THE AUK
A QUARTERLY JOURNAL OF
ORNITHOLOGY

VOL. 85 OCTOBER, 1968 No. 4

THE GIANT SWIFTLET, *COLLOCALIA GIGAS* HARTERT AND BUTLER

SOEKARJA SOMADIKARTA

MOST species of *Collocalia* swiftlets are very difficult to distinguish both in the field and as museum specimens. An exception is the Giant Swiftlet, *Collocalia gigas,* the largest and most distinctive of the swiftlets (average wing size, 150.0 mm). It can be separated easily from other *Collocalia* and from *Chaetura gigantea.* Indeed, it is the only species of swiftlet that has never been confused with other members of its genus in collections or in the literature.

Oberholser (1906) apparently overlooked *C. gigas* in his monograph of this genus, despite three published references to it. Most subsequent authors considered it a rare species (Robinson, 1921; Delacour, 1947; Gibson-Hill, 1948, 1949; Smythies, 1957, 1960; Sims, 1960; Medway, 1966) as only four specimens have been reported in the literature: the type from the Malay Peninsula, one from Java, and two from Sumatra. Very little is known about the bird in life, and its morphological diagnoses have always been based on one or two specimens.

I have been able to locate and examine 58 specimens in various museums and have studied the species in life. The data so accumulated provide considerable new biological information about the species which this paper summarizes. Most of the specimens I have examined are in the Rijksmuseum van Natuurlijke Historie (RMNH) in Leiden, which houses 49 skins, of which 47 were acquired with the Bartels collection in 1954. The nine remaining specimens comprise four in the Museum Zoologicum Bogoriense (MZB) in Bogor, two (including the type, AMNH No. 634,789) in the American Museum of Natural History in New York, one in the United States National Museum (USNM) in Washington, one in the Zoologisches Museum in Berlin (ZMB), and one in the National Museum of Singapore (NMS).

DISTRIBUTION AND RECORDS

Malaya.—The type of *C. gigas* is a female collected at an altitude of 2,700 feet at Semangko Pass, Selangor, in 1900 (Hartert and Butler, 1901).

Four newly hatched Lesser Prairie Chickens (*Tympanuchus pallidicinctus*) from Roger Mills County, southwestern Oklahoma (above) and four newly hatched Greater Prairie Chickens (*T. cupido*) from Osage County, northeastern Oklahoma. The plate fails to show the brownish tone that characterizes the underparts of the Greater chicks. (See page 679.)

It is the only specimen from the Malay Peninsula. Medway and Nisbet (1967) list a sight record by Manning and Sergeant at Labu, Negri Sembilan, on 16 October 1965.

Sumatra.—Robinson and Boden Kloss (1924) reported a pair of *C. gigas* collected in 1914 by E. Jacobson at an altitude of 1,440 feet at Balun, Muara Labu, Padang Highlands. A colored plate (Plate VIII) of "COLLOCALIA GIGANTEA, Hartert" [error for *C. gigas* Hartert and Butler] was included with this publication. These are still the only specimens known from this island. Although Robinson (1921) assumed that *C. gigas* had been collected in New Guinea, it is highly probable that he was referring to Jacobson's Sumatra specimens.

Java.—The first report of *C. gigas* from Java was a single male specimen received from Max Bartels [Sr.] (Finsch, 1901, 1902). Bartels had in fact shot two birds (a male and a female) at an elevation of 3,000 feet at Pasir Datar, Mount Pangrango, West Java, on 2 October 1900. By 1941 at least 50 specimens had been collected on the island of Java, of which Max Bartels [Sr.] alone accounted for 44 (24 ♂♂, 20 ♀♀) between 1900 and 1925, all from western Java. Between 1941 and 1963 no more were reported despite repeated attempts to collect the species (Hoogerwerf, 1949b; Medway, 1962). In January 1964 I collected six specimens (2 ♂♂, 4 ♀♀) at an altitude of about 5,000 feet at Tjibeureum, near Tjibodas, Mount Gedeh, West Java, by shooting into nesting sites hidden inaccessibly behind a waterfall. I returned four times at 3-month intervals, but did not find the species there again.

