

The taxonomic and conservation status of *Pinarolestes sanghirensis* Oustalet 1881

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This paper describes the rediscovery of *Pinarolestes sanghirensis* Oustalet 1881 on Sangihe Island, off north Sulawesi, Indonesia. Its identity as an endemic species, the Sangihe Shrike-thrush *Colluricincla sanghirensis*, is established on the basis of voice, behaviour, tarsus length and plumage, and its conservation status is discussed. The species appears to be restricted to one small area of forest above 600 m on Sangihe, and is judged to be Critically Endangered. Recommendations are made regarding its conservation through establishment of a protected area on the island.

INTRODUCTION

In 1881, Emile Oustalet described *Pinarolestes sanghirensis* from 'Petta, Île Sanghir'. The description of this new taxon was based on two specimens purchased in 1878 for the Muséum National d'Histoire Naturelle, Paris (MNHN), from the dealer Léon Laglaize, with 26 other specimens of birds. Twelve of these were labelled as originating in Sangihe, the others from various other localities (C. Jouanin, *in litt.* to G. F. Mees, 8 July 1969).

The Sangihe Islands (= Sangi, Sangir, Sanghir, Kepulauan Sangihe) are located between the northern peninsula of Sulawesi and Mindanao (Philippines) (Figure 1); they belong to Indonesia. The main islands are — from south to north — Biaro, Tahulandang, Siao and Sangihe. They form a chain of entirely volcanic

islands of a recent date, the Sangihe Volcanic Arc. The highest volcanoes are Gunung (Mount) Api on Siao (1,827 m) and Gunung Awu in northern Sangihe (1,320 m). Although Mayr (1967: 37) quotes the type locality of *Pinarolestes sanghirensis* as 'Petta Island, Sangi Island', Petta (Peta, Pejta) is in fact a village on the north-eastern coast of Sangihe, due east of Mt Awu (co-ordinates: 3°41'N 125°31'E, see also Salvadori 1876: 51, footnote; Meyer 1884: 5).

Due to the proximity of the Sangihe Islands to the comparatively well explored Minahasa district in the province of Sulawesi Utara (North Sulawesi, Noord-Celebes), quite a few naturalists have visited these islands and made ornithological collections, including D. S. Hoedt, C. B. H. von Rosenberg and L. D. W. A. Renesse Van Duivenbode, who collected for the Rijksmuseum

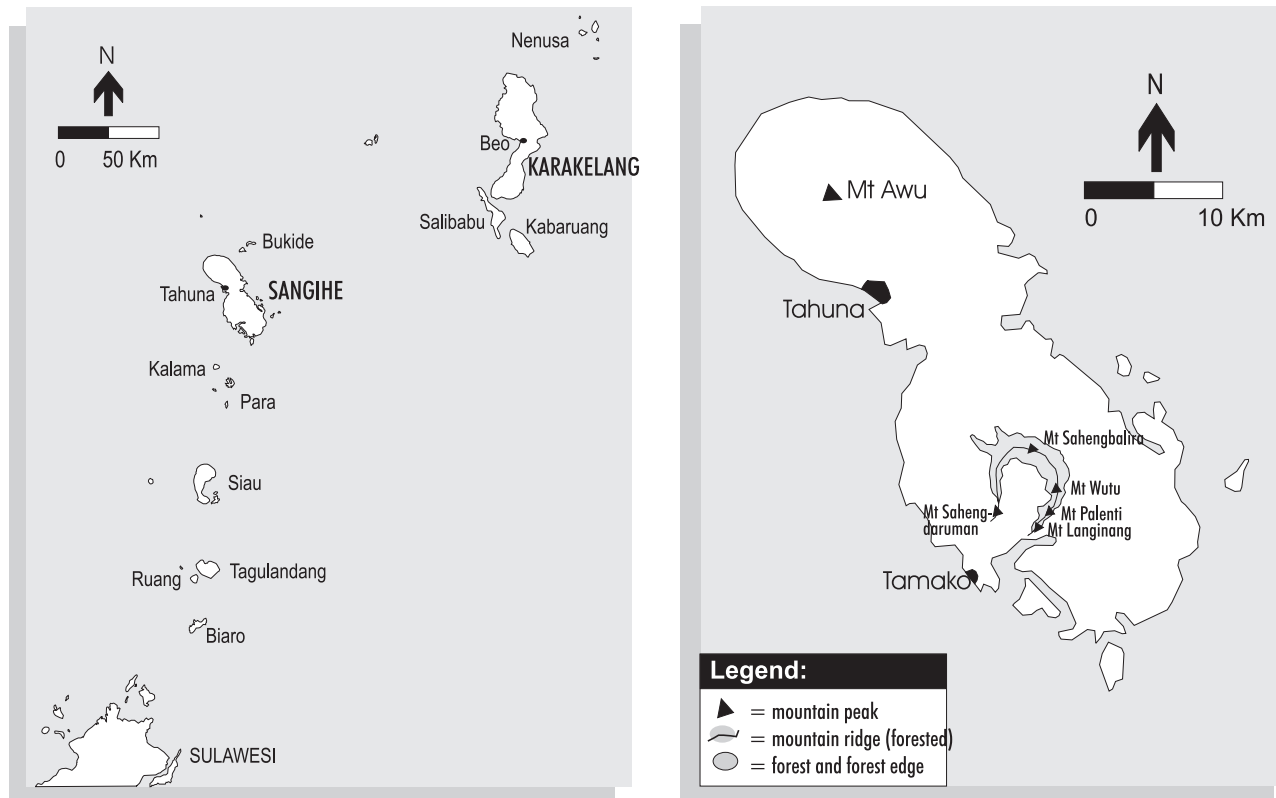


Figure 1. Location of Sangihe Island and places mentioned in the text.

van Natuurlijke Historie and contributed substantially to the knowledge of the avifauna of the Sangihe Islands (Salvadori 1876, Rozendaal in prep.). For the history of ornithological collecting in the Sangihe Islands, see Blasius (1888), Meyer and Wigglesworth (1898-1899), Junge (1954) and White and Bruce (1986).

The Sangihe Islands show a relatively high degree of endemism, both at the species and subspecies level. Perhaps most notable among these is the enigmatic Cerulean Paradise Flycatcher *Eutrichomyias rowleyi* Meyer 1878, which until recently was known from only one female specimen and one published sight record (White and Bruce 1986, Collar *et al.* 1994). It is surprising that none of the collectors found any trace of *P. sanghirensis* since it was first described. However, it is unclear how far they, or their 'native collectors', penetrated into primary forest, especially that on the slopes of the volcanoes. Noteworthy in this respect is the fact that only very few specimens of some other taxa from Sangihe are preserved in museum collections, such as the Golden Bulbul *Alophoixus affinis platenae*: FGR and FRL found this species only in primary forest on the slopes of Mt Sahendaruman and Mt Sahengbalira between c. 700 m and 800 m.

