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# RECORDS OF BATS (MICROCHIROPTERA) FROM WALLACEA

by

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and

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New distributional records of bats (Microchiroptera) are reported from Borneo, Sulawesi, the Moluccas and the Lesser Sunda Islands, with taxonomic notes.

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## INTRODUCTION

The bat fauna of that part of Australasia bounded by Borneo to the west and New Guinea to the east is quite well known in terms of the genera and species that occur there. Current distributional information has been checklisted in detail by Van Strien (1986). However, the region includes a multitude of islands of varying size whose bats have been reported only rarely and incompletely, so that much remains to be learnt of their distribution in this archipelago.

This paper reports and discusses the Microchiroptera obtained by the junior author during field work on Sulawesi and several islands of the Moluccas; these have been supplemented by unreported material chiefly in the Rijksmuseum van Natuurlijke Historie, Leiden and in the British Museum (Natural History), London. Specimens of Megachiroptera have been reported elsewhere (Rozendaal, 1984; Bergmans & Rozendaal, 1988).

The following acronyms have been used: AMNH, American Museum of Natural History, New York; BM(NH), British Museum (Natural History),

London; MZB, Museum Zoologicum Bogoriense, Bogor; RMNH, Rijksmuseum van Natuurlijke Historie, Leiden; and ZMB, Zoologisches Museum, Berlin.

## SYSTEMATIC SECTION

### **Emballonura alecto alecto** (Eydoux & Gervais, 1836)

*Vespertilio (Nycticeius) alecto* Eydoux & Gervais, 1836: 7 – Manila, Luzon I., Philippines.

Specimens examined. — RMNH 33380, ♂ (in alcohol, skull extracted), 13.iv.1983, Tanjung Mandera, Tangkoko-Batuangus nature reserve, N. Sulawesi, 1° 34' N 125° 09' E, in shallow coastal cave, leg. F. G. Rozendaal; RMNH 34911-34913, 1 ♂, 2 ♀♀ (in alcohol), 25.iv.1985, N. of Solog, W. of Inobonto, N. Sulawesi, 0° 48' N 124° 06' E, vertical cave in small limestone ridge, leg. F. G. Rozendaal; RMNH 34902-34906, 5 ♂♂ (in alcohol, skull of 34902 extracted), Saumlaki, Yamdena I., Tanimbar Is., 7° 57' S 131° 19' E, Japanese ammunition tunnels in limestone escarpment, sea-level, leg. F. G. Rozendaal.

Measurements and weights. — (Skulls of RMNH 33380, 34902, in that order): length of forearm (N. Sulawesi) 46.3 – 49.9, (Tanimbar Is.) 42.9 – 45.9; greatest length of skull 15.1, 14.4; condylobasal length 14.0, 13.4; condylocanine length 13.2, 13.0; width across rostral swellings 6.1, 6.1; least interorbital width 4.7, —; least postorbital width 3.0, 2.7; zygomatic width 8.8, 8.9; width of braincase 7.0, 6.9; mastoid width 7.6, 7.7; $c^1 - c^1$ (alveoli) 3.6, 3.6, (cingula) 3.7, 3.6; $m^3 - m^3$ 6.2, 6.4; $c - m^3$ 5.5, 5.4; length complete mandible from condyles —, 9.7; length right ramus from condyle 10.5, 9.9; $c - m_3$ 5.6, 5.6; weight (RMNH 34902-34906) 4.9-5.4 (mean 5.2 g).

Remarks. — Specimens from C. Sulawesi are discussed and measured by Hill (1983: 140-141). Those from Yamdena Island are the first to be recorded from the Tanimbar Islands and are similar in size to specimens from Sulawesi and the southern Moluccan islands of Ambon, Seram and Kai.

### **Emballonura nigrescens papuana** Thomas, 1914

*Emballonura papuana* Thomas, 1914b: 443 – Wakatimi, Mimika R., SW. West Irian.

Specimens examined. — RMNH 33375, ♂ (in alcohol, skull extracted), RMNH 33396-33400, 2 adult ♂♂, 2 adult ♀♀, immature ♂ (in alcohol), 27.iii.1983, Bataka, NW. Halmahera, N. Moluccas, 1° 24' N 127° 30' E; found roosting under banana (*Musa*) leaf in cultivation, sea-level, leg. F. G. Rozendaal.

Measurements (of RMNH 33375) and weights. — Length of forearm 34.4; greatest length of skull 12.2; condylobasal length 10.9; condylocanine length 10.6; width across rostral swellings 4.2; least interorbital width 3.2; least

postorbital width 2.5; zygomatic width —; width of braincase 6.0; mastoid width 6.4; $c^1 - c^1$ (alveoli) 3.2, (cingula) 3.2; $m^3 - m^3$ 5.5; $c - m^3$ 4.5; length complete mandible from condyles —; length right ramus from condyle 8.4; $c - m_3$ 4.7; weight 2.7 – 3.3 g and 4.7 g (pregnant ♀).

Remarks. — The slightly inflated braincase of the skull examined agrees closely with that of *E. n. papuana*, rather than with *E. n. nigrescens* from the islands of Buru, Ambon and Seram.

### **Taphozous (Saccolaimus) saccolaimus** Temminck, 1838

*Taphozous saccolaimus* Temminck, 1838: 14 – Java.

Specimens examined. — BM(NH) 87.208, ♂ (in alcohol, skull extracted), 21.ix.1985, Imandi area, Dumoga Valley, W. of Kotamobagu, c. 150 km W. of Manado, N. Sulawesi, c. 0° 31' S 123° 58' E, leg. A. J. Marshall.