Borneo.—Morrison reported seeing the species on the top of Mount Sepali, at an altitude of 3,191 feet, in the Kanowit District of Borneo in May 1952 (Smythies, 1957), and Harrisson saw large swiftlets, possibly of this species, near Santubong in August 1956 (Smythies, 1960). These two reports tend to support Stresemann's prediction (1926b) that *C. gigas* might be found to inhabit Borneo. Specimens are still not known from this island.

DESCRIPTION OF THE SPECIES

Specimens examined.—MALAYA: Semangko Pass, Selangor, 1 ♀ (type). SUMATRA: Balun, Padang Highlands, 1 ♂ and 1 ♀. WEST JAVA: Mt. Pangrango, 22 ♂♂ and 22 ♀♀; Tjiparaj, 1 ♂; Tjibeureum, Mt. Gedeh, 1 ♂ and 4 ♀♀; Mt. Halimun, 1 ♂; Mt. Masigit, 3 ♂♂ and 1 ♀.

Diagnosis.—By far the largest species of the genus. Crown, back, tail, outer web, and inner half of inner web of primaries sooty black glossed slightly with green. Side of neck, chin, throat, breast, abdomen, flanks, and outer half of inner web of primaries dusky brown. Concealed white barbs at bases of feathers on back, breast, and abdomen varying greatly in prominence. Dark shafts of feathers of abdomen and undertail coverts more or less pronounced. Largely concealed white spot in front of eye.

TABLE 1

MEASUREMENTS IN MILLIMETERS AND WEIGHTS IN GRAMS OF *COLLOCALIA GIGAS*

	Male(s)			Female(s)		
	Malay Pen.	Sumatra	Java	Malay Pen.	Sumatra	Java
		1 ♂	25 ♂ ♂	Type	1 ♀	21 ♀ ♀
Wing (chord)	–	155.0	142.5–158.0	153.5	159.0	145.0–155.5
			av. 150.1			av. 150.3
Outermost rectrices (OR)	–	64.5	23 ♂ ♂	62.0	worn	21 ♀ ♀
			58.0–64.0			59.0–66.0
			av. 61.5			av. 61.9
Central rectrices (CR)	–	55.5	20 ♂ ♂	51.0	55.0	22 ♀ ♀
			49.0–55.0			50.0–55.0
			av. 51.9			av. 52.1
Tail furcation (OR-CR)	–	9.0	20 ♂ ♂	11.0	–	21 ♀ ♀
			6.5–13.0			6.0–14.0
			av. 9.6			av. 9.2
Exposed culmen	–	7.0	23 ♂ ♂	5.0	7.0	25 ♀ ♀
			6.5–7.0	(worn)		6.5–7.0
			av. 6.9			av. 6.9
Tarsus	–	16.0	27 ♂ ♂	15.0	16.0	27 ♀ ♀
			14.5–15.5			14.5–15.0
			av. 14.9			av. 14.9
OR/wing × 100	–	41.6	18 ♂ ♂	40.3	–	17 ♀ ♀
			38.7–43.0			38.9–43.5
			av. 41.3			av. 41.2
Tarsus/OR × 100	–	24.8	18 ♂ ♂	24.0	–	17 ♀ ♀
			23.3–25.2			22.0–25.4
			av. 24.2			av. 24.3
Weight	–	–	1 ♂	–	–	2 ♀ ♀
			37.0			35.0–39.0
						av. 37.0

Tarsus naked or feathering limited to proximal portion. Tenth primary 2–3 mm longer than eighth.

Measurements.—See Table 1.

Remarks.—The wing and tarsus measurements of the two Sumatra specimens are large; the wing cord of the female (159.0 mm) is the largest of all I have measured, and that of the male (155.0 mm) is exceeded by only one specimen (158.0 mm) of the 25 males from Java. The tarsus in both Sumatra specimens is longer than that of all of both sexes from Java, and that of a female (type) from Malaya.

Range (Figure 1).—Known by specimens from west-central Malay Peninsula (2,700 feet), from west-central Sumatra (1,440 feet), and from western Java (1,000–5,000 feet, cf. Max Bartels, 1906; Max Bartels, Jr., 1931; Hoogerwerf, 1947–48). Reported by sight from Borneo.