OUSTALET'S DESCRIPTION OF *PINAROLESTES SANGHIRENSIS*

Oustalet observed that the specimens belonged with either the genus *Pinarolestes* Sharpe 1877 or *Colluricincla* (misspelt by Oustalet as *Colluriocincla*, cf. Salvadori 1875, 1881). The genus *Pinarolestes* was created by Sharpe (1877) for the taxon *Myiolestes vitiensis* Hartlaub 1866 from Fiji. This bird, the Fiji Shrikebill, is currently placed in the genus *Clytorhynchus* Elliot 1870 (Corvidae: Monarchini – Sibley and Monroe 1990; or Monarchidae – Mayr 1986, Pratt *et al.* 1987). The type species of *Colluricincla* Vigors and Horsfield 1827 is the Grey Shrike-thrush *C. harmonica* (Latham 1801) of New Guinea and Australia.

Oustalet observed that his specimens differed from the 'commonest species of New Guinea, *Pinarolestes megarhynchus*' (Quoy and Gaimard 1830) by 'their colour and shape of their bill and their body dimensions' (Oustalet 1881), our translation. In fact, Oustalet stated that 'in certain respects, these two birds compared well with another form of the same genus, discovered at Kordo (Misorì [= Biak]), and described "primitivement" by M[onsieur]. Meyer under the name *Myiolestes melanorhynchus*' [= *C. megarhyncha melanorhyncha* (Meyer 1874)]. 'In the birds from Sanghir, a male and a female, the plumage colours are similar to those of the male from Kordo described by Meyer, the upperparts are olive-brown, the wing coverts and the lower back a reddish brown, the tail feathers a rather dark brown above, a lighter brown on the underside, the wing feathers brown with a rufous margin on the outer webs, the underparts with a brownish tinge, grading into a greenish yellow on the flanks, roughly similar as in *P. melanorhynchus*, but the bill is not uniformly black like the specimen from Misorì, but pale brown at the base of the mandible, the feet are not pale brown, but a blackish brown, at least in these dried-out specimens; the specimens do not have the green reflections of the

nape more pronounced than on the remainder of the upperparts, nor yellowish streaks on the forehead, the outer margins of primaries and secondaries are more of a reddish ochre tinge than yellowish red, and the inner margins are tinged reddish white, the under-tail coverts have a pronounced saffron tint, and the dimensions do not agree with those indicated by A. B. Meyer' (Meyer 1874). Oustalet quoted wing lengths of 100 and 98, tail lengths of 82 and 82, and length of the exposed culmen of 19 and 18 mm for the male and female specimens, respectively.

A ZOOGEOGRAPHIC ANOMALY

The Little Shrike-thrush *Colluricincla megarhyncha* (Quoy and Gaimard 1830), the taxon that *P. sanghirensis* has usually been associated with, is distributed throughout New Guinea and its satellite islands and also occurs in coastal northern and eastern Australia (Mayr 1967, Ford 1979). The species shows very complex geographical variation, which has resulted from ecotypy, allopatric subspeciation and introgressive hybridization (Ford 1979).

Meyer and Wigglesworth (1898: 120, 402) listed *P. sanghirensis* as *Colluricincla sangirensis* [sic] for Great Sangihe. Mathews (1930), who was notorious for introducing a multitude of generic names, including the creation of the genus *Caleyia* (Mathews 1913), listed the taxon as *Caleyia megarhyncha sanghirensis*. Stresemann (1939: 350) mentioned *P. sangirensis* [sic] as an old endemic of Papuan origin. Mayr (1967) and Rand and Gilliard (1967: 432) listed it as a subspecies of *Colluricincla megarhyncha*.

However, subsequent authors expressed serious doubts about the occurrence of a shrike-thrush on Sangihe, considering it to be a zoogeographic anomaly of some magnitude, since no shrike-thrushes are known to occur on any of the North Moluccan islands, and because no further specimens had been obtained. Ford (1979: 207), in a review of the Little Shrike-thrush *C. megarhyncha*, doubted the provenance of *P. sanghirensis*, and hence its validity. White (in White and Bruce 1986: 57, 383) included the taxon as *Colluricincla megarhyncha*, and alluded to the possibility that it could be a form of *Pachycephala*. However, Bruce (in White and Bruce 1986: 383) preferred to list the taxon in brackets for Wallacea; Andrew (1992: 37, 61) also excluded Sangihe from the distribution of *C. megarhyncha*.

Much of the discussion about the identity of *Pinarolestes sanghirensis* has focused on the provenance of Laglaize's specimens. G. F. Mees found a specimen in the collections of RMNH labelled as '*Tyto novaehollandiae*, Papou, Laglaize', which he identified as *Tyto rosenbergii* (Schlegel 1866), a bird 'known only from Celebes'. Apparently, Mees considered this — besides the fact that Laglaize was a trader in natural history specimens rather than a collector — as proof of incorrect labelling, and considered it more likely that the specimens of *P. sanghirensis* actually originated in New Guinea (Mees, *in litt.* to C. Jouanin, 19 June 1969). Admittedly, Laglaize's collections reveal several cases of mislabelling, and the doubts expressed by Mees seemed valid. Incidentally, although the skin was obviously misidentified and mislabelled, it should be

noted that the Sulawesi Owl also occurs on Sangihe, as shown already by Meyer (1884) and Blasius (1888), and was observed and tape-recorded by FGR on Mt Sahendaruman (at 600 m), and heard by FRL on the mid-slopes of Mt Awu.

Ford (1979: 207) referred to the correspondence between Jouanin and Mees, and added that 'to have colonised Sangihe Island, *megarhyncha* would have had to cross Weber's line without leaving any trace in the Moluccas, a very improbable event'. Previously, Meyer and Wiglesworth (1898: 402) had stated that 'Sangi forms an unexpected addition to its range, though its occurrence there is not more remarkable than its presence in Fiji and Tonga.' However, it should be noted that these remarks refer to *Colluricincla sensu lato*, i.e. including *Pinarolestes* as used for *Myiolestes* (*Clytorhynchus*) *vitiensis*. Stresemann (1939: 350) remarked that *P. sangirensis* [sic] must have reached Sangihe over water from Halmahera, similar to the Red-and-blue Lory *Eos histrio*. But the lory has a living congener in the North Moluccas — Violet-necked Lory *Eos squamata* — whereas *Colluricincla* does not. Hartert (1903: 54), in a footnote, draws attention to a specimen of *C. megarhyncha*, allegedly collected on Bacan, reported (with a query) by Guillemard (1885: 571), and dismissed by Salvadori (1886). The forests at higher altitudes of Bacan and Halmahera have been relatively well explored ornithologically and it seems unlikely that *Colluricincla* has been overlooked in the North Moluccas.

Ford (1979: 207) furthermore stated that 'in the Australo-Papuan region, *megarhyncha* occurs on many offshore islands that were joined to the mainland in times of low sea-level and few (Biak and perhaps one or two eastern islands) that have never been joined, so its ability to cross oceans seems rather poor.' However, an isolated species, the Palau Morningbird *Colluricincla tenebrosa* occurs in Palau (Pratt *et al.* 1980, 1987; see also Diamond 1972: 275). According to Ford (1979: 207), Palau was 'colonised by stock of *C. m. megarhyncha*, which produced the strikingly differentiated allospecies *C. tenebrosa*.' The distance from the Vogelkop and satellite islands of New Guinea to Palau is approximately 900 km, and that from the Vogelkop to Sangihe 700 km. Like Sangihe, the northern islands of the Palau group are of ancient, volcanic origin (Gressitt 1954).

