

NOTES ON THE SIXTH SPECIMEN RECORD OF THE THREE-TOED SWIFTLET *Aerodramus papuensis* IN PAPUA NEW GUINEA

STEVEN G. HAMILTON,¹ JOHN ERICO² and MICHAEL K. TARBURTON³

¹The Nature Conservancy, Papua New Guinea Field Office, P.O. Box 2750, Boroko, NCD, Papua New Guinea

²Papua New Guinea Research and Conservation Foundation, P.O. Box 1261 Goroka, E.H.P. Papua New Guinea

³Biology Department, Pacific Adventist University, PMB Boroko, NCD, Papua New Guinea

Received: 16 May 2000

The Three-toed Swiftlet *Aerodramus papuensis* Rand is a poorly known and enigmatic member of the Family Apodidae. There are four uniformly dark swiftlets in New Guinea and they are impossible to separate in the field. In the hand however, the Three-toed Swiftlet can be readily separated by the number of toes and the absence of a hallux. This paper describes the sixth specimen record of the Three-toed Swiftlet; the collection of four specimens from Losapi Cave (6°38'S, 145°09'E), in Papua New Guinea.

INTRODUCTION

The Three-toed Swiftlet *Aerodramus papuensis* Rand is a poorly known and enigmatic member of the Family Apodidae. It was described from birds collected by A. L. Rand from near sea level at Hollandia (now Jaya Pura) and along the Idenburg River, up to 1 800 metres a.s.l. in the north of Irian Jaya on the island of New Guinea, in March and July 1939 (Rand 1941, 1942). However, the first specimen record was a single specimen, most probably taken between May and June 1891 by A. Giulianetti from Kapa-Kapa 50 kilometres south-east of Port Moresby (Somadikarta 1975). The species was collected for the third time in Papua New Guinea (PNG) in April 1966. Seventeen specimens were taken from Wengomanga, Morobe District and were lodged in the Australian National Wildlife Collection in Canberra. The fourth collection was a single specimen taken at Chuave in the Chimbu District at 1 500 metres a.s.l. in October 1970. It is lodged in the Bernice P. Bishop Museum (BBM 99342, Schodde and Somadikarta, unpubl. manuscript). The fifth collection was of a single specimen taken on 1 April 1993 at Luplupwintem Cave, Western Highlands Province (Rowland 1994). That specimen is held in the Australian Museum. We report here the sixth specimen record for PNG.

METHODS

Study area

Losapi Cave (6°38'S, 145°09'E) is located at about 1 520 metres a.s.l. in the Crater Mountain Wildlife Management area which extends over parts of the Eastern Highlands, Chimbu and Gulf Provinces PNG. The single entrance is approximately 30 metres across and 15 metres high, opening into a larger chamber more than double this size and reaching approximately 60 metres high. The cave extends approximately 600 metres further into the side of a ridge and contains several, 30–40 metre high domed chambers. Following periods of rain a fast flowing stream runs most of its length and passes underground close to the mouth.

The aspect of the cave is such that very little moon light breaks through the rainforest canopy and visibility for the human eye is close to zero. Visibility reduces further as the cave entrance is approached. At night in the cave there is zero visibility to the human eye, and the birds use their echolocatory calls from the beginning of the entrance chamber to their roost sites high in the first chamber, and beyond.

Methods of capture

On 17 November 1996, between 1900–2300 hours, 28 Three-toed Swiftlets were trapped in a mist-net while Hamilton and Erico were mist-netting bats in the cave entrance at Losapi Cave. Four of these were collected and have been examined and measured by Tarburton (Table 1, see Results). The specimens reported here are held as study skins in the PNG National Museum and Art Gallery (numbers PM 26612–26615).

At 2230 h on 18 November, 28 *A. papuensis* were captured as they exited the cave. The two mist nets used covered about 70 per cent of the entrance, so a high percentage of the population was captured. The captured birds were held in cloth bags to prevent the inconvenience of recapture that night whilst netting for bats. No further swiftlet captures were made after this time until dawn when *Collocalia esculenta* were emerging from their roosts in the caves entrance. These birds made a twittering call, different from the clicking and non-echolocatory calls of *A. papuensis*.

The trapped birds were held in cloth bags during the day and their faeces collected and contents examined.

RESULTS

Table 1 presents the measurements taken by Tarburton from the four specimens collected on 17 November 1996.