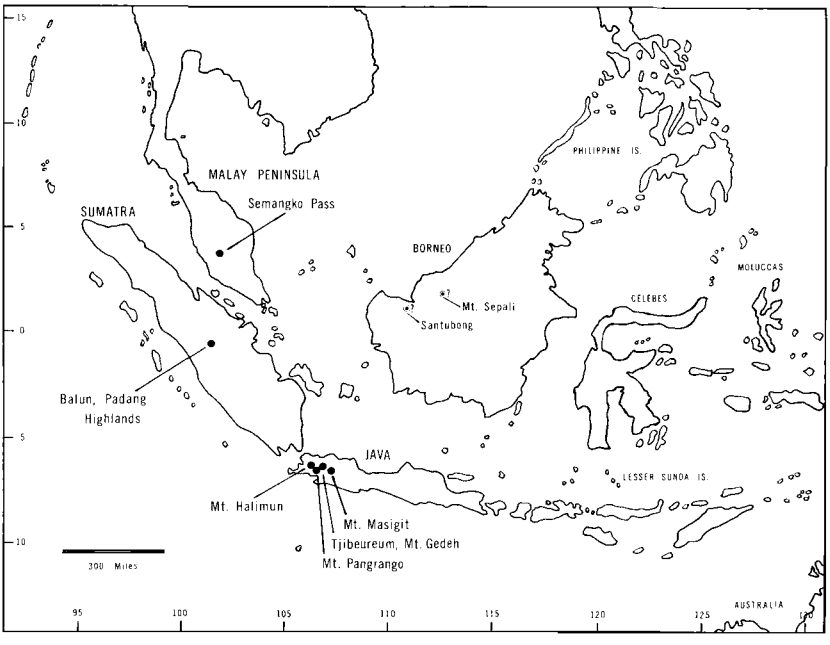

Figure 1. The range of *Collocalia gigas*. Black dots represent specimen localities; reported by sight from Borneo.

Habitat and nesting site.—According to Max Bartels [Sr.] (1915) *C. gigas* was common at all times of the year in the Mount Pangrango area, West Java. It was especially noticeable in the morning and in the late afternoon, but during the rainy season (October–May) it was observed also during the middle of the day. He further noted that giant swiftlets usually flocked with *Chaetura gigantea* and not uncommonly with bats to hunt for winged termites. He also reported that the flocks of *C. gigas* were larger than those of *Chaetura gigantea*. The several times that I saw *C. gigas* in flight at Tjibeureum, three to five birds were associated with several individuals of *C. linchi* (formerly *C. esculenta linchi,* Somadikarta, MS) as a single foraging flock.

Glenister (1951) believed *C. gigas* to be resident in Malaya, though there was, and still is, no report of its breeding there. Breeding data from Sumatra are also lacking. Even Max Bartels [Sr.], who collected most of the specimens known from Java, did not mention its breeding. In 1922 his son reported it nesting behind waterfalls (E. Bartels, 1931; Stresemann, 1926a, 1928).

The observations of Max Bartels [Sr.] (1915) on *C. gigas* in the Mount Pangrango area of West Java are of considerable interest because they

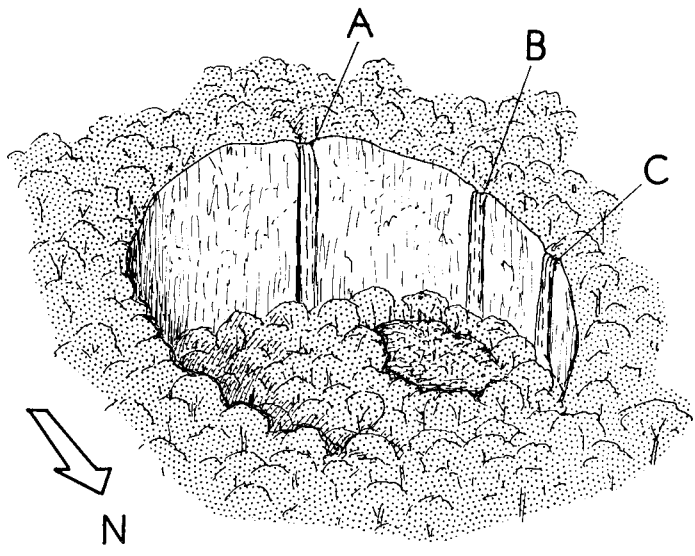

Figure 2. Diagram of nesting site of *Collocalia gigas* at Tjibeureum, West Java. Waterfalls indicated by A, B, and C. Nest located behind B.