Apart from Jouanin, nobody seems to have seriously looked at the two Paris specimens of *P. sanghirensis*. White (in White and Bruce 1986: 383) obviously quotes (in translation) from the original description and measurements given by Oustalet. Bruce (in White and Bruce 1986: 383) stated that he 'studied the holotype in MNHN and its origin.'

C. Jouanin (*in litt.* to G. F. Mees, 28 July 1969) compared the two specimens in MNHN with the descriptions of *C. megarhyncha* given by Rand and Gilliard (1967), and concluded that they 'evidently do not belong to group I [western New Guinea and satellite islands], because they have the underparts not ochraceous; the colour of underparts agrees best with that of group III [eastern New Guinean islands], but this group has other characters which do not apply to the two specimens. They have no streaking on the throat and the bill is not black, but horn-coloured.'

Ford (1979) summarized the geographic variation of *C. megarhyncha* on New Guinea and its satellite islands

as follows, and distinguished between four groups: (1) a rufous-plumaged or *megarhyncha* group (western New Guinea including Vogelkop and islands); (2) a black-billed, fuscous or *obscura* group (northern New Guinea from Geelvink Bay, east to headwaters of the Sepik river); (3) an olive-brown-backed, buff-bellied or *despecta* group (S, SE and NE New Guinea); and (4) an olive-green-backed or *fortis* group (E Papuan Islands) (compare the illustrations in Beehler *et al.* 1986: plate 42). Ford (1979: 207) apparently concluded from Jouanin's letters to Mees that Laglaize's specimens were closest to the green-backed *fortis* group of the eastern Papuan islands.

THE REDISCOVERY OF *PINAROLESTES SANGHIRENSIS*

Aware of the controversy that had surrounded *P. sanghirensis* for over a century, FGR considered this taxon as a prime target species during a survey of remaining primary forest on Sangihe in 1985. Apart from a single ascent of Mt Awu from Tahuna, no surveys were carried out on the slopes of this volcano by FGR, since views from Angges and Naha revealed the large extent of deforestation on this mountain. Instead, FGR's fieldwork on Sangihe, from 8 May to 7 June 1985, was concentrated on the forested slopes of Mt Sahendaruman, where the remaining primary forest and forest edge were surveyed from two camps, by means of mist-netting and regular observation. Details of the two main observation and collecting sites are as follows (see map, fig A):

- *Site 1*: 3°32'N 125°32'E, forest edge on spur, north-western slope of Mt Sahendaruman, altitude *c.* 600 m (13-20 May);
- *Site 2*: 3°32'N 125°33'E, forest edge on north-eastern slope of Mt Sahendaruman, above Liwung, altitude *c.* 700-750 m (28 May-1 June).

At the first site, FGR tape-recorded the predawn chorus of an unidentified species, but the powerful songster proved elusive. At the second site, the same loud and far-carrying song was again very much in evidence from 05h30 to 06h00 (and during the daytime just before and after rain). A good tape-recording was obtained on 30 May. Initial views were frustratingly brief, when birds were momentarily attracted from their hidden song perch by playback of the recorded song. These fleeting observations did not permit a detailed description beyond 'grey-brown upperparts, and pale underparts, moderately long tail and bill.' A bird subsequently observed for a longer period in the middle storey, again reacting to playback of its recorded song, was the size of a whistler, with a large eye, relatively long bill, mid-brown upperparts, darker tail, slightly rufous on flanks, and its behaviour was rather like that of a whistler. FGR had no field experience with members of the genus *Colluricincla*, but with the illustrations in Peckover and Filewood (1976) in mind, it was strongly suspected that these birds were Oustalet's long-lost *P. sanghirensis*. Finally, after several more birds had been observed in the forest, one was mist-netted in dense rattan undergrowth in the late afternoon of 1 June 1985, settling the identity beyond all doubts and solving one

Table 1. Measurements (mm) of Sangihe Shrike-thrush *Colluricincla sanghirensis* from Sangihe Island. *Measurements of the syntypes of *Pinarolestes sanghirensis* given by Oustalet (1881: 79) and of the specimen collected by Riley (1997) in November 1996 are listed in parentheses. Riley (1997) gives additional measurements.

Specimen	Sex	Wing	Tail	Tail/wing	Tarsus	Bill (to skull)	Exposed culmen
10.069-A5	M	95 (100*)	78 (82)	1.22	21.5	23	19 (19)
10.069A6	F	93.5 (98)	76 (82)	1.23	20	24	20 (18)
RMNH 64668	F	91	79	1.15	21	22.5	18.5
Riley (1997)		(92.5)	(82)		(22)	(23)	

of the greatest ornithological mysteries of Wallacea. Unaware of FGR's discovery, in August 1996 FRL observed the species in forest on Mt Sahengbalira (3°31'N 125°31'E), only a few km from FGR's sightings. Subsequently, sightings were made in 1997 and 1998 on Mt Sahengbalira by Riley (1997), B. King (pers. comm.) and F. Verbelen (pers. comm.).

DESCRIPTION OF *PINAROLESTES SANGHIRENSIS*

Specimens examined: MNHN 10.069-A5/334, 10.069-A6/335, male, female, 1878, 'G. Sanghir', leg. L. Laglaize (numbers 307 and 306 respectively), the two syntypes of *Pinarolestes sanghirensis*; RMNH 64668, female (ovaries not enlarged; skull incompletely ossified), 1 June 1985, Gn. (Mt) Sahendaruman, P. Sangihe, alt. 725 m, collected by F. G. Rozendaal. Oustalet (1881) designated no holotype (*contra* Bruce, in White and Bruce 1986: 383) and both specimens, which have been preserved as relaxed mounts, have syntype status. A specimen collected on 18 November 1996, now in Museum Zoologicum Bogoriense (Bogor, Indonesia) (Riley 1997), was not available for examination.

Description of specimen RMNH 64668

Upperparts: head olive-grey, slightly darker grey-brown than olive-grey mantle, back and rump; lesser wing-coverts, wings and tail brown (flight feathers: outer web brown, inner web very dark brown), ear-coverts dark with pale buffy shaft-streaks; underparts pale grey, slightly tinged with buff, distinctly more buff on belly, lower flanks and undertail-coverts, which are tinged cinnamon-buff; p10-p9 (primaries counted descendantly) in pin, remainder fresh; tail feathers fresh (see Table 1).

Soft parts: Legs grey, soles ochre, iris dark grey, bill: upper dark grey/horn, lower paler (horn), slightly yellowish at gape.

Measurements (mm) and weight: Total length 185, wing 91 (flattened chord), tail 79, tarsus 21, gape 25, thick thrush-like bill, strong feet, bill from skull 22.5, exposed culmen 18.5, weight 36 grams (18h00) (see Table 1).

Stomach contents: Small black and dark brown chitinous insect remains.

In comparison with the two original specimens of *sanghirensis*, collected more than a century ago, the

specimen collected in 1985 has the upperparts slightly more olive in hue, a slightly greyer breast and slightly buffier lower breast and belly; the tails of the syntypes are more rufous; furthermore, the bill of specimen RMNH 64668 is darker (see Plate 1). However, the bill and feet of the two syntypes have been varnished, and Oustalet, in his original description, remarked that the bill was 'not uniformly black like the specimen from Misori, but pale brown at the base of the mandible', i.e. rather similar to that of the newly collected specimen. The specimen collected in November 1996 had dark horn upper mandible with paler cutting edge, and darkest on culmen; a flesh-pale horn lower mandible, paler on cutting edge and underside and more pink towards base (Riley 1997).