Measurements. — Length of forearm 72.0; greatest length of skull 25.3; condylobasal length 23.2; condylocanine length 24.0; palatal length 8.3; least interorbital width 9.1; least postorbital width 5.3; zygomatic width 16.1; width of braincase 11.6; mastoid width 14.0; $c^1 - c^1$ (alveoli) 5.4, (cingula) 5.6; $m^3 - m^3$ (alveoli) 10.8, (crowns) 11.0; $c - m_3$ (alveoli) 10.3, (crowns) 10.9; length complete mandible from condyles 19.2; length right ramus from condyle 19.8; $c - m_3$ 12.1.

Remarks. — There is one previous record of this species from Sulawesi: Feiler (1980) reported four ♀♀ and four young in the Staatliches Museum für Tierkunde, Dresden, collected by Ribbe and Kühn in 1883 in the southern part of the island. Of these only one now remains, the others were lost in the Second World War.

### **Megaderma spasma celebensis** Shamel, 1940

*Megaderma spasma celebensis* Shamel, 1940: 352 – Likoepang, Sulawesi.

Specimens examined. — RMNH 34886, ♂ (in alcohol), 21/22.iii.1985, rentis area, Toraut, Dumoga-Bone N. P., N. Sulawesi, 0° 34' N 123° 54' E, primary forest, alt. 225 m, leg. F. G. Rozendaal; RMNH 34887, ♂ (in alcohol), Clark's camp, Dumoga-Bone N. P., N. Sulawesi, 0° 37' N 123° 51' E, primary forest, alt. 1140 m, leg. F. G. Rozendaal; RMNH 34890, ♂ (in alcohol), 16/17.v.1985, NW. slope of Gunung Sahendaruman, Sangihe I., c. 3° 32' N 125° 32' E, forest edge, alt. 625 m, leg. F. G. Rozendaal.

Measurements and weights. — (RMNH 34856, 34857, 34890, in that order): length of forearm 54.5, 51.3, 54.8; length of tibia 30.5, 28.1, 30.4; length of ear 34.8, 31.4, 34.2; weight 15.5, 15.5, 16.5 g.

Remarks. — RMNH 34890 is the first specimen of *Megaderma spasma* to be reported from the Sangihe Islands.

### **Rhinolophus celebensis celebensis** Andersen, 1905

*Rhinolophus celebensis* Andersen, 1905a: 83, pl. 3, figs. 4a, b – Makassar, S. Sulawesi.

Specimens examined. — RMNH 33349, ♀ (in alcohol), 12/13.iv.1983, Tangoko-Batuangus reserve, N. Sulawesi, 1° 34' N 125° 09' E, primary forest, alt. 100 m, leg. F. G. Rozendaal; RMNH 33347, ♂ (orange morph; in alcohol), 13.iv.1983, Tanjung Mandera, Tangkoko-Batuangus reserve, N. Sulawesi, 1° 34' N 125° 09' E, shallow coastal cave, leg. F. G. Rozendaal; RMNH 34918, 34921, ♀, ♂ (in alcohol), 22/23 and 24/25.iii.1985, rentis area, Toraut, Dumoga-Bone N. P., N. Sulawesi, 0° 34' N 123° 54' E, primary forest, alt. 225 m, leg. F. G. Rozendaal; RMNH 34919, ♂ (in alcohol), 4.v.1985, Batuputih, N. Sulawesi, 1° 34' N, 125° 09' E, cultivation, sea-level, leg. F. G. Rozendaal; RMNH 34920, ♂ (in alcohol), 16/17.v.1985, NW. slope of Gunung Sahendaruman, Sangihe I., c. 3° 32' N 125° 32' E, forest edge, alt. 600 m, leg. F. G. Rozendaal; RMNH 34914-34916, 2 ♂♂, 1 ♀ (in alcohol), 1.ii.1985, Mantung cave, c. 2 km SE. of Beo, Karakelang I., Talaud Is., 4° 13' N 126° 48' E, primary forest, alt. 25 m, leg. F. G. Rozendaal; RMNH 34917, ♂ (in alcohol), 9.ii.1985, Sungei Goat, between Gunung Ajamana and Gunung Biala, Karakelang I., Talaud Is., 4° 17' N 126° 49' E, primary forest, alt. 80 m, leg. F. G. Rozendaal.

Measurements and weights. — Length of forearm: N. Sulawesi (RMNH 34918, 34919, 34921) 40.3 – 43.2; Sangihe Is. 45.6; Talaud Is. 40.8 – 41.8; weight (N. Sulawesi) 6.3 – 8.4 g; (Sangihe I.) 7.5 g; (Talaud Is.) 4.5 – 5.8 g.

Remarks. — *Rh. celebensis* had not been recorded hitherto from the Sangihe or Talaud Islands.

### **Rhinolophus affinis princeps** Andersen, 1905

*Rhinolophus affinis princeps* Andersen, 1905a: 106 – Lombok, Lesser Sunda Is.

Specimens examined. — RMNH 34123-34124, 2 ♀♀ (skins and skulls), 10.iii.1971, Kisol, 12 km E. of Borong, SW. Flores, Lesser Sunda Islands, alt. 175 m, leg. J. A. J. Verheijen; RMNH 27897, ♂ (in alcohol), 1864, Solor I., Lesser Sunda Islands, leg. J. Semmelink.