correspond to my observations at Tjibeureum. Bartels (loc. cit.) reported that the birds flew from west to east in the late afternoon, continuing eastward if they did not find termites. By sunset they returned westward to an unknown destination.

Tjibeureum is situated at an elevation of about 5,000 feet in the Tjibodas–Mount Gedeh Nature Reserve, some 60 miles south-southeast of Djakarta. Three waterfalls make a drop of 100–130 feet over rocky cliffs into a hollow crescent in a mountainside. The cliffs are covered with mosses, including *Sphagnum,* and in places with a luxuriant growth of *Elatostemma* sp. and *Gunnera macrophylla* (Doctors v. Leeuwen, 1929). Small trees and shrubs occupy the west-central inner portion of the floor of the crescent and form a more or less open area surrounded by dense virgin rain forest (Figure 2). The nesting sites of *C. gigas* were recessed in the damp rock about 40 to 50 feet above the ground and were hidden behind waterfall B on the west side of the cliffs (Figure 3). They were practically impossible to reach. No such recesses are present behind waterfalls A and C. The birds therefore had to fly eastward in order to leave their nests and westward to enter them. *C. linchi* in this area nests much higher on the cliffs, almost at the top, and always away from the waterfalls.

Food.—Max Bartels, Jr. noted on the label of a female (ZMB No. 36.837), collected in the late afternoon of 2 February 1937 on the south-

Figure 3. Nesting sites (arrows) of *Collocalia gigas* behind waterfall B diagrammed in Figure 2.

west slope of Mount Pangrango–Gedeh, West Java, that its stomach was filled with insects, primarily flying ants, a smaller quantity of small flies, some gnats (including a rather large tipulid), a small beetle, and a small bug. Koningsberger (1908) found nine flies in the stomach of a male

C. gigas. I found many flying insects, most of them flies, in several stomachs of both sexes.

Breeding season.—*C. gigas* has been recorded as breeding in October, November, and December (Hoogerwerf, 1949a, 1949b; Hellebrekers and Hoogerwerf, 1967). I collected a juvenile female at Tjibeureum, West Java, 12 January 1964 by shooting into the nesting site.

Nest and eggs.—According to Hoogerwerf (1949b), his collector obtained on two different occasions a nest containing a single egg from a wet rock along the river close to a waterfall in the vicinity of Tjibodas, West Java. Hoogerwerf (loc. cit.) described the nest as a sturdy bowl with a rather thick wall and a shallow cup constructed mainly of dark roots and fibrous material, covered with moss on the outside. Parts of the nest had prominent glue-like spots of hardened saliva. The inside measurements were 7 × 7.5 cm in width and about 2 cm in depth. The outside measurements were 9 cm at its widest (upper) part and about 6.5 cm in height. Both of the eggs are blunt-ended, thin-shelled, rough-textured, and dull white in color. The two eggs measure 30 × 19.1 mm, and 27.8 × 18 mm, a third egg (Hellebrekers and Hoogerwerf, 1967) 27 × 17.7 mm. The weight of these three eggs (blown) averages 0.276 g (0.243–0.320); seven eggs (blown) in the Bartels Collection average 28.5 (26–31.5) × 18 (17.8–18.1) mm in size and 0.29 (0.27–0.33) g in weight (Hellebrekers and Hoogerwerf, 1967).

It should perhaps be noted that Hoogerwerf's description of the nest site, of the nest and single egg, including their measurements, of *Collocalia gigas* is virtually indistinguishable from the description by Allen (1960) of the nest site, nest and single egg, including their measurements, of *Chaetura gigantea* in the Malay Peninsula.