The observed difference in plumage coloration between the 1985 and original specimens may be attributable to some degree of foxing as well as age (specimen RMNH 64668 is a subadult female); also, the two Paris specimens may have been exposed to daylight for a considerable length of time. It is worth noting that, in other related taxa, males average larger than females (Baker 1951, Diamond 1972, Ford 1979) suggesting, perhaps, that the Paris specimens may be incorrectly sexed. Riley (1997) provided a full plumage description of the bird his team collected.

Ford (1979: 196) observed — for birds of the *rufigaster* group of Australian *C. megarhyncha* — that 'compared with adults, first-year birds of all populations are invariably more richly rufous below, slightly darker and more olive above, have a stronger rufous-brown tinge on the upper and lower wing-coverts and on the edges of the remiges and have variously sized rufous superciliaries (remnants of the juvenile plumage persisting longest in the postorbital areas).' Ford (1979) also noted that 'One subspecies, *gouldii*, was named on the basis of a first-year plumaged specimen', and that 'adults are apparently more wary than first-year birds', because he found the latter more numerous in museum collections. Baker (1951: 283) noted that immatures of *C. tenebrosa* resembled adults, but had a paler head, neck and ear-coverts, and darker sides of neck, throat and upper breast darker, and paler lower breast and abdomen than adult birds.

COMPARISON WITH *COLLURICINCLA MEGARHYNCHA*

Due to the complexity and variation in plumage of the various subspecies of *C. megarhyncha* it would be rather

meaningless to draw conclusions from differences in plumage between *sanghirensis* and *megarhyncha*. It is worth noting, however, that the most similar subspecies are those in the *fortis* group defined by Ford (1979). These are *C. m. fortis* of the D'Entrecasteaux Archipelago, *C. m. trobriandi* of the Trobriand Islands and *C. m. discolor* of Tagula, Louisiade Archipelago. The *fortis* group therefore occurs just to the east of New Guinea, rather than in the (western) part of the range of *C. megarhyncha* that is nearest to Sangihe.

The wing and tail lengths of *sanghirensis* fall within the range of those published for *C. megarhyncha* (see e.g. Diamond 1972, Ford 1979). The tail/wing ratio of *sanghirensis* (0.81-0.87) falls within the average range of *C. megarhyncha* (0.82-.0.86); the Palau Morningbird *C. tenebrosa* has a tail/wing ratio of 0.73-0.75 (see measurements in Ford 1979). The discrepancy between the ratio of specimen RMNH 64668 of *sanghirensis* and the two Paris specimens can most likely be attributed to the immaturity of the RMNH specimen. Bill lengths of *sanghirensis* also fall within those of *C. megarhyncha*. Despite similarities in bill, wing and tail length, the tarsus of *sanghirensis* is considerably shorter than those of subspecies of *C. megarhyncha*. The three specimens of *sanghirensis* (see Plates 2-4) have tarsus measurements of 20-21.5 mm, compared with a range of 24.5-29 mm for the five Australian subspecies documented by Ford (1979).

BEHAVIOUR

Colluricincla sanghirensis has been encountered singly, but is also, and perhaps more frequently, observed in small groups. FRL observed 3-5 individuals together on 9 August 1996, feeding in the mid- to upper strata of montane forest at 920 m, whilst Riley (1997) reported usually observing flocks of 5-8 birds, but on one occasion, of 'up to 15 individuals'. Birds observed by FRL were not associated with any other birds, and Riley (1997) also noted that the species tends to form single species flocks. The birds observed by FRL gave the appearance of being rather clumsy as they fed among epiphytic fern fronds and other canopy vegetation. After feeding in a rather dispersed manner in the subcanopy, the birds flew off as a group and alighted in similar habitat some 40 m distant. The tail was noted to be rather broad, and is presumably normally held in a rather spread fashion. Birds observed by FRL were clearly foraging for invertebrates within the vegetation. Occasionally, the species also feeds amongst leaf litter on the ground and on the bark of trees (Riley 1997).

Diamond (1972: 285) noted that in New Guinea *C. megarhyncha* is 'inconspicuous and solitary, but nevertheless common and ubiquitous' and added that 'in behavior, posture, appearance and voice *C. megarhyncha* is simply a big and sluggish *Pachycephala*.' On Palau, Pratt *et al.* (1980) observed that 'Morningbirds forage slowly and deliberately in the forest understory ... They are solitary skulkers, apparently taking food from trunks and branches of trees. We have not seen them gleaning leaves.' The behaviour of *C. sanghirensis* is, therefore, apparently quite different to that documented for both of these species.

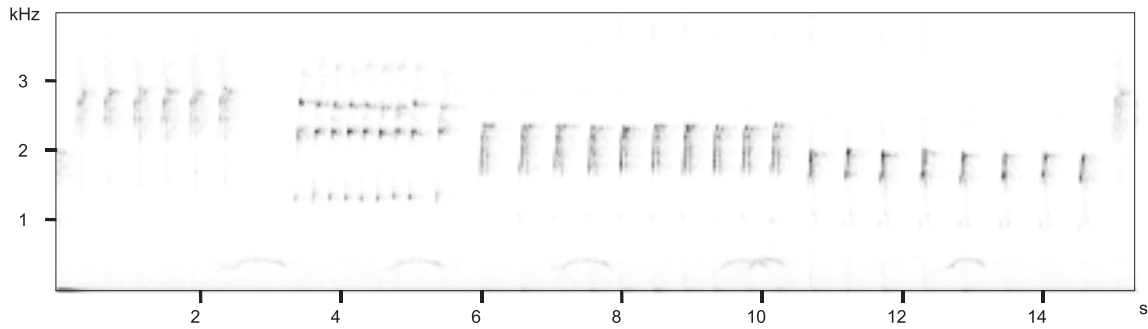
Colluricincla megarhyncha occurs from sea level to high altitudes (Diamond 1972), but *C. sanghirensis* occurs only above c. 600 m, in submontane and montane forest.

