coastal north-eastern Australia is at variance with the combined taxonomic assessments of Hartert (1905), Mathews (1915-16) and Campbell and Barnard (1917). Campbell and Barnard aligned material from Cardwell with dark *humeralis* Bonaparte of New Guinea and Hartert pointedly recorded that specimens from Cape York Peninsula were paler than those from New Guinea, yet not as large as nominate *rufa* from Arnhem Land.

Robinson and Laverock (1900) also reported a dark specimen collected by E. Olive purportedly at Cooktown but its label was lost and there is evidence (see under *Ninox rufa meesi* below) that the localities on Olive's specimens are untrustworthy.

MATERIALS AND METHODS

We examined thirty-two specimens from all Australian museums, close to the number studied by Mees (1964) in his revision of this species, but including material in the Queensland and South Australian Museums from critical areas in north-eastern Australia that he did not see.

To define geographical variation in colour more precisely, we found it necessary to assess and measure the width of the bars in the plumage. Mathews (1915-16) first observed that geographical variation in colour results as much from the breadths of dark and light barring on the plumage as from intensity of pigmentation. The breadth of dark rufous-brown bars and creamy-white bars vary inversely with respect to each other, particularly on the remiges and rectrices: in dark populations, the dark bars are broader and the light bars narrower than in light populations and vice versa. These differences are compared quantitatively in the descriptions of subspecies. Depth of colour, reflecting differences in the concentrations of melanins, varies concomitantly.

In the descriptions, measurements of bars on remiges and rectrices are the breadths of the penultimate dark bar in both sexes; primary means the second outermost primary, secondary means the longest secondary and rectrix means the second outermost rectrix on either side. These particular bars were measured to avoid the vagaries of wear that may affect terminal bars on outermost remiges and rectrices. All measurements are in millimetres; those in parentheses are means.

ASSESSMENT

There is little difference between sexes and age classes. Immatures are rather more reddish in tone, particularly on the secondary coverts and slightly paler because the pale bars are slightly broader. Females average slightly darker and greyer brown than males both dorsally and ventrally (partly because the dark bars average broader) and, as pointed out by Mees (1964), they are smaller.

We conclude that there are five subspecies: nominate *rufa*, pale and very large, in Arnhem Land and the Kimberley Division; *queenslandica*, dark and moderately large, in north-eastern Queensland south of Cape York Peninsula; *meesi*, pale and moderately small, restricted to Cape York Peninsula; *humeralis*, dark and moderately small, throughout lowland New Guinea; *aruensis*, apparently dark and very small, on the Aru Islands.

Geographical distribution of colour shows the usual ecotypic response to humidity: populations in very wet rainforests of New Guinea and the Cairns-Mackay region are dark whereas those in more monsoonal habitats on Cape York Peninsula, in Arnhem Land and in the Kimberley Division are light. Size may therefore provide a more reliable clue to the affinities of the