Voice.—Hoogerwerf (1949b) described the song of *C. gigas* as "a loud, far reaching swift-sound," although he himself never observed the bird with certainty.

Aging and molt.—The 58 skins of *C. gigas* that I examined were collected in every month of the year except June, and are therefore useful for a study of molt. Only one (collected 12 January 1964) was in juvenal plumage; the rest were birds of the year or adults.

The two middle rectrices, the extent of concealed white on the barbs at the bases of the feathers of the back and of the abdomen, and the grayish white margin on the undertail coverts are useful in distinguishing first-year birds from adults. The inner and outer webs of the middle pair of rectrices are asymmetrical at the tip in first-year birds, but are symmetrical in adults (Figure 4). The white on the concealed barbs on the back and abdomen is more pronounced in first-year birds than in adults. The grayish white margin on the undertail coverts is more prominent in

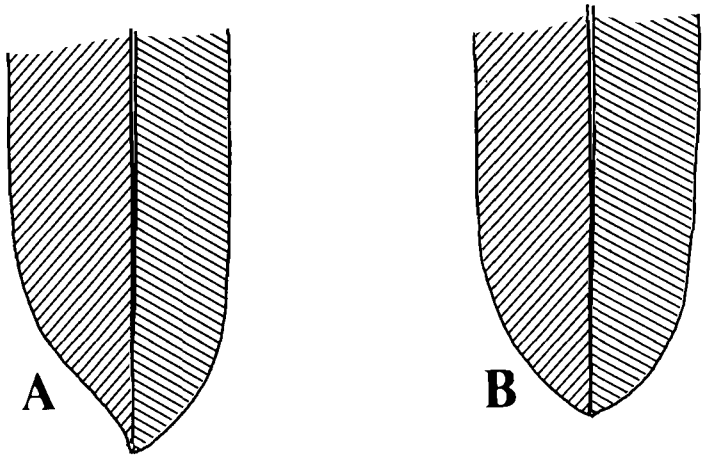

Figure 4. Central tail feathers of *Collocalia gigas*. A represents first-year bird; B is adult.

adults than in first-year birds. Some of the adult birds have several white feathers on the abdomen, breast or back. The juvenile and first-year birds have softer plumage than the adults.

The state of molt was recorded by the simple numerical system used by Newton (1966) in which the molt of the individual feathers are scored as follows: old feather = 0, feather missing or in small pin stage = 1,

TABLE 2
THE PRIMARY MOLT CYCLE OF *COLLOCALIA GIGAS*

	Number of specimens	Total primary score	Average primary score	Male(s)			Female(s)		
				Number	Number in molt	Per cent in molt	Number	Number in molt	Per cent in molt
January	10	21	2.1	4	4	100	6	2	33
February	6	187	31.1	4	4	100	2	1	50
March	6	257	42.7	1	1	100	5	5	100
April	2	146	73.0	1	1	100	1	1	100
May	2	141	70.5	2	2	100	–	–	–
June	–	–	–	–	–	–	–	–	–
July	2	162	81.0	1	1	100	1	1	100
August	10	978	97.8	6	6	100	4	4	100
September	4	392	98.0	3	3	100	1	1	100
October	3	300	100.0	1	0	0	2	0	0
November	1	0	0	1	0	0	–	–	–
December	9	6	0.6	4	1	25	5	0	0

TABLE 3

THE RELATION OF THE MOLT OF THE SECONDARIES, TAIL, HEAD, AND BODY FEATHERS TO THE SCHEDULE OF THE PRIMARY MOLT

Primaries	1	2	3	4	5	6	7	8	9	10
Secondaries					1	7	2	3	4	5	6
Rectrices								5	4	3	2	1
Head/body	- - - - - - - - - - - - - - - - - - - -

feather in large pin or brush stage = 2, feather brush to ½-grown = 3, feather ½- to ¾-grown = 4, and feather ¾-grown to full length = 5. A newly-molted bird in October (see Table 2) would, therefore, have a primary score of 100 (10 primaries, fully grown in each wing).