VOCALIZATIONS

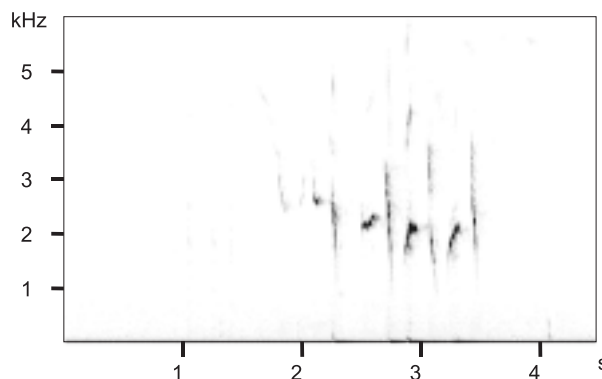
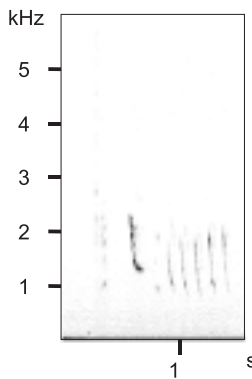
In May 1985, FGR noted that the loud and ringing song of numerous individuals of *C. sanghirensis* formed a predawn chorus at Mt Sahendaruman, which usually started at 05h00, before sunrise, and was most powerful until c. 05h30. After that, the song was given in a 'hesitant', abbreviated form, with longer intervals between phrases, and the phrases comprising fewer notes per unit. The song consists of a repetition of phrases, each lasting c. 10 seconds, and typically comprises four distinct units of rapidly uttered notes with frequencies between 1 and 4.5 kHz, at four distinct pitch levels. Typically, the second unit (of about 8-9 notes) of each phrase comprises notes uttered at a quicker rate than those of the first unit, and at a slightly higher pitch than the first unit. The third unit consists of about 6-10 notes at a lower pitch than the first, and the fourth unit comprises about 3-8 notes at a lower pitch than those of the third unit. A typical song phrase is reproduced as a sonagram (see Figure 2). The chorus of *C. sanghirensis* resembles that of the Bare-throated Whistler *Pachycephala nudigula* of Flores (FGR pers. obs.). The small group of *C. sanghirensis* observed by FRL in August 1996 were quiet for most of the time, but periodically gave a single contact note, and when they flew off, at least one bird uttered a double note reminiscent of some *Pycnonotus* bulbuls.

Riley (1997) reported a number of vocalizations, but not the song. Contact calls included a 'soft and slightly lisping *chweep...chweep...chweep* (extremely similar to contact calls of young chickens)'. These notes were reported to vary in pitch, tone and frequency; sometimes up to three notes per second but at other times only one note every 10 seconds. A variant of this call was described as *trup...twup...twup*, harsher and louder than the *chweep* call and uttered more rapidly. A third variant on this was a thinner note of higher pitch, transcribed as *swip...swip...swip*. Riley (1997) described these three contact calls as being clear but not particularly loud 'like the sound produced when one purses one's lips, a thin "sucking" sound.' A second type of contact call, usually given with one of the variants described above, was a single, quiet, downwardly inflected whistle. A third call, given by perched birds, was a hard thrush-like *churr*, with a rolling quality, and constant in pitch and tone. Finally, a presumed alarm call, given in flight, was a harsh, slightly wheezy *wweeah*. Riley (1997) noted that these contact calls are unlike those given by *C. megarhyncha* (see below).

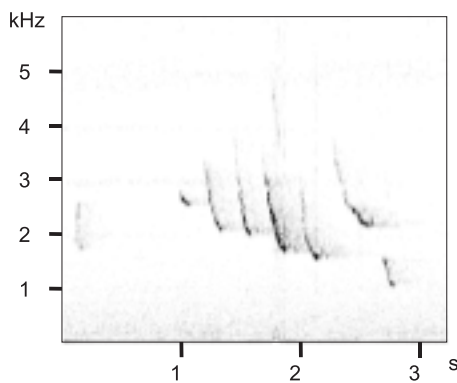
The songs of both *C. megarhyncha* and *C. tenebrosa* differ significantly from that of *C. sanghirensis*. Both have songs which are rather thrush-like, whilst that of *C. sanghirensis* is probably best described as being drongo-like in quality. Whereas *sanghirensis* repeats individual notes, typically from 3-10 times before changing to a new note, its congeners do not generally repeat notes, but string together distinctly different notes (see



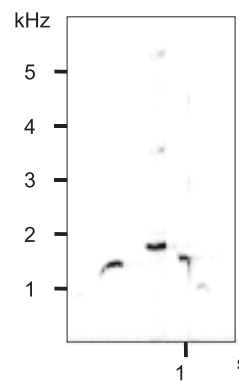
Colluricincla sanghurensis (30 May 1985, Gn. Sahendaruman, P. Sangihe, alt. 725 m/F.G. Rozendaal)



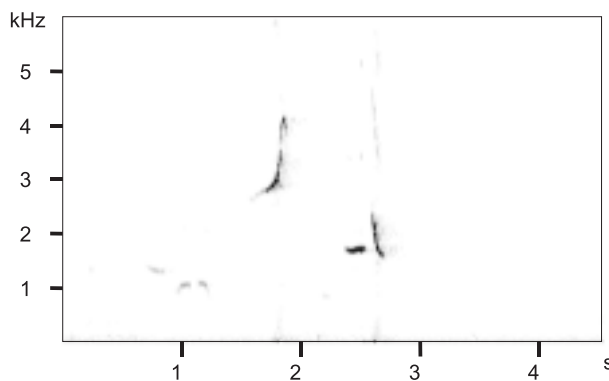
Colluricincla megarhyncha (The British Library National Sound Archive, NSA #38490/J. Roché)



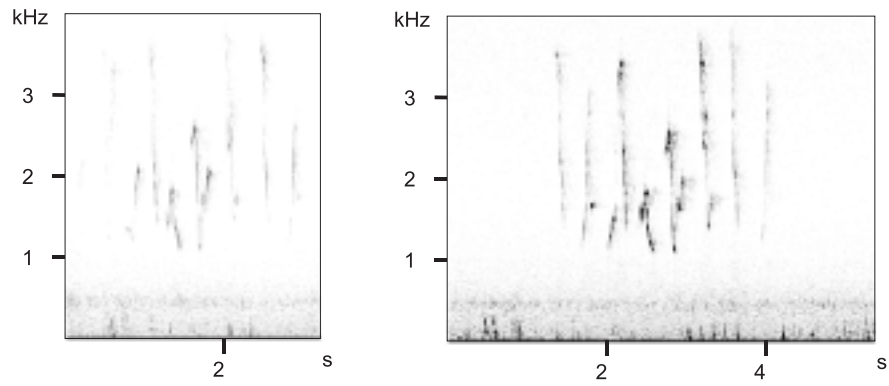
Colluricincla megarhyncha (The British Library National Sound Archive, NSA #43208/Steve Smith)



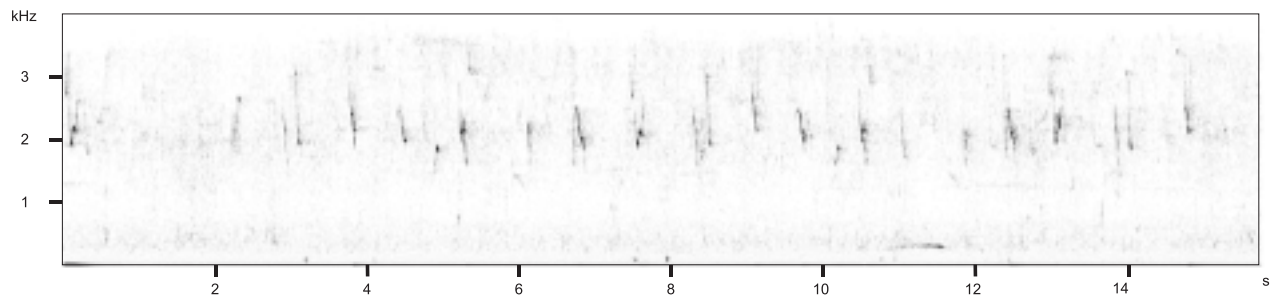
Colluricincla megarhyncha (The British Library National Sound Archive, NSA #38411/J. Roché)