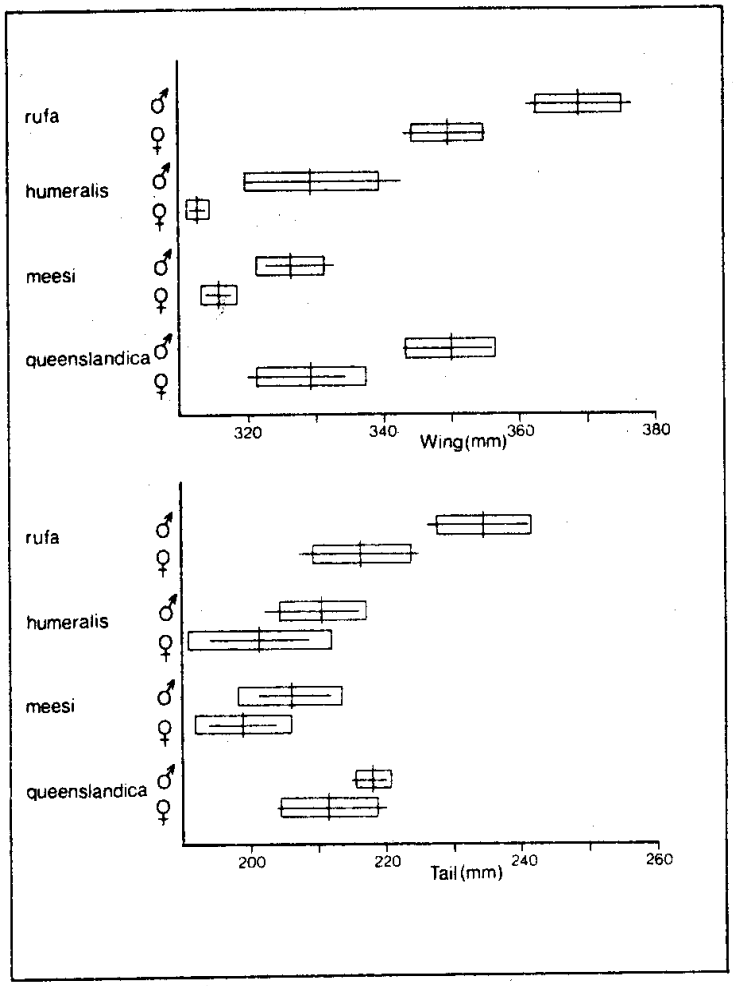

Figure 1. Measurements of Australian and New Guinean Rufous Owls. Wing was measured flattened and the tail from the base of the central rectrices. Horizontal lines are ranges; vertical lines, means; and blocks, standard deviations.

population on Cape York Peninsula, aligning it with forms in New Guinea and north-eastern Australia. In the east, the southern-most populations (Cairns–Mackay region) are largest (Bergmann's Rule) but not clinally so, those on Cape York Peninsula being discontinuously smaller and insignificantly different from those in New Guinea in size (Fig. 1). Rand's (1942) observation that some birds from the Trans-Fly of southern New Guinea opposite Cape York Peninsula are pale ventrally points to recent genetic connexion between the last two populations and raises the possibility that the characters of the population on Cape York Peninsula could also result from past intergradation, now stabilized, between the large light form of north-western Australia and the small dark forms of New Guinea and north-eastern Queensland or in New Guinea in particular. In addition to their small size, the pale birds on Cape York Peninsula approach those in New Guinea and north-eastern Queensland in lacking a rufous wash through the ventral barring and in having barring that is more clear-cut and slightly broader on the dorsum than in north-western Australian populations. Regrettably, these external characters alone are insufficient to demonstrate a hybrid

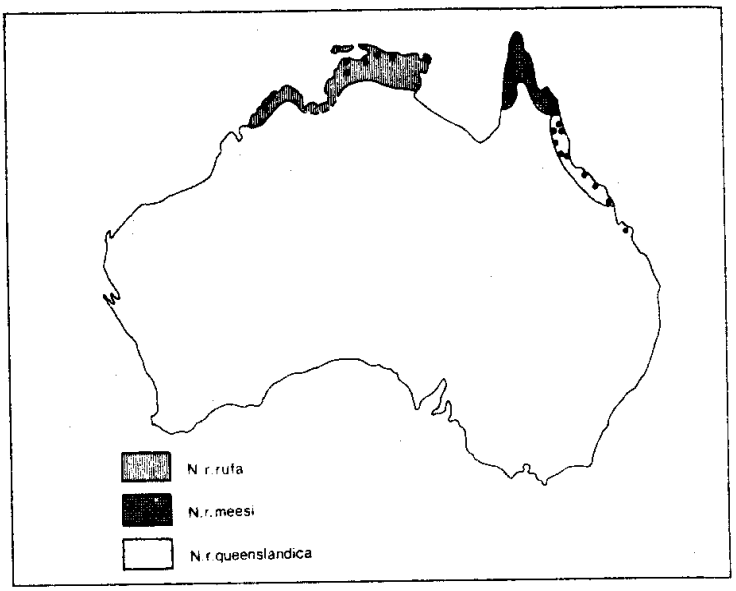

Figure 2. Distribution of subspecies of *Ninox rufa* in Australia. Dots indicate sight records and collected specimens.

origin for the population of Cape York Peninsula unequivocally.

CONCLUSION

We recognize five subspecies as follows:

Ninox rufa rufa (Gould)

Athene rufa Gould, May 1846, Proc. zool. Soc. Lond. 1846 : 18 (Port Essington, Northern Territory).

Characters. Dorsum, mid-brown with moderately wide mid-brown bars and narrower, indistinct cream bars; ear-coverts mid- to dark grey-brown; ventral surface with rather indistinctly margined rufous-brown bars alternating with broader white bars washed pale rufous, specially on the breast; under wing-coverts barred mid red-brown to rufous. Dark bars of wing and tail very narrow in both sexes: bar of primary 9–14 (11), of secondary 9–13 (11), of rectrix 6–10 (8). Size very large: wing ♂♂ 361–377 (369), ♀♀ 343–355 (350); tail ♂♂ 226–241 (235), ♀♀ 207–225 (217); culmen from cere ♂♂ 31.0–32.4 (31.7), ♀♀ 29.9–32.8 (31.4).