The primaries are molted in descending mode from the 1st (innermost) to the 10th (outermost). The 2nd primary is usually shed when the 1st is in brush stage (score = 2). The other primaries are shed sequentially when the adjacent one is ½-grown to full length (score = 4–5). Usually no more than two primaries are in growth at a time.

Molting of the secondaries begins with the 1st (outermost) followed by the 7th (innermost), then the 2nd, 3rd, 4th, 5th, and 6th centripetally (cf. Stresemann and Stresemann, 1966). The 1st secondary is dropped when the 5th primary is in pin or brush stage (score = 1–3). The secondary molt ends with the shedding of the 6th; this takes place when the 9th primary is grown to full length (score = 4–5) or when the 10th primary is in pin stage (score = 1).

Tail molt in *Collocalia* progresses centripetally. It begins with the 5th (outermost) pair of rectrices, concurrently with the growing out of the 7th or the 8th primary, rarely earlier (Stresemann and Stresemann, 1966). The following six specimens of *C. gigas* I examined showed tail molt:

Specimen	Tail molt	Primary molt
♂ (May)	5th (score = 4)	8th (score = 4)
	4th (score = 2)	
♀ (August)	1st (score = 4)	9th (score = 4)
		10th (score = 1)
♂ (August)	1st (score = 4)	10th (score = 4)
♂ (August)	1st (score = 3)	10th (score = 5)
♂ (August)	3rd (score = 1)	10th (score = 3)
♀ (September)	2nd (score = 3)	10th (score = 1)

Three other specimens (March, May, July) with a 7th primary score of 1–3 and 1 specimen (March) with an 8th primary score of 3 have not yet begun tail molt.

Most likely the wing and tail feathers of *C. gigas* are not molted during

the bird's first year of life. The juvenal body feathers are in molt when the 5th through the 10th primaries are growing. Apparently not all the juvenal body feathers are molted during this period. The relation of the molt of the secondaries, tail, head and body feathers to the schedule of the primary molt is shown in Table 3. The males commence the wing molt in the last week of December, the females the last week of January. Both terminate from the latter part of August to the middle of September. The molt cycle of *C. gigas* therefore complements the reproductive period; no female bird, and only one male, was in molt during the breeding season (Table 2).

ACKNOWLEDGMENTS

I am grateful to Eric Alfred, National Museum, Singapore, to Dean Amadon, American Museum of Natural History, to G. Mauersberger, Zoologisches Museum Berlin, and to G. F. Mees, Rijksmuseum van Natuurlijke Historie for lending the specimens used for this study. I also wish to thank Bayard H. McConnaughey (ex-member of the Kentucky Contract Team, Bogor) for making the pictures of the nesting site of *C. gigas* near Tjibodas, West Java, and Richard L. Zusi for preparing the illustrations. I am particularly indebted to S. Dillon Ripley, Paul Slud, George E. Watson, and Richard L. Zusi for their critical reviews of the manuscript.

LITERATURE CITED

ALLEN, F. G. H. 1960. A nest of the spine-tailed swift *Chaetura g. gigantea*. Ibis, 102: 126–127.

BARTELS, E. 1931. Vogels van Kole Beres (Van aanteekeningen voorzien door Dr. M. Bartels, Jr.). Natuurk. Tijdschr. Ned. Ind., 91: 308–348.

BARTELS, M. 1906. Systematische Übersicht meiner Java-Vögel. J. f. Orn., 54: 497–519.

BARTELS, M. 1915. Zur Ornis Java. Verh. Orn. Ges. Bayern, 12: 199–200.

BARTELS, M. 1923. Neues aus Java. Orn. Monatsb., 31: 54–57.

BARTELS, M., JR. 1931. Ein neuer Stachelschwanzsegler aus Java. Orn. Monatsb., 39: 54.

DELACOUR, J. 1947. Birds of Malaysia. New York, The Macmillan Company.

DOCTORS V. LEEUWEN, W. M. 1929. Tjibodas (Botany). Java, Fourth Pacific Sci. Congr., Excursion Guides (C3).

FINSCH, O. 1901. *Collocalia gigas* in Java. Bull. Brit. Orn. Club, 12: 30.