Measurements. — (RMNH 34123, 34124, 27897, in that order, the last external data only): length of forearm 53.6, 52.7, 52.9; length of $III^m$ 40.1, 39.2, 38.4; $III^1$ 16.8, 16.4, 16.0; $III^2$ 26.4, 24.6, 24.6; condylocanine length —, 21.2; palatal length —, —; rostral width 6.5, 6.5; least postorbital width 2.1, —; width of braincase 9.9, 9.8; mastoid width 10.9, 10.8; $c^1 - c^1$ (alveoli) 6.6, 6.7, (cingula) 6.7, 6.8; $m^3 - m^3$ 8.9, 8.6; $c - m^3$ 9.5, 9.3; length complete mandible from condyles 16.5, 16.4; length right ramus from condyle 17.1, 17.0; $c - m_3$ 10.2, 10.0.

Remarks. — The specimen from Solor is the first of *Rh. affinis* to be reported from that island and this record constitutes the easternmost locality so far: it is otherwise known in the Lesser Sunda Islands from Lombok,

Sumbawa, Sumba and Flores, having been reported only recently from the last island by Bergmans & Van Bree (1986: 335).

### **Rhinolophus euryotis timidus** Andersen, 1905

*Rhinolophus euryotis timidus* Andersen, 1905b: 285 – Bacan I., N. Moluccas.

Specimens examined. — RMNH 33378, ♀ (orange-rufous morph; in alcohol, skull extracted), 16.iii.1983, foot of Gunung Gamkunora, E. of Baru, NE. of Tosoa, NW. Halmahera, N. Moluccas, 1° 20' N 127° 31' E, primary forest, alt. c. 180 m, leg. F. G. Rozendaal; RMNH 33379, ♀ (in alcohol, skull extracted), 25.iv.1983, Wayaua, Bacan, N. Moluccas, 0° 45' S, 127° 38' E, cultivation, sea-level, leg. F. G. Rozendaal.

Measurements and weights. — (RMNH 33378, 33379, in that order ): length of forearm 54.8, 55.0; width of noseleaf 12.6, 11.7; width of sella 4.0, 3.3; condylocanine length 21.6, 21.0; rostral width 6.7, 6.5; least postorbital width 2.3, 2.2; zygomatic width 12.0, 11.5; width of braincase 10.0, 9.8; mastoid width 11.2, 11.1; $c^1 - c^1$ (alveoli) 6.3, 6.4, (cingula) 6.5, 6.5; $m^3 - m^3$ (alveoli) 8.8, 8.5, (crowns) 9.0, 8.7; $c - m^3$ 9.5, 9.2; length complete mandible from condyles 16.2, 15.9; length right ramus from condyle 16.8, 16.5; $c - m_3$ 10.1, 9.8; weight 16.5, 18.0 g. Comparable measurements for the other subspecies of *Rh. euryotis* appear in Hill (1983: 147): a series (5 ♂♂, 10 ♀♀, RMNH 34140-34154) of *Rh. e. aruensis* has a forearm length of 52.6 – 56.1 (mean 54.3).

Remarks. — The specimen from Halmahera is apparently the first record of *Rh. euryotis* from that island: it has a slightly wider noseleaf and sella than the Bacan example.

### **Hipposideros bicolor bicolor** (Temminck, 1834)

*Rhinolophus bicolor* Temminck, 1834: 19, pl. 1, fig. 3; 1835: 18 (further description). Lectotype designated and type locality restricted to Anjer coast, NW. Java (Tate, 1941a).

Specimen examined. — RMNH 31422, ♀ (skin and skull), 14.x.1970, Ruteng, Flores I., Lesser Sunda Islands, 8° 36' S, 120° 28' E, leg. J. A. J. Verheijen.

Measurements. — (RMNH 31422): length of forearm 48.0; length of tail —; length of tibia c. 21; length of foot c. 7; greatest length of skull —; condylobasal length —; condylocanine length —; basal length —; palatal length 6.8; length of palatal bridge 3.5; width across rostral swellings 4.9; least postorbital width 2.9; zygomatic width 9.3; width of braincase —; mastoid width —; $c^1 - c^1$ (alveoli) 4.2, (cingula) 4.3; $m^3 - m^3$ 6.2; $c - m^3$ 6.7; $m^{1-3}$ 4.2; length complete

mandible from condyles 12.0; length right ramus from condyle 12.4; c – $m_3$ 7.2.

Discussion. — This specimen agrees both externally and cranially with the account of a Javan example of *H. b. bicolor* by Hill (1983: 148). Pohle (1950: 334) lists *H. bicolor* from all major islands of the Lesser Sunda group, possibly drawing this conclusion from the map provided by Tate (1941a: 363) for the distribution of the *H. bicolor* group. Similarly, Pohle (1950: 334) lists *H. galeritus* from all of these islands, perhaps on the basis of Tate's map (1941a: 365) for this group. Specimens from the island of Bali reported and listed by Tate (1941a: 361, 392) as *H. bicolor aruensis* seem more probably to be *H. ater* and are listed as *H. a. saevus* Andersen, 1918, by Kitchener & Foley (1985: 224). Specimen RMNH 31422 from Flores appears to be the first definite record of *H. bicolor* from the Lesser Sunda Islands. Laurie & Hill (1954: 54-56) were unable to find records of *H. bicolor* or of *H. galeritus* from these islands: since then the concept of *H. bicolor* has been re-defined (Hill, 1963), and three of the Australasian subspecies (*amboinensis* Peters, 1871, *aruensis* Gray, 1858, and *saevus*) assigned to *H. bicolor* by these authors have been transferred to *H. ater*, one other, *macrobullatus* Tate, 1941, now being considered specifically distinct (Van Strien, 1986: 20; Bergmans & Van Bree, 1986: 340; Hill et al., 1986: 538). Bergmans & Van Bree (1986: 337) recorded *H. bicolor bicolor* from Sepanjang Island in the Kangean Islands, and re-examined the syntype series.