In this species, the three toes are much more robust than in the Mountain *A. hirundinacea*, Uniform *A. vanikorensis*, White-rumped *A. spodiopygius* and Glossy Swiftlets *Collocalia esculenta*, and along with the tarsus, are noticeably more robust in live birds than their emaciated appearance in all of the skins in the Australian and PNG collections. The tarsus is densely feathered while the crown and back have white concealed barbs and black shafts and tips. The nape feathers are paler than in the Bare-legged Swiftlet *A. nuditarisus*. The throat is a silvery-grey that contrasts with the breast. However, in some individuals the pale throat blends gradually into the darker breast, making it less distinguishable. The abdomen has dark shafts, though sometimes this feature is only evident in feathers closer to the vent. The rump is slightly paler than the back and tail.

Table 2 is a composite display of the published characters that have been claimed as diagnostic (Mayr and Rand 1937; Rand 1941, 1942; Somadikarta 1967; Salomonsen 1983; Chantler and Driesens 1995).

TABLE 1

Measurements of four specimens of the Three-toed Swiftlet *Aerodramus papuensis* collected on 17 November 1996 at Lopasi Cave, Papua New Guinea. All measurements are in millimetres.

Wing length	Outer rectrix	Centre rectrix	Length	Tarsus	Mid toe	Claw	Culmen	Exposed culmen
¹ 133	55	50	125	11	5.8	4.5	5.6	4.2
² 137	54	47	123	12	8.4	5.2	7	5.1
³ 128	47	46	116	13.5	6.8	4.3	6.2	4.4
³ 120	53	45	116	10.5	6.6	4.7	6.4	4.9

¹This bird was moulting its first primary and its upper wing coverts.

²This bird was moulting its first primary.

³No moult.

TABLE 2

Summary of published diagnostic features for the four uniformly dark swiftlets of mainland New Guinea.

Character	<i>A. papuensis</i>	<i>A. nuditarsus</i>	<i>A. vanikorensis</i>	<i>A. hirundinacea</i>
Toes	Three	Four	Four	Four
Tarsus	Densely feathered	Naked	Mostly unfeathered	Feathered
Feathers of crown and back	White concealed barbs, black shafts and tips	Black-grey	Less white rami than in <i>hirundinacea</i>	Extensive white bases and rami
Nape	Bases paler than <i>nuditarsus/vanikorensis</i>	Dark bases	Slight grey bases	Slightly pale bases
Throat	Silvery grey contrasts with breast	Uniform with breast	Pale by contrast with breast	Uniform with breast
Abdominal feathers	Dark shafts	Not given	Not given	Inconspicuous shafts

Mayr and Rand 1937; Rand 1941, 1942; Somadikarta 1967; Salomonsen 1983; Chantler and Driessens 1995.

TABLE 3

Wing and exposed culmen measurements of the four similarly dark New Guinea swiftlets.

Species	Wing		Exposed culmen	
	mm	n	mm	n
<i>A. papuensis</i>	120-142	24	4.2-5.3	22
<i>A. nuditarsus</i>	131-142	10	4.9-5.6	10
<i>A. vanikorensis granti</i>	109-123	88	4.3-5.3	11
<i>A. hirundinacea excelsa</i>	113-141	65		
<i>A. hirundinacea hirundinacea</i>	109-123	32	3.3-6.3	18

These data were measured by Tarburton from specimens held in the Australian Museum (Sydney), the Australian National Wildlife Museum Canberra, the National Museum of Australia (Melbourne) and the Papua New Guinea Museum (Port Moresby) as well as data from Mayr and Rand 1937; Rand 1941, 1942; Somadikarta 1967; Salomonsen 1983; Chantler and Driessens 1995 and the American Museum of Natural History.

The data in Table 3 were measured by Tarburton from specimens held in the Australian Museum (Sydney), the Australian National Wildlife Museum Canberra, the National Museum of Australia (Melbourne) and the Papua New Guinea Museum (Port Moresby) as well as data from the above publications and the American Museum of Natural History.

DISCUSSION

The Three-toed Swiftlet is thus now confirmed as resident from a relatively wide range on New Guinea, ranging 720 kilometres from the Idenburg River in the west to Losapi Cave in the east. In addition, it appears to occupy a fairly wide altitudinal range from near sea level to about 2 400 metres a.s.l. As the first collection indicates it may also range to coastal areas.