Series Studied. 6 ♂♂, 5 ♀♀.

Distribution. Coastal western and northern Kimberley Division to coastal and subcoastal Arnhem Land, perhaps south-east to Roper River, in pockets of rainforest, galleries of paperbark (*Melaleuca*) forest and occasionally mangroves (Fig. 2).

Ninox rufa meesi, new subspecies

Holotype. B20480, South Australian Museum. Adult female: Watson River, Cape York Peninsula, 31 July 1914, coll. W. R. McLennan. Wing 318, tail 194, culmen from cere 26.5.

Characters. Like *N. r. rufa* in colour but differs in smaller size and broader dark bars on wing and tail. Dorsum, mid-brown with moderately wide mid-brown bars and finer cream-white bars more distinctly margin-

ed than in *N. r. rufa* (approaching those of *N. r. humeralis*); ear-coverts mid- to dark grey-brown; ventral surface, pale as in *N. r. rufa* but rufous-brown bars less rufous and more clear-cut from white bars, which are narrower and without any rufous wash; under wing-coverts, barred deeper red-brown than in *N. r. rufa*. Dark bars of wing and tail rather narrow in both sexes: bar of primary 14–18 (16), of secondary 11–15 (13), of rectrix 11–13 (12). Size small: wing ♂♂ 323–330 (327), ♀♀ 314–318 (316); tail ♂♂ 201–212 (206); ♀♀ 194–204 (199); culmen from cere ♂♂ 24.8–26.3 (25.6), ♀♀ 26.1–26.5 (26.3). Note: These measurements agree with those given by Mees (1964) for other specimens from Cape York Peninsula (from Cooktown north) in the American Museum of Natural History, New York.

Series Studied. 2 ♂♂, 2 ♀♀.

Distribution. Coastal and subcoastal Cape York Peninsula, probably as far south as the Staaten and Gilbert Rivers in the west and about Cooktown–Endeavour River in the east, in gallery and alluvial rainforests and dense paperbark (*Melaleuca*) forests (Fig. 2).

Taxonomic notes. We name this new subspecies after Dr G. F. Mees, Rijksmuseum, Leiden, in recognition of his important revisionary studies in Australian Strigiformes.

We also exclude the specimen purportedly from Cooktown that North had provisionally named *Ninox olivii* (see Mees 1964: 9) because we doubt its provenance. Sexed as a female, it is pale but very large in size (wing 345 mm according to us, 352 mm according to Mees). If it did actually come from Cooktown, as labelled, then it can be interpreted as a mis-sexed male hybrid between the subspecies *meesi* and *queenslandica* (diagnosed below), having the pallid tones of *meesi* and large size of *queenslandica*.

It is, nevertheless, indistinguishable from females of nominate *rufa* from Arnhem Land. This raises the possibility of mislabelling or false assumption of the provenance because E. Olive, who sent the specimen to North, perhaps from Cooktown in August 1901, could easily have taken it beforehand when collecting at Katherine in Arnhem Land in 1898–99 (Le Souëf 1899) or even had it sent to him later by a colleague.

Ninox rufa queenslandica Mathews

Ninox rufa queenslandica Mathews, 1911, Bull. Br. Orn. Club 27: 62 (The Hollows, Mackay, north-eastern Queensland).

Ninox rufa marginata Mees, 1964, Zool. Verh., Leiden 65: 8 (Cardwell, north-eastern Queensland)—new synonym.

Characters. Differs from *N.r. meesi* in its larger size and darker tone of plumage with broader dark bars on wing and tail. Dorsum, dark cold brown with much broader dark bars than *N.r. meesi* and fine indistinct cream bars similar in tone to those of *N. r. rufa*; ear-coverts, blackish; ventral surface with rich deep rufous-brown bars edged brown and alternating with narrower white bars; under wing-coverts barred dark umber. Dark bars of wing and tail broad in both sexes: bar of primary 18–21 (20), of secondary 14–18 (15), of rectrix 12–15 (14). Size large: wing ♂♂ 343–356 (350), ♀♀ 320–334 (329); tail ♂♂ 215–220 (218), ♀♀ 204–220 (212); culmen from cere ♂♂ 28.6–30.5 (29.0), ♀♀ 27.5–29.8 (28.8)

Series Studied. 3 ♂♂, 5 ♀♀.