### **Hipposideros cervinus cervinus** (Gould, 1863)

*Rhinolophus cervinus* Gould, 1863: pl. 34, letterpress – "Caves on Albany Island", Cape York, Queensland, Australia.

Specimens examined. — RMNH 33330, 33333, 33335, 2 ♂♂, ♀ (in alcohol), 25/26. and 26/27.i.1983, Sungei Moinakom, Dumoga-Bone N. P., N. Sulawesi, 0° 41' N 124° 03' E, primary forest, alt. 625 m, leg. F. G. Rozendaal; RMNH 33332-33334, ♀, ♂, 13.iv.1983, Tanjung Mandera, Tangkoko-Batuangus reserve, N. Sulawesi, 1° 34' N 125° 09' E, shallow coastal cave, leg. F. G. Rozendaal; RMNH 34932, ♀ (in alcohol), 25.iv.1985, Komangaan (Kotamobagu – Inobonto), N. Sulawesi, 0° 49' N 124° 12' E, cave in limestone ridge, leg. F. G. Rozendaal; RMNH 34933, ♀ (in alcohol), 25.iv.1985, Solog, W. of Inobonto, N. Sulawesi, 0° 48' N 124° 06' E, vertical cave in small limestone ridge, leg. F. G. Rozendaal; RMNH 34922-34931, 6 ♂♂, 4 ♀♀ (in alcohol), Mantung cave, 2 km SE. of Beo, Karakelang I., Talaud Is., 4° 13' N, 126° 48' E, primary forest, alt. 25 m, leg. F. G. Rozendaal.

Measurements and weights. — Length of forearm in the Sulawesian specimens (7) 48.4 – 50.6, in those from Karakelang (10) 46.1 – 49.1; weight (N. Sulawesi) 7.5 – 11.0 g; (Karakelang I.) 6.3 – 7.2 g.

Discussion. — Specimens from S. and C. Sulawesi were referred by Hill

(1983: 150) to *H. c. cervinus*, following Jenkins & Hill (1981: 289). Such examples, however, with forearm lengths of (17) 45.0 – 49.1 lie towards or exceed the upper limit of forearm length as established by these authors for that subspecies, and like these reported here from N. Sulawesi approach the slightly larger Bornean subspecies *H. c. labuanensis* (Tomes, 1859) in which the length of the forearm is (32) 43.7 – 51.8. Possibly *H. c. batchianus* Matschie, 1901, from Bacan Island, with a forearm length of 47.5 might prove appropriate for specimens from the Talaud Islands, whence *H. cervinus* does not appear to have been reported, and perhaps also for those from Sulawesi. Jenkins & Hill (1981: 289) found the forearm length in *H. c. cervinus* to be (37) 40.4 – 48.2 but their sample included eight specimens from Sulawesi. Two of these were paratypes of *H. celebensis* Sody, 1936, which these authors found referable to *H. cervinus*, on this account placing *celebensis* in the synonymy of *H. c. cervinus*. However, until Sody's holotype can be re-examined the definitive status and application of *celebensis* must remain uncertain.

### **Hipposideros papua** (Thomas & Doria, 1886)

*Phyllorhina papua* Thomas & Doria, 1886: 204 – Korido, Misori I., Geelvink Bay, Irian Jaya, New Guinea.

Specimens examined. — RMNH 30981-30982, ♂, ♀ (in alcohol, skulls extracted), 9.iii.1955, caves near Djitmaoe, Amaru Lakes area, Vogelkop, Irian Jaya, New Guinea, c. 1° 16' S 132° 12' E, leg. M. Boeseman; RMNH 43907, ♂ (in alcohol), 9.vii.1985, Ake Songa, 2 km SSW. of Gunung Bibinoi, Bacan, N. Moluccas, 0° 48' S, 127° 43' E, shallow cave in primary forest, alt. c. 200 m, leg. F. G. Rozendaal; RMNH 33331, ♀ (in alcohol), 16/17.iii.1983, foot of Gunung Gamkunora, E. of Baru, NE. of Tosoa, NW. Halmahera, N. Moluccas, 1° 20' N 127° 31' E, primary forest, alt. c. 180 m, leg. F. G. Rozendaal.

Measurements and weights. — (RMNH 30981, 30982, 34907, 33331, in that order, the latter two forearms only): length of forearm 49.6, 52.0, 52.6, 52.3; greatest length of skull 19.7, 19.8; condylobasal length 17.1, 17.5; condylocanine length 17.0, 17.2; length of palate —, — (soft palate in situ); rostral width 6.0, 5.9; least postorbital width 2.9, 2.8; zygomatic width 10.8, 11.0; width of braincase 8.5, 8.4; mastoid width 9.7, 9.8; c – $m^3$ 7.3, 7.5; length complete mandible from condyles —, —; length right ramus from condyle 13.2, 13.5; c – $m_3$ 8.0, 8.3; weight (RMNH 34907, 33331) 10.0, 9.3 g.

Discussion. — These specimens represent a large series preserved in the Rijksmuseum van Natuurlijke Historie, but appear to be the first of *Hipposideros papua* to be recorded since the species was described from three syntypes ("cotypes") in 1886. They are in good general agreement with the

syntype (BM(NH) 86.11.3.9) in the collection of the British Museum (Natural History) but this specimen in alcohol is in very bad condition.