FINSCH, O. 1902. Zur Verbreitung von *Collocalia gigas* Hartert et Butler. Orn. Monatsb., 10: 38.

GIBSON-HILL, C. A. 1948. The Malayan swiftlets. Malayan Nature J., 3: 190–200.

GIBSON-HILL, C. A. 1949. An annotated checklist of the birds of Malaya. Bull. Raffles Mus., 20: 1–299.

GLENISTER, A. G. 1951. The birds of the Malay Peninsula, Singapore and Penang. London, Oxford University Press.

HARTERT, E., AND A. L. BUTLER. 1901. *Collocalia gigas*, n. sp. Bull. Brit. Orn. Club, 11: 65.

HELLEBREKERS, W. PH. J., AND A. HOOGERWERF. 1967. A further contribution to our oological knowledge of the island of Java (Indonesia). Zool. Verhandel., 88: 1–164.

HOOGERWERF, A. 1947–48. Contribution to the knowledge of the distribution of birds on the island of Java, with remarks on some new birds. Treubia, 19: 83–137.

HOOGERWERF, A. 1949a. Een bijdrage tot de oölogie van het eiland Java. Buitenzorg, Kon. Plantentuin van Indonesië. [Reprinted in Limosa, 22, 1949.]

HOOGERWERF, A. 1949b. De avifauna van Tjibodas en omgeving (Java). Buitenzorg, Kon. Plantentuin van Indonesië. [Reprinted in Limosa, 23, 1950.]

KONINGSBERGER, J. C. 1908. Aantekeningen over maaginhouden van vogels, part 2. Teysmannia, 19: 720–727.

MEDWAY, LORD. 1962. The swiftlets (*Collocalia*) of Java and their relationships. J. Bombay Nat. Hist., 59: 146–153.

MEDWAY, LORD. 1966. Field characters as a guide to the specific relations of swiftlets. Proc. Linn. Soc. London, 177: 151–172.

MEDWAY, LORD, AND J. C. T. NISBET. 1967. Bird report 1965. The Malayan Nat. J., 20: 59–80.

NEWTON, I. 1966. The moult of the bullfinch *Pyrrhula pyrrhula*. Ibis, 108: 41–67.

OBERHOLSER, H. C. 1906. A monograph of the genus *Collocalia*. Proc. Acad. Nat. Sci. Philadelphia, 58: 177–212.

ROBINSON, H. C. 1921. On some rare birds from the Indo-Malayan subregion. Bull. Brit. Orn. Club., 41: 64–66.

ROBINSON, H. C., AND C. BODEN KLOSS. 1924. On a large collection of birds chiefly from West Sumatra made by Mr. E. Jacobson (with notes by the collector). J. Fed. Malay States, Mus., 11: 189–247.

SIMS, R. W. 1960. The identification of Malaysian species of swiftlets. Ibis, 103a: 205–210.

SMYTHIES, B. E. 1957. An annotated checklist of the birds of Borneo. Sarawak Mus. J., 7: 523–818.

SMYTHIES, B. E. 1960. The birds of Borneo. Edinburgh, Oliver and Boyd.

STRESEMANN, E. 1926a. Beiträge zur Ornithologie der indo-australischen Region. Bruchstücke einer Revision der Salanganen (*Collocalia*). Mitt. Zool. Mus. Berlin, 12: 177–195.

STRESEMANN, E. 1926b. Beiträge zur Ornithologie der indo-australischen Region. II. Bruchstücke einer Revision der Salanganen (Collocalia). Mitt. Zool. Mus. Berlin, 12: 347–353.

STRESEMANN, E. 1928. Sauropsida: Aves. Pp. 337–432 *in* Handbuch der Zoologie, 7. Band, 2. Halfte, 4. Lieferung (W. Kükenthal, ed.). Berlin, Walter de Gruyter.

STRESEMANN, E., AND V. STRESEMANN. 1966. Die Mauser der Vögel. J. f. Orn., 107, Sonderheft.

National Research Council Visiting Research Associate, Department of Vertebrate Zoology, Smithsonian Institution, Washington, D. C. 20560. Present address: Museum Zoologicum Bogoriense, National Biological Institute, Bogor, Indonesia.