Distribution. Coastal north-eastern Queensland and adjacent tableland, from Battle Camp Range—Endeavour River in the north to about Mackay and the Connors Range in the south, in tropical and subtropical rainforest. Records supplied to the RAOU Field Atlas Scheme indicate that *queenslandica* is fairly continuous between these limits (*pace* Mees 1964).

A barrier of dry eucalypt forest and woodland extends south from Mackay along the coast and adjacent ranges to the Dawson River and Rockhampton. These forests also mark the northern limits of the Powerful Owl *Ninox strenua*, which is the vicariant of *Ninox rufa* and replaces it ecologically in the wet sclerophyll forests of south-eastern Australia. Thus unsuitable habitat and the presence of a territorial competitor lead us to query the occurrence of the Rufous Owl south of Mackay, at Waterpark Creek, Rockhampton, where Wolstenholme (1925) is reported to have seen it. In those days, confusion between Rufous and Powerful Owls was frequent, as Mees has already pointed out (1964: 11) (Fig. 2).

Taxonomic notes. The type of *marginata* Mees is of the large dark form to which, according to its illustration and description (Mathews 1915–16), the type of *queenslandica* Mathews belongs. Mathews's and Mees's (1964) measurements of the wing of the type of *queenslandica*, which is quoted as a male by Mathews and Mees, are 347 mm and 348 mm respectively and are comparable with those of males that we have seen from the Cairns–Cardwell area farther north.

Ninox rufa humeralis (Bonaparte)

Athene humeralis Bonaparte, 1850, Consp. Gen. Av. 1: 48 (Oceania = Triton Bay, New Guinea–see Mees 1964).

Characters. Differs from *N. r. queenslandica* in its smaller size and slightly darker tone and broader dark bars at least on tail. Dorsum, cold dark brown with broad dusty-brown dark bars alternating with distinct but fine whitish bars; ear-coverts, blackish; ventral surface with broad rich chocolate-brown bars alternating with narrower white bars as in *N. r. queenslandica*; under wing-coverts barred dark umber. Dark bars of wing and tail very broad in both sexes: bar of primary 18–21 (20), of secondary 13–18 (16), of rectrix 14–17 (16). Size small: wing ♂♂ 320–343 (330), ♀♀ 312–314 (313); tail ♂♂ 202–218 (211), ♀♀ 194–209 (202); culmen from cere ♂♂ 24.9–28.4 (27.3), ♀♀ 25.6–29.5 (27.6).

Series Studied. 1 ♂, 1 ♀, 6 unsexed but five probably

male and one probably female and assumed so in measurements.

Distribution. New Guinea and Waigeu Island, in lowland and hill rainforest, rarely above 1,200 metres (cf. Mayr 1941).

Ninox rufa aruensis (Schlegel)

Noctua aruensis Schlegel, 1866, Nederl. Tijdsch. Dierk. 3: 329 (Wokam, Aru Islands).

Characters. Not having seen material of this form, we draw attention to Mees's (1964) comment that it is a very small subspecies (♀ with wing of 260 mm) and, by inference, dark.

Distribution. Aru Islands, probably in gallery rainforests.

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REFERENCES

CAMPBELL, A. J., and H. G. BARNARD. 1917. Birds of the Rockingham Bay District, North Queensland. Emu 17: 2-38

HARTERT, E. 1905. List of birds collected in north-western Australia and Arnhem Land by Mr J. T. Tunney. Novit. zool. 12: 194-242.

LE SOUËF, D. 1899. Ornithological notes from the Northern Territory. A list of the birds, with the nest and eggs, obtained by Mr E. Olive on the Katherine River. Victorian Nat. 16: 61-72.

MATHEWS, G. M. 1915-16. The Birds of Australia, 5. London: Witherby.

MAYR, E. 1941. List of New Guinea Birds. New York: Am. Mus. nat. Hist.

MEES. G. F. 1964. A revision of the Australian owls (Strigidae and Tytonidae). Zool. Verh., Leiden 65: 1-62.

RAND, A. L. 1942. Results of the Archbold Expeditions 42. Birds of the 1936-1937 New Guinea Expedition. Bull. Am. Mus. nat. Hist. 79: 289-336.

ROBINSON, H. C., and W. S. LAVEROCK. 1900. The birds of North Queensland, 1. On two collections from Cooktown and the neighbourhood of Cairns. Ibis (7) 6: 617-653.

WOLSTENHOLME, H. 1925. Notes on the birds observed during the Queensland congress and campout, 1924, II. Emu 24: 243-251.