As in the syntype the ears are long, broad and triangular, with a small, thickened antitragal fold. They are haired for one third to one half their length. The noseleaf in these specimens agrees in almost every respect with that of the syntype and with the account in Hill (1963: 70-74): in particular the second supplementary leaflet extends anteriorly beyond the first leaflet on to the upper lip but does not reach the median line, a character that can be readily observed from a frontal view of the noseleaf. The syntype has a small, rudimentary third leaflet on each side but this is variable in size and occurrence in the newly available specimens. In one (RMNH 33331) the third leaflet is relatively well developed on each side, about one third as long as the anterior leaflet, with its outer edge clearly visible from the front, not concealed by the second leaflet. In RMNH 30982 the third leaflet is moderately well developed on the left but very small on the right, while in RMNH 30981 it is absent from the left and very small, almost minute, on the right: similarly, in RMNH 34907 it is minute on the left side and only very slightly larger on the right. Thus in the two ♂ examples this leaflet is at best only incipient or little more than that, but is more developed in the ♀ specimens. The ♂ RMNH 34907 has a well-developed frontal sac with a transverse opening, this structure is represented in the ♀ (RMNH 33331) by a tuft of hairs. Cranially and dentally RMNH 30981-30982 agree with the syntype.

### **Hipposideros diadema diadema** (Geoffroy, 1813)

*Hipposideros diadema* Geoffroy, 1813: 263, pls. 5, 6 – Timor.

Specimens examined. — RMNH 34875, 34877-34882, 6 ♂♂, 1 ♀ (in alcohol), 2.xi.1985, cave Bang Ngoeroeti, near Olilit Lama, Yamdena I., Tanimbar Is., 7° 57' S, 131° 22' E, disturbed forest, alt. c. 60 m, leg. F. G. Rozendaal.

Measurements and weights. — These seven specimens are a little shorter in forearm length (77.4 – 83.4) than four from Timor (82.3 – 89.0) reported by Goodwin (1979: 116). One from Timor in the British Museum (Natural History) has a forearm length of 78.9 while 24 Javan specimens have forearm lengths of 80.0 – 90.7; Goodwin (1979: 116) reports seven from Bali with forearm lengths of 87.5 – 93.0. Weight 39.0 – 42.0 g.

Remarks. — There appears to be no previous record of *H. diadema* from the Tanimbar Islands. Bergmans & Van Bree (1986: 339) recorded a very large specimen from Sepanjang Island, Kangean Islands.

### **Hipposideros diadema speculator** Andersen, 1918

*H[ipposideros] diadema speculator* Andersen, 1918: 381 – Kalao I., Flores Sea, S. of Sulawesi.

Specimens examined. — RMNH 33116, ♀ (in alcohol; pregnant), 29/30.i.1983, Sungei Moinakom, Dumoga-Bone N. P., N. Sulawesi, 0° 41' N 124° 03' E, primary forest, alt. 625 m, leg. F. G. Rozendaal; RMNH 34885, ♀ (in alcohol), rentis area, Toraut, Dumoga-Bone N. P., N. Sulawesi, 0° 34' N 123° 54' E, primary forest, alt. 225 m, leg. F. G. Rozendaal; RMNH 34883, ♀ (in alcohol), NW. slope of Gunung Sahendaruman, Sangihe I., c. 3° 32' N 125° 32' E, forest, alt. 625 m, leg. F. G. Rozendaal; RMNH 34884, ♂ (in alcohol), 1.ii.1985, Mantung cave, 2 km SE. of Beo, Karakelang I., Talaud Is., 4° 13' N 126° 48' E, primary forest, alt. 25 m, leg. F. G. Rozendaal.

Measurements and weights. — (RMNH 33116, 34885, 34884, 34883, in that order): length of forearm 86.5, 85.3, 79.1, 85.1; length of ear 33.4, 34.3, 32.4, 33.0; width of rostrum 10.3, 10.3, 9.9, 10.0; c – $m^3$ 12.2, 11.9, 12.0, 12.3; weight (RMNH 33116, 34885) 54 g (pregnant), 31.5 g.

Remarks. — The combination of long ears, wide rostrum and relatively shorter toothrows of the specimens from the Sangihe and Talaud Islands suggests that these should be referred to *H. d. speculator* rather than to *H. d. griseus* (Meyen, 1833) from the Philippines or to *H. d. euotis* Andersen, 1905, from Bacan (N. Moluccas). There appears to be no previous record of the species from the Sangihe or Talaud Islands.

### **Myotis muricola browni** Taylor, 1934

*Myotis browni* Taylor, 1934: 288 – near Saub, Cotabato, Mindanao I., Philippines.

Specimens examined. — RMNH 34909, ♀ (in alcohol), 26.iii.1985, rentis area, Toraut, Dumoga-Bone N.P., N. Sulawesi, 0° 34' N 123° 54' E, primary forest, alt. 225 m, leg. F. G. Rozendaal; RMNH 34892, 34910, 2 ♂♂ (in alcohol), 5.iv. and 6.iv.1985, Clark's camp, Dumoga-Bone N. P., N. Sulawesi, 0° 37' N 123° 51' E, primary forest, alt. 1180 m, leg. F. G. Rozendaal.

Measurements and weights. — Length of forearm 31.4 – 32.7 (3); weight (RMNH 34892, 34909-34910) 3.4, 4.3, 3.7 g.

Remarks. — Hill (1983: 153) referred small specimens of *M. muricola* from C. Sulawesi to *M. m. (?) browni*, otherwise known from the Philippines. These examples from the northern part of Sulawesi are similarly small.

### **Myotis ater** (Peters, 1867)

*Vespertilio ater* Peters, 1867: 18 – Ternate I., N. Moluccas.