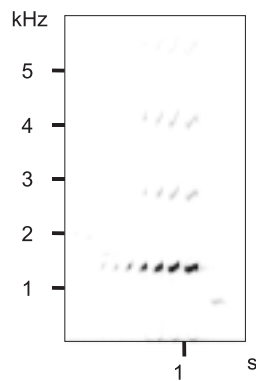
Colluricincla megarhyncha (The British Library National Sound Archive, NSA #38411/J. Roché)



Colluricincla tenebrosa (Cornell, LNS #5610/H.D.Pratt)



Colluricincla tenebrosa (Cornell, LNS #5355/H.D.Pratt)



Colluricincla niger (The British Library National Sound Archive, NSA #46872/D. Gibbs)

Figure 2. Sonagrams of the songs of shrike-thrushes *Colluricincla*.

sonagrams in Figure 2). Beehler *et al.* (1986) described the song of the Little Shrike-thrush *C. megarhyncha* from New Guinea as a series of four or five mellow whistled notes on a moderate pitch: *uwih weeteeyu* or *hoot hoottuWEEtu*. Coates (1990: 222) described the song as 'a melodious, whistled, "thrush-like" tune of three to five or six, sometimes up to a dozen notes. There are many variations, the commonest and simplest being a pattern of three notes, with the second note notably higher than the first and the third slightly lower than the first: *who-WHI-oo* or *who-WIdou*. This pattern may also form the basis for other tunes with additional successively down-the-scale notes being placed either immediately before or immediately after the phrase. Another common simple tune consists of five notes, the first at a higher pitch, the remainder delivered more rapidly, initially down the scale, then up: *phe, u-oo-u-ii*. A song is readily uttered in response to another bird of the same species singing nearby, to a sudden loud report (the crack of a falling limb, gunshot, etc.), or the sudden loud call of another species. The contact call, commonly uttered, is a single loud, throaty *tchuck* or *tuck*, or a higher-pitched sharp nasal *twik* or *chik*. A repeated monotone harsh rasping note is given in alarm.'

Pratt *et al.* (1980, 1987) remarked that the song of *tenebrosa* 'has no striking pattern, but rather is an almost random series of liquid chirps and whistles' and 'a pleasing jumbled warble of liquid chirps and whistles, broken into short segments.' Baker (1951) remarked that the song could be heard infrequently during the day, although the bird would sing when the skies were overcast. Sonagrams of song phrases of *C. tenebrosa* are reproduced in Figure 2.

DISTRIBUTION AND HABITAT

During the fieldwork carried out by FRL in 1996, no attempt was made to study vegetation in a quantified manner. However, during the course of the surveys, counterparts, with training as foresters, identified tree species, whilst villagers provided local names which were later compared with lists used by the Indonesian Department of Forestry in Manado, North Sulawesi. The following description relates to the vegetation observed on the western side of Mount Sahengbalira.

The extreme severity of the slopes in the region where *C. sanghirensis* occurs, and the slippery conditions caused by rain, made it impossible to conduct surveys in the areas away from trails, which mostly followed ridgetops. The vegetation on these ridges was considered to be primary forest, with no signs of any recent felling of trees. Rattan *Calamus* was, however, collected for making baskets and for use in constructing houses. Large trees, reaching up to 1.2 m diameter at breast height, were regularly found along ridgetops between 700-850 m although, above this altitude, trees were generally smaller. The forest along and adjacent to ridgetops was characterized by an abundance of medium-size palms, primarily *Areca* (including what appeared to be *A. vestiaria* and *A. catechu*), and the understorey was rich in rattans and saplings, providing relatively dense cover. Above 800m plants identified as being very large gingers (Zingiberaceae), some reaching 8 m in height, dominated many slopes, perhaps in areas that had

experienced landslides in the past. Bamboo was present in small areas. Tree palms were present throughout the habitat but were nowhere dominant except at the forest edge where past disturbance was apparent. At the highest elevations, palm-like *Pandanus* was very common and dominated some areas.

The following genera were identified (by the forester working with FRL) amongst the taller trees present along the ridges: *Alstonia*, free-standing and large strangling *Ficus*, *Eugenia*, *Albizia*, *Palaquium*, *Canarium*, *Pangium*, *Diospyros*, *Michelia*, *Cananga*, *Erythrina* and *Agathis*. The York University expedition (Anon. 1996) reported that *Tectona* and *Pometia pinnata* were also present in this area. *Pandanus* trees were found throughout the forest, but were commonest above 850 m, in particular on the tops of all peaks. Some of these pandans were very large, reaching 20 m in height. The area is very wet and often covered in cloud: consequently, mosses and other epiphytes were relatively abundant in this forest.

The Sangihe Shrike-thrushes observed by FRL were feeding in the sub-canopy of trees on a boulder-strewn slope where the understorey was dominated by the huge ginger-like plants mentioned above, and in an area with a high density of tall *Pandanus*. Riley (1997) subsequently observed the species in this same area. The canopy at this altitude, at 920-950 m, was rather low, reaching only about 15-20 m. Lower down the mountain, at 750-800 m, *C. sanghirensis* was found in much taller forest, where ridgetop trees reached 30 m, and the understorey and lower levels comprised a great diversity of plants, including many smaller palms.

AFFINITIES OF *PINAROLESTES SANGHIRENSIS* AND THE GENUS *COLLURICINCLA*

Based on structure and plumage characters (including the lack of sexual dichromatism), we conclude that *Pinarolestes sanghirensis* — the Sangihe Shrike-thrush — belongs to the genus *Colluricincla*. Differences between *sanghirensis* and *megarhyncha* — in structure (short tarsus), plumage and bare part colour (plumage unlike that of any of the nearest populations of *C. megarhyncha*; bill pale), behaviour (*sanghirensis* being rather gregarious and feeding in the canopy) and very different voice (see relevant section) — provide sufficient basis to treat *C. sanghirensis* as a full, endemic species.

The specific and generic limits in the drab-coloured 'whistlers' currently included in the genera *Colluricincla*, *Pachycephala* and *Pitohui* have kept the pens, typewriters and word-processors of recognized and unrecognized authorities on Australo-Papuan birds busy ever since Vigers and Horsfield (1827) created the genus *Colluricincla*.

A multitude of generic names is available for taxa currently included in *Colluricincla* and *Pitohui*, and the greatest nomenclatural havoc was created by Mathews, who used no fewer than seven generic names in his notorious *Systema Avium Australasianarum* (Mathews 1930). In addition to using the names *Pitohui* (treated as a synonym of *Rectes* Reichenbach 1850), *Pseudorectes* Sharpe 1877, *Melanorectus* Sharpe 1877 and *Colluricincla*, Mathews used three names he had introduced in 1912-1914: *Bowyeria* Mathews 1912,

Caleyia Mathews 1913 and *Alphacincla* Mathews 1914, while synonymizing his *Conigravea* (Mathews 1913) with *Colluricincla*. In addition, Mathews included the genus *Clytorhynchus* in his family Prionopidae, with the species *pachycephaloides* and *nigrogularis*, and used *Pinarolestes* for the taxa *vitiensis* and *macrorhynchus*, which are currently included in the genus *Clytorhynchus* (with *macrorhynchus* now being considered a synonym of *vitiensis*).

A detailed discussion of the generic limits and affinities of *Colluricincla* is beyond the scope of this paper, and nomenclatural issues discussed here are limited to those that are relevant to the taxonomic status of the taxa *megarhyncha*, *tenebrosa* and *sanghirensis*. With hindsight, it might perhaps be said that amid the nomenclatural confusion, Mathews had at least scored a point by placing all three in his *Caleyia*.

Mayr (1933) created a monotypic genus *Malacolestes* for the Palau Morningbird, described as *Rectes tenebrosus* by Hartlaub and Finsch (1868). Later, Mayr (1944: 5) admitted that the diagnostic characters of *Malacolestes* (more pointed wing with a longer first primary, longer bill and much softer plumage) were insufficient for generic separation from *Myiolestes*. Moreover, he stated that 'not even the genus *Myiolestes* can be maintained as distinct from *Colluricincla*' and proposed to include *megarhyncha* and *tenebrosa* in the genus *Colluricincla*. Earlier, Mayr (1941: 153, footnote) had stated that 'it is doubtful whether this genus [= *Myiolestes*] can be upheld as distinct from *Pachycephala*.' Nevertheless, Mayr (1967) listed *megarhyncha* as *Colluricincla megarhyncha* and *tenebrosa* as *Pitohui tenebrosus*. Deignan (1964) also suggested that *Colluricincla* should be merged with *Pachycephala*, but Ford (1979: 208) prudently pointed out that such an action would create many nomenclatural problems, and to those mentioned by Ford we can add the primary homonymy between Palau Morningbird *Colluricincla tenebrosa* and Sooty Whistler *Pachycephala tenebrosa* from New Guinea.

In addition, Ford remarked that *Colluricincla* differs from *Pachycephala* by: 'tonal quality of song, which seems remarkably constant and distinctive in *Colluricincla*, though the songs of species differ; and perhaps the consistent lack of pronounced sexual dichromatism,

weak in *harmonica* and some forms of *megarhyncha*. *Colluricincla* may tend to have longer and stronger bills, but this may simply be related to size of body as suggested by *P. lanioides* [= White-breasted Whistler], which is a large whistler with a robust bill. If *Colluricincla megarhyncha* is closest to *Pachycephala* as suggested by the similarity between the *fortis* subspecies group and *P. simplex* [= Grey Whistler], then it is [postulated] also closest to the ancestral form of *Colluricincla* unless there has been convergence.'

Discussing the phylogeny and speciation in the genus *Colluricincla*, Ford (1979: 207) agreed with Mayr (1944: 5) and Baker (1951: 284) that *tenebrosa* of Palau had been derived from New Guinean *megarhyncha*, although Baker (1951: 284) remarked that *tenebrosa* and *megarhyncha* might not be sufficiently distinct to warrant treating them as separate species, and Mayr (1967) later placed *tenebrosa* in *Pitohui*. Ford remarked that '*C. tenebrosa*, like most forms of *megarhyncha*, lives near and sometimes on the ground in thick cover and possesses a sweet fine song, its bodily proportions fall in the range of variation in *megarhyncha*.'

For a variety of excellent colour pictures of members of *Colluricincla*, *Pachycephala* and *Pitohui*, see Coates (1990), Peckover and Filewood (1976) and Reader's Digest (1983).

CONSERVATION STATUS OF *COLLURICINCLA SANGHIRENSIS*

The International Council for Bird Preservation (now BirdLife International), in 1987, initiated a Biodiversity Project that sought to locate areas of the world that were particularly important for biodiversity conservation, through mapping the distribution of all restricted-range bird species. Restricted-range species were defined as all species with a global range of less than 50,000 km². By overlaying the ranges of such species using a Geographic Information System (GIS), it was possible to identify centres of endemism for birds, or Endemic Bird Areas (EBAs). Twenty-four such areas were identified in Indonesia, including one centred on the islands of the Sangihe and Talaud archipelagos (the

Table 2. Restricted-range and endemic bird species of Sangihe and their conservation status, based on global threat status assigned to the species by Collar *et al.* (1994).

Species	Status
Endemic to Sangihe, or Sangihe and Talaud*	
*Red-and-blue Lory <i>Eos histrio</i>	Endangered
Sangihe Hanging Parrot <i>Loriculus catamene</i>	Endangered
Sangihe Scops Owl <i>Otus collari</i>	
Cerulean Paradise-flycatcher <i>Eutrichomyias rowleyi</i>	Critically Endangered
Sangihe Shrike-thrush <i>Colluricincla sanghirensis</i>	
Elegant Sunbird <i>Aethopyga duyvenbodei</i>	Endangered
Restricted-range species found on Sangihe	
Blue-tailed Imperial Pigeon <i>Ducula concinna</i>	
Grey Imperial Pigeon <i>Ducula pickeringii</i>	Vulnerable
Sulawesi Dwarf Kingfisher <i>Ceyx fallax</i>	
Lilac-marked Kingfisher <i>Cittura cyanotis</i>	
Pied Cuckooshrike <i>Coracina bicolor</i>	

Sangihe and Talaud EBA: E19 in ICBP 1992, Sujatnika *et al.* 1995; EBA 167 in Stattersfield *et al.* 1998).

Ten restricted-range bird species were known to occur within the Sangihe-Talaud EBA before 1996 (Sujatnika *et al.* 1995, Stattersfield *et al.* 1998), of which five were endemic to it and four have already been classified as globally threatened (Collar *et al.* 1994; Table 2). Subsequently, two additional endemic species of rallid have been discovered in the Talaud archipelago (Lambert 1998a, 1998b). Based on the criteria for identification of EBAs that are outlined by Stattersfield *et al.* (1998), EBA 167 may now need to be split into two, the Sangihe Islands and the Talaud Islands. The recognition of *C. sanghirensis* as another endemic species clearly increases the importance of Sangihe as a centre for avian endemism and increases the need to reconsider boundaries of the EBA.

Using the criteria that form the basis of the IUCN Red List Categories (SSC 1994), *C. sanghirensis* should be considered as Critically Endangered under criterion B, since its extent of occurrence is estimated to be less than 100 km², and within this area it is known from only a single location where there is likely to be a continuing decline in area, extent and quality of habitat. Whilst the primary forest habitat in the vicinity of Mt Sahengbalira appeared (to FRL) to be little disturbed on the ridgetops, there is reported to be limited harvesting of large trees in the area (Wardill *et al.* 1997), and there were clear signs of ongoing small-scale encroachment for agriculture at the forest edges. Over time this may constitute a threat to the integrity of such a small area.

Whilst there is a remote possibility that the species occurs in the forest on the upper slopes of Mt Awu, this does not seem very likely in view of the fact that there are no records from the well-watched lower slopes of the mountain, up to at least 500 m. The patchy, rather open and degraded forest on Mt Awu reaches only about 700 m altitude (the vegetation above this is scrub and grassland, interrupted by many areas of bare lava flows), and at the highest altitudes (above 600 m) is of low stature and dominated by what appears to be almost pure stands of *Pandanus*. These higher areas are on steep terrain and very difficult to penetrate: no ornithologist is known to have explored their avifauna thoroughly.

The occurrence of *C. sanghirensis* elsewhere on the island is even less likely. There are no known forest patches that might support a viable population. If it were able to survive in degraded forest, or was in forest at lower altitudes, one would anticipate that the various collectors, ornithologists and birders who have visited the island would surely have found it already. The origin of the type is certainly very questionable in view of what is now known, and the type locality may not have been Petta: the specimen may have come from the upper slopes of nearby Mt Awu. An alternative explanation is that *C. sanghirensis* is intolerant of any habitat modification so that it is now restricted to the primary forest that remains in the vicinity of Mt Sahengbalira, but that it was formerly more widespread, even occurring at lower altitudes.

Although the islands of the Sangihe and Talaud archipelagos have been identified as important centres for biodiversity conservation by BirdLife's ten-year (1987-1997) review (Stattersfield *et al.* 1998), they are poorly provided for by protected areas. Talaud has two

protected areas and two or three endemic bird species (depending on taxonomic opinion: *Todiramphus enigma* is treated as an endemic species by some authors but as a subspecies of *T. chloris* by others). In contrast, Sangihe, which has more endemic and restricted-range species, has no protected area (although there is a proposed 5,000 ha wildlife sanctuary in the vicinity of Mt Sahendaruman and Mt Sahengbalira) and very little natural forest. Indeed, Sangihe had largely been deforested by 1920 (Whitten *et al.* 1987) and, more than 75 years ago, Heringa (1921) reported that the Sangihe Islands, with the exception of Biaro, ranked at that time among the most densely populated areas of eastern Indonesia and were as a consequence totally deforested. However, his observation that 'the coconut groves are reaching the summits of the volcanoes on Tahulandang and Sangihe' was and is incorrect.

Apart from the patches of disturbed forest on the slopes of Mt Awu, the only uninterrupted pieces of natural forest on Sangihe are found at higher altitudes in the southern half of Sangihe, on the slopes of the peaks that form an ancient caldera. This caldera, 5 km across at its widest point, extends across high ridgetops from Mt Sahendaruman (806 m) to Mt Sahengbalira (1,031 m) and Mt Palenti (827 m) (Figure 1). The forest in this area has the status of Protection Forest (*Hutan Lindung*) with a total area estimated to comprise 400-500 ha (Wardill *et al.* 1997). It is only in this area of forest that *C. sanghirensis* has been found. The forest in this area extends along the ridgetops for 4.5 km, and extends downwards to 700 m on ridgetops and 500 m in some adjacent valleys. The south-facing valleys, particularly those of the catchments of River Kentuhang and River Peliang (Pelelang, Pellang) appeared to contain the most extensive and best forest. In total, based on observations by FRL, there is an estimated 225-340 ha of forest in this catchment area. A hydroelectric dam is planned for the River Kentuhang (although not visited by FRL, local people reported that construction of the dam foundations had already begun in August 1996), and it is already forbidden to fell trees in the forested catchment, according to local villagers.

The intact nature of forest on the ridgetops visited by FRL suggest that here, at least, this rule is largely respected at present, although there were shifting cultivators cutting scrub and trees on some of the steep slopes at the lower forest edges. Wardill *et al.* (1997) point out that there is intense demand for agricultural land, particularly in view of the high population density, which, at 177 people per km², is the highest on any island in the Sangihe and Talaud archipelagos. Nevertheless, the importance of forest to the maintenance of hydrological processes seems to be well understood by people living in the Kentuhang and Peliang valleys. They are very well aware of the scarcity of water in rivers in the northern part of the island, where vegetation on mountain tops has been very seriously degraded.

RECOMMENDATIONS

Lambert (1997) made a number of recommendations relating to the conservation of biodiversity on Sangihe. These included several that have implications for the conservation of *C. sanghirensis*. In particular:

1. Consideration should be given to declaring and gazetting the forests in the vicinity of Mt Sahengbalira as a Wildlife Reserve (*Suaka Margasatwa*), possibly with core areas as Strict Nature Reserves (*Cagar Alam*). The area should extend from the lowest remaining forest in the catchment of the Rivers Kentuhang and Peliang and extend across the central ridge and down the north- and east-facing slopes of the caldera, rather than simply including the forested peaks. Whilst the present status of Protection Forest apparently confers relatively good protection, the status could be legally and relatively easily changed to, for example Production Forest, in which selective logging would be allowed. Once an official protected area, such as a Wildlife Sanctuary, such change in land status would be much more difficult. It is important that the boundaries of any reserve that is declared are identified in collaboration with, and with the consent of, people living in the immediate area.

Creation of a protected area in the vicinity of Mt Sahengbalira would not only protect the Sangihe Shrike-thrush, but also safeguard all of Sangihe's other endemic species, including the Critically Endangered Cerulean Paradise Flycatcher which was found there in October/November 1998 (J. C. Wardill *in litt.* to N. J. Collar). Four restricted-range species (Blue-tailed Imperial Pigeon, Lilac-marked Kingfisher, Sulawesi Dwarf Kingfisher and Pied Cuckooshrike) also occur in the proposed protected area, of which the last two may now be restricted, on Sangihe, to the area (Wardill *et al.* 1997). Of these four restricted-range species, two are of subspecies endemic to Sangihe (Table 2). Furthermore, the apparently very distinct subspecies of Black-crowned White-eye *Zosterops atrifrons nehrkorni* (which should be the subject of taxonomic review) is only known from forest above *c.* 900 m on Mt Sahengbalira. Only a few individuals of this endemic taxon have been observed (Wardill and Hunowu 1998).

2. Lambert (1997) also proposed that an awareness programme should be initiated in the villages in the immediate vicinity of the area proposed as a wildlife sanctuary. Emphasis should be on the importance of the forests in the context of a water catchment area, and good farming practice on the steep lands that have already been cleared. A similar recommendation was made by Wardill *et al.* (1997), who furthermore highlighted the need to involve land-use planners in such an initiative. Important awareness work was carried out in 1997 by the 'Action Sampiri' team who began the implementation of a major awareness programme during 1998 and 1999.
3. In view of the importance of Sangihe as a centre for faunal and floral endemism, the Directorate for Forest Protection and Nature Conservation (PHPA) of the Ministry of Forestry should consider establishing a presence on the island.

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Plate 1. Immature female Sangihe Shrike-thrush *Colluricincla sanghirensis*, 1 June 1985, Gunung (Mount) Sahendaruman, Sangihe, off Sulawesi, Indonesia, alt. 725 m (specimen RMNH 64668). Reproduced from a slide by F. G. Rozendaal.



Plates 2-4. Specimens of Sangihe Shrike-thrush *Colluricincla sanghirensis*. Upper: RMNH 64668, female, 1 June 1985, Mt Sahendaruman, Sangihe, alt. 725 m, collected by F. G. Rozendaal. Middle: MNHN 10.069-A5/334, male, 1878, 'G. Sanghir', leg. L. Laglaize (number 307); Lower: MNHN 10.069-A6/335, female, 1878, 'G. Sanghir', leg. L. Laglaize (number 306); the latter two are the syntypes of *Pinarolestes sanghirensis* Oustalet 1881. (F. G. Rozendaal).