The Three-toed Swiftlet was treated by Mayr (1941) and Rand (1941) as a subspecies of the then thought-to-be wider

ranging Whitehead's Swiftlet *A. whiteheadi*. However, Somadikarta (1967) recognized it as a full species being the first author to note that these birds had only three toes. It has no hallux (hind toe). Although he stated that the loss of a toe was alone insufficient to separate *A. papuensis* generically, he separated it specifically from the Bare-legged Swiftlet *A. nuditarsus*, which Salomonsen had separated from *A. whiteheadi* in 1962. *A. whiteheadi* is now considered confined to the Philippines (Dickson *et al.* 1991; Chantler and Driessens 1995) leaving Papua New Guinea with four partly sympatric, very similar species that have overlapping measurements (Table 3). The other two species are Uniform Swiftlet *A. vanikorensis* and Mountain Swiftlet *A. hirundinacea*.

Identification of these swiftlets is notably difficult and fraught with problems. In the field we consider it impossible to identify them. However, in the hand the Three-toed Swiftlet is most readily identifiable by possessing three rather than four toes. Other differences are slight and are affected by altitude, age, seasonal and individual variations. In addition, there is a lack of good spread of geographic data.

The range of size in each of these four species contributes to making them confusingly similar swiftlets. The wing and exposed culmen measurements are the major repeatable measures of size available from study skins that have been used to separate these swiftlets (Table 3). Few weights, length and wing span measurements are recorded and for many workers the last two measurements are not considered repeatable, and therefore not reliable. It has been claimed that bill length can be used to distinguish *A. vanikorensis* from *A. hirundinacea* (Chantler and Driessens 1995), but as is clear from Table 3, there is considerable overlap. The same is true of wing length (Table 3), so neither wing length nor bill length can be used alone for identification.

When Rand (1941) collected 12 specimens of the Three-toed Swiftlet from the Idenburg River, Irian Jaya (Bernard camp) and one from Hollandia, he reported these birds to be common, feeding in parties of twenty to thirty but usually so high to be out of gunshot range. Occasionally they fed low over the marshes. In PNG, sight records have been reported from the Lower Markham Valley, Watut and Bullolo Valleys and much of the area between Lae and Wau in Papua New Guinea (Coates 1985), as well as Manam Island, PNG (Bergy 1978). However, we maintain that it is impossible to positively identify any of these four species from field sightings alone.

The fifth collection (1 specimen) recorded for PNG was collected on 1 April 1993 by Dr. Tim Flannery (Australian Museum, Sydney) and Lester Seri (Department of Environment and Conservation, PNG). Like the present specimens it was captured whilst mist-netting for bats. The nets were set outside Luplupwintem Cave, Western Province on the southern slopes of the Hindenburg Range (Rowland 1994). Flannery suggested that as the bird he caught was not in the net at 2100 h, but was shortly after first light at 0615 h, it might be nocturnal or crepuscular (Rowland 1994). Because these birds can echolocate (we heard their echolocatory clicks as well as their defence calls, from birds flying in the dark) it is probable that they behave like others in the genus. Birds of this genus in Borneo, Fiji and the Cook Islands will use their echolocatory ability to leave the roosting and nesting caves at about 0400 h and return mostly an hour after dark (1900 h), but with some not arriving until after 2200 h (Medway 1962; Tarburton 1988, 1994). This behaviour allows these birds to stay out at productive feeding locations during dusk, the prime feeding time, and then to use their echolocation to find their cave and their nest or roost. It also allows them to leave early and reach their most productive feeding locations at the other profitable feeding period, around dawn. Such crepuscular behaviour is not reported for any other group of birds, apart from the Oil Birds of South America (which also have the ability to echolocate). Tarburton's subsequent observations of the birds over ten nights at and outside the cave demonstrated that they were involved in such behaviour.

Although there is a paucity of specimens of this species there is a greater paucity of observational records, perhaps because it is very similar to the other, apparently more common swiftlets with which it may be confused. Few observers ever trap birds and then count their toes — something which will be necessary to determine the size and extent of the PNG population.

No nests were observed, either because there were not any or because they were inconspicuous due to the great height of the cave ceiling and the multitude of small crevices and cave formations. By day, no Three-toed Swiftlets or any other uniformly dark swiftlets were observed flying or roosting in or near the cave, further indicating that they fed a long distance from the cave.