Specimens examined. — RMNH 34128-34136, 4 ♂♂, 2 ♀♀, juvenile ♂, 2 juvenile ♀♀ (in

alcohol), 1864, Bone, Sulawesi, 0° 32' N 123° 08' E, leg. H. A. Bernstein; RMNH 33376, ♀ (in alcohol, skull extracted), 29/30.i.1983, Sungei Moinakom, Dumoga-Bone N. P., N. Sulawesi, 0° 41' N 124° 03' E, primary forest, alt. 625 m, leg. F. G. Rozendaal; RMNH 36392, ♀ (skin and skull), 1.xii.1939, Malenge I., Togian Is., N. Sulawesi, 0° 20' N 122° 05' E, leg. J. J. Menden.

Measurements and weights. — Length of forearm (Sulawesi only) 34.4 – 37.1 (7); of RMNH 33376 (N. Sulawesi), 36392 (Malenge I.), in that order: length of forearm 36.6, 37.4; greatest length of skull 13.9, 14.0; condylobasal length 13.3, 13.4; condylocanine length 12.7, 12.7; least postorbital width 3.4, 3.3; zygomatic width —, —; width of braincase 6.5, 6.4; mastoid width 7.2, 7.0; $c^1 - c^1$ (alveoli) 3.6, 3.7, (cingula) 3.7, 3.8; $m^3 - m^3$ 5.9, 5.8; $i^2 - m^3$ 6.7, 6.6; $c - m^3$ 5.5, 5.5; length complete mandible from condyles 10.4, 10.4; length right ramus from condyle 10.8, 10.9; $c - m_3$ 5.9, 5.8; weight (RMNH 33376) 4.2 g.

Discussion. — These specimens agree closely with those from Sulawesi and the Moluccas measured and discussed by Hill (1983: 155-157). The example from Malenge Island is the first of the species to be recorded from the Togian Islands. It is unusual in lacking the small middle premolars ($pm^3_3$) from both sides of the upper and lower jaws: there is no trace of alveoli for these teeth. The absence of $pm^3_3$ from one or both sides of the jaw is known in several other species of *Myotis* (Hill & Topál, 1973), notable examples in south-eastern Asia being *M. annectans* (Dobson, 1871), *M. ridleyi* (Thomas, 1898) and *M. rosseti* (Oey, 1951), none recognized initially as referable to *Myotis* on account of their aberrant dental formula.

## **Myotis adversus adversus** (Horsfield, 1824)

*Vespertilio adversus* Horsfield, 1824: unpaginated – Java.

Specimens examined. — RMNH 34125-34127, 2 ♀♀ (skins and skulls), unsexed juvenile (skull only), 8.iii.1971, Marokama, E. of Borong, W. Flores, Lesser Sunda Islands, leg. J. A. J. Verheijen.

Measurements. — (RMNH 34125, 34126, in that order): length of forearm 43.4, —; greatest length of skull 17.2, 16.8; condylobasal length 15.9, 15.3; condylocanine length 14.9, 14.5; width across anteorbital foramina 4.6, 4.3; least postorbital width 4.1, 4.2; zygomatic width —, —; width of braincase 8.3, 7.9; mastoid width 8.6, 8.4; $c^1 - c^1$ (alveoli) 4.8, 4.5, (cingula) 5.0, 4.8; $m^3 - m^3$ 6.9, 6.9; $c - m^3$ 6.3, 6.3; length complete mandible from condyles 12.1, 11.8; length right ramus from condyle 12.5, 12.2; $c - m_3$ 6.6, 6.6.

Remarks. — *M. adversus* has apparently not before been reported from any of the Lesser Sunda Islands. These specimens agree more closely in size with

*M. a. adversus* from Java than with *M. a. moluccarum* (Thomas, 1915) from Sulawesi east to the Solomon Islands, measured by Hill (1983: 161).

### **Myotis adversus moluccarum** (Thomas, 1915)

*Leuconoe moluccarum* Thomas, 1915: 170 – Ara, Kai Is., Moluccas.

Specimens examined. — RMNH 34889-34901, ♂, 2 ♀♀ (in alcohol; RMNH 34901 with young), 1.ii.1985, Mantung cave, 2 km SE. of Beo, Karakelang I., Talaud Is., 4° 13' N 126° 48' E, primary forest, alt. 25 m, leg. F. G. Rozendaal.

Measurements and weights. — Length of forearm 39.6 – 41.0 (3); weight 9.0, 9.5, 9.2 g.

Remarks. — There appears to be no previous record of *M. adversus* from the Talaud Islands.

### **Pipistrellus javanicus** (Gray, 1838)

*Scotophilus javanicus* Gray, 1838: 498 (renaming of *Vespertilion javanais* F. Cuvier, 1832) – Java.

Specimens examined. — RMNH 34908, ♀ (in alcohol, skull extracted), 11.ii.1985, Sungei Goat, between Gunung Ajamana and Gn. Biala, Karakelang I., Talaud Is., 4° 17' N 126° 49' E, primary forest, alt. 80 m, leg. F. G. Rozendaal; RMNH 34139, ♂ (skin and skull, both in bad condition), 24.ii.1972, Wae Sano, Flores, Lesser Sunda Islands, leg. J. A. J. Verheijen & J. E. Schmutz.

Measurements and weights. — (RMNH 34908, 34139, in that order): length of forearm 32.7, 31.0; greatest length of skull 13.3, —; condylobasal length 12.4, —; condylocanine length 12.0, —; width across anteorbital foramina 4.2, —; least postorbital width 3.5, —; zygomatic width 8.1, —; width of braincase 6.5, —; mastoid width 7.4, —; $c^1 - c^1$ (alveoli) 4.3, 4.3, (cingula) 4.4, 4.4; $m^3 - m^3$ 5.5, 5.6; $c - m^3$ 4.5, 4.7; length complete mandible from condyles 8.9, 9.0; length right ramus from condyle 9.1, 9.4; $c - m_3$ 4.7, 5.0; weight (RMNH 34908) 4.1 g.

Discussion. — Records of *P. javanicus* from Sulawesi are reviewed by Hill (1983: 163-164); specimen RMNH 34908 is the first to be reported from the Talaud Islands. This specimen has slightly smaller canines than those from Java, Madura and one from Sulawesi. It is similar in size to specimens from Sabah reported by Francis & Hill (1986: 45) or to one (♀ BM(NH) 94.7.2.53) from Palawan Island, Philippines.

Pohle (1950: 334) listed *P. "tralatitius"* (=*javanicus*) from Sumba and Timor, but the specimens upon which these records were based prove to be

either *Myotis muricola* or *Pipistrellus tenuis* (Hill, 1983: 164; Goodwin, 1979: 117). The badly damaged example (RMNH 34139) from Flores seems best referable to *P. javanicus*; it thus constitutes the first record of this species from that island and from the Lesser Sunda Islands at large.

### **Philetor brachypterus rohui** Thomas, 1902

*Philetor rohui* Thomas, 1902: 220 – Albert Edward Range, E. Papua New Guinea, 6000 ft.

Specimens examined. — RMNH 33382, ♀ (in alcohol, skull extracted), 28.i.1983, Sungei Moinakom, Dumoga-Bone N. P., N. Sulawesi, 0° 41' N 124° 03' E, primary forest, alt. 625 m, leg. F. G. Rozendaal.

Measurements and weight. — Length of forearm 33.6; greatest length of skull 14.0; condylobasal length 13.7; condylocanine length 13.2; width across anteorbital foramina 5.2; width across supraorbital swellings —; least postorbital width 4.6; zygomatic width 10.4; width of braincase 8.1; mastoid width 8.7; $c^1 - c^1$ (alveoli) 5.0, (cingula) 5.1; $m^3 - m^3$ 6.8; $c - m^3$ 4.5; length of complete mandible from condyles —; length right ramus from condyle 10.1; $c - m_3$ 4.8; weight 8.2 g.

Discussion. — Although not before reported from Sulawesi, the occurrence of *Ph. brachypterus* on this island is not wholly unexpected since the species is known to occur from Nepal to the Philippines, Malaya, Sumatra and thence in New Guinea and New Britain (Kock, 1981: 314; Koopman, 1983: 525). This specimen from Sulawesi is unusual in the presence of a small anterior upper premolar ($pm^2$) in each side of the jaw, intruded into a recess between the canine and the large upper premolar ($pm^4$) usual in this genus, which are in contact. There is no trace of $pm^2$ in 15 examples of *Ph. brachypterus* in the collection of the British Museum (Natural History), nor did Koopman (1983: 526) find any evidence of its presence in some 20 specimens in the American Museum of Natural History. In size and in the width of the narial emargination the Sulawesian specimen corresponds closely with *Ph. b. rohui*, but subspecific distinctions in *Ph. brachypterus* are very provisional (Hill, 1983: 169).

The occurrence of a small $pm^2$ in *Philetor* is of some interest in connection with the status of *Pipistrellus anthonyi* Tate, 1942 from Burma, which may be referable to *Philetor*. Tate distinguished *anthonyi* from *Philetor* chiefly on account of the presence of $pm^2$. Koopman (1983: 526) added that it has an abruptly narrowed narial emargination and high coronoid in contrast with the latter genus. For these reasons he hesitated to synonymize it with *Ph. brachypterus* while admitting the possibility that it should be transferred to *Philetor*, a

view supported by its short rostrum, well-developed supraorbital tubercles, and compressed posterior lower premolar ($pm_4$).

The inclusion of Java in the range of *Ph. brachypterus* (as *Pipistrellus brachypterus*) by Chasen (1940: 50) was based on a specimen obtained by the "Novara" Expedition and on a further example from the Bartels collection, which this author had examined (Chasen, 1940: 50, footnote). The true identity of the former of these specimens as a *Pipistrellus* was established by Bauer (in Hill, 1971: 142), but the latter specimen could not then be traced (Husson, in Hill, 1971: 142).

While examining correspondence on the Bartels collection of Javanese mammals, one of us (FGR) discovered the following passage which refers to a specimen sent for identification by Dr. Max Bartels, Jr. to F. N. Chasen (F. N. Chasen, in litt. to Dr. Max Bartels, Jr., 10 June 1939, in RMNH archives): "No 1657 *Pipistrellus*: We can only call this *P. brachypterus* Temm. It agrees pretty well with the original description, but as far as I know there is no material anywhere at present good enough to make a direct comparison profitable. Sooner or later we shall get the real *brachypterus* from Sumatra and a further study wil be possible". Mention of the collector's number 1657 led to the whereabouts of the specimen, which was found in a box containing *Pipistrellus* sp., with another example. Both were identified as *P. javanicus javanicus* by Dr. K. F. Koopman during his visit to Leiden in 1972: this identity of no. 1657 has been confirmed during the present study. Thus Java can no longer be included in the range of *Philetor brachypterus*, although it is likely that the species occurs there.

### **Miniopterus australis tibialis** (Tomes, 1858)

*Vespertilio tibialis* Tomes, 1858: 126 – Ambon I., Moluccas.

Specimens examined. — RMNH 33377, ♂ (in alcohol, skull extracted), 27/28.i.1983, Sungei Moinakom, Dumoga-Bone N. P., N. Sulawesi, 0° 41' N 124° 03' E, primary forest, alt. 625 m, leg. F. G. Rozendaal; RMNH 34936-34938 (in alcohol, skulls of 34937 and 34938 extracted), 25.iv.1985, Komangaan (Kotamobagu – Inobonto), N. Sulawesi, 0° 49' N 124° 12' E, cave in limestone ridge, leg. F. G. Rozendaal.

Measurements and weights. — (RMNH 33377, 34936 external values only, 34937, 34938, in that order): length of forearm 39.0, 40.3, 40.0, 40.6; length of tibia 15.8, 16.6, 16.3, 16.9; length of tail 39.2, 40.6, 39.8, 38.0; greatest length of skull 14.5, 14.4, 14.4; condylobasal length 13.6, 14.1, 14.0; condylocanine length 12.9, 13.2, 13.1; width across anteorbital foramina 3.8, 3.8, 3.7; least postorbital width 3.5, 3.4, 3.5; zygomatic width 8.0, 8.1, —; width of braincase

7.3, 7.2, 7.3; mastoid width 7.6, 7.7, 8.0; $c^1 - c^1$ (alveoli) 4.0, 4.0, 4.0, (cingula) 4.1, 4.2, 4.1; $m^3 - m^3$ 5.9, 5.8, 5.8; $c - m^3$ 5.5, 5.6, 5.5; length complete mandible from condyles —, 10.4, 10.3; length right ramus from condyle 10.4, 10.5, 10.4; $c - m_3$ 6.0, 6.0, 6.0; weight 7.6, 6.2, 7.2, 6.2 g.

### **Miniopterus pusillus macrocneme** Revilliod, 1914

*Miniopterus macrocneme* Revilliod, 1914: 360 – New Caledonia and Loyalty Is.

Specimens examined. — RMNH 34934-34935, 2 ♂♂ (in alcohol, skulls extracted), 25.iv.1985, Komangaan (Kotamobagu – Inobonto), N. Sulawesi, 0° 49' N 124° 12' E, cave in limestone ridge, leg. F. G. Rozendaal; RMNH 34898-34899, ♂, ♀ (in alcohol, skulls extracted), 27.viii.1985, Saumlaki, Yamdena I., Tanimbar Is., 7° 57' S, 131° 19' E, Japanese ammunition caves in limestone escarpment, leg. F. G. Rozendaal.

Measurements and weights— (RMNH 34934-34935, 34898-34899, in that order): length of forearm 45.8, 45.4, 41.6, 41.0; length of tibia 20.3, 20.1, 19.1, 18.4; length of tail 51.3, 51.5, 46.3, 47.4; greatest length of skull 14.3, 14.2, 13.3, 13.3; condylobasal length 13.8, 13.6, 12.9, 12.8; condylocanine length 13.2, 13.0, 12.1, 12.0; width across anteorbital foramina 3.9, 3.8, 3.5, 3.5; least postorbital width 3.7, 3.7, 3.4, 3.3; zygomatic width —, 7.9, —, 7.4; width of braincase 7.5, 7.4, 7.1, 7.0; mastoid width 8.3, 7.9, 7.5, 7.5; $c^1 - c^1$ (alveoli) 4.1, 4.1, 3.9, 3.9, (cingula) 4.2, 4.2, 4.0, 4.0; $m^3 - m^3$ 5.8, 5.8, 5.4, 5.4; $c - m^3$ 5.4, 5.4, 5.1, 5.0; length complete mandible from condyles 10.0, —, —, 9.3; length right ramus from condyle 10.4, 10.3, 9.9, 9.5; $c - m_3$ 5.8, 5.8, 5.5, 5.5; weight 8.1, 8.6, 5.8, 6.0 g.

Remarks. — Specimens from N. Sulawesi are a little larger in some respects than those measured by Hill (1983: 177) and correspond more closely to examples from New Guinea. Those from the Tanimbar Islands are apparently the first of this species to be recorded from this group and are similar in size to those from the islands of Ambon and Seram.

### **Murina florium florium** Thomas, 1908

*Murina florium* Thomas, 1908: 371 – Flores, Lesser Sunda Islands.

Specimens examined. — RMNH 33374, ♀ (in alcohol, skull extracted), 25.i.1985, Sungei Moinakom, Dumoga-Bone N. P., N. Sulawesi, 0° 41' N 124° 03' E, primary forest, alt. 625 m, leg. F. G. Rozendaal; RMNH 34894, ♂ (in alcohol, skull extracted), 11.iv.1985, Hog's Back, Dumoga-Bone N. P., N. Sulawesi, 0° 35' N 123° 52' E, alt. 492 m, leg. F. G. Rozendaal.

Measurements and weights. — (RMNH 33374, 34894, in that order): length of forearm 32.9, 34.6; greatest length of skull 15.7, 16.2; condylobasal length 14.3, 14.6; condylocanine length 13.8, 14.1; palatal length c. 6.6, 7.0; length of palate to gnathion 8.0, 8.3; width across anteorbital foramina 4.1, 4.2; least postorbital width 4.5, 4.3; zygomatic width 9.2, 9.3; width of braincase 7.9, 7.5; mastoid width 8.0, 7.9; $c^1 - c^1$ (alveoli) 3.8, 4.0, (cingula) 4.0, 4.2; $m^3 - m^3$ 5.5, 5.6; $c - m^3$ 5.2, 5.4; length complete mandible from condyles 10.3, 10.5; length right ramus from condyle 10.8, 11.0; $c\text{-}m_3$ 5.8, 6.0; weight 5.25, 5.5 g.

Discussion. — These are the first specimens of *Murina* to be reported from the island of Sulawesi, although Tate (1941b: 578) referred two examples from Peleng Island to *M. florium*, with no further details. In size and general features these Sulawesian specimens agree quite closely with the holotype (