Glossy Swiftlets became active at dawn and were netted entering and leaving the cave mouth on several occasions throughout the day when the nets were up, with most captures following dawn and prior to dusk. This fits our experience in other locations where some of the population

is breeding and some is not. Those returning during the day are nest-building, incubating or feeding nestlings, whereas the influx following dusk is of both breeding and non-breeding birds returning to roost for the night.

The captive *A. papuensis* held in cloth bags remained quiet throughout the course of the day but as dusk, their most important feeding period, approached they became progressively vocal and active and remained active for some time. The two birds that Rand (1942) caught at night (unfortunately, he did not tell us what time they were captured) could well have been on their way into their cave when the insects attracted to the bright lights shining on a white illuminated cloth (set to catch moths) caught their attention. Faeces examined from the netted birds that were held overnight, yielded great quantities of moth scales and small chitinous exoskeletons from undetermined insect species.

ACKNOWLEDGMENTS

We are grateful to our field assistants Peter Minimulu, Research Conservation Foundation field biologist and Jacki Salkeld (Taronga Zoo), PNG Research and Conservation Foundation, and landowners around Herowana Village for their help with this project. Hamilton and Tarburton are grateful to the Crater Mountain Management committee for permitting them to work in the area. Dion Hobcroft and Paul Andrews of Taronga Zoo, and David Bishop made useful comments.

REFERENCES

- Bergy, J. (1978). Bird observations in the Madang Province. *PNG Bird Society Newsletter* 148: 9–20.
- Brooke, R. K. (1972). Generic limits in old world Apodidae and Hirundinidae. *Bull. Brit. Ornithol. Club* 92: 53–57.
- Chantler, P. and Driessens G., (1995). 'Swifts. A guide to the Swifts and Treeswifts of the World.' (Pica Robersbridge, UK.)
- Coates, B. J. (1985). 'The Birds of Papua New Guinea.' (Dove Publications. Alderly, Queensland.)
- Dickinson, E. C., Kennedy, R. S. and Parkes, K. C. (1991). The birds of the Philippines. BOU Checklist No 12. (BOU, Tring, Herts.)
- Mayr, E. (1937). Birds collected during the Whitney South Sea expedition. (33): notes on New Guinea birds, 1. *Am. Mus. Novit.* 915: 1–19.
- Mayr, E. (1941). 'List of New Guinea Birds.' (Am. Mus. Nat. Hist. New York.)
- Mayr, E. and Rand, A. L. (1937). Results of the Archbold Expeditions No. 14: The birds of the 1933–1934 Papuan expedition. *Bull. Amer. Mus. Nat. Hist.* 73: 1–248.
- Medway, L. (1962). The swiftlets (*Collocalia*) of Niah Cave, Sarawak; Part 2: ecology and the regulation of breeding. *Ibis* 104: 228–245.
- Rand, A. L. (1941). Results of the Archbold Expeditions No. 32. New and interesting birds from New Guinea. *Am. Mus. Nov.* 1102: 1–15.
- Rand, A. L. (1942). Results of the Archbold Expeditions No. 43: Birds of the 1938–1939 New Guinea Expedition. *Bull. Am. Mus. Nat. History* 79: 425–516.
- Rowland, P. (1994). A new altitude record and range extension of the Three-toed Swiftlet *Collocalia papuensis*. *Muruk* 6: 10.
- Salomonsen, F. (1962). Whitehead's Swiftlet (*Collocalia whiteheadi* Olgive-Grant) in New Guinea and Melanesia. *Vidensk. Medd. Dansk. Naturh. Foren.* 125: 509–512.
- Salomonsen, F. (1983). Revision of the Melanesian Swiftlets (*Apodes, Aves*) and their conspecific forms in the Indo-Australian and Polynesian Region. Noona Dan Papers No. 141 *Det Kongelige Danske Videnskaberne Selskab Biologiske Skifter* 23: 1–112.
- Somadikarta, S. (1967). A recharacterization of *Collocalia papuensis* Rand, the Three-toed Swiftlet. *Proc. US Nat. Mus., Smithsonian Inst.* 124: 1–8.
- Somadikarta, S. (1975). An unrecorded specimen of *Collocalia papuensis* Rand. *Bull. Brit. Orn. Club* 95: 41, 44–45.
- Tarburton, M. K. (1988). Breeding biology of the White-rumped Swiftlet at Chillagoe. *Emu* 88: 202–209.
- Tarburton, M. K. (1994). The diet of the White-rumped Swiftlet (*Aerodramus spodiopygius*) in Queensland's savannah. *Avocetta* 17: 125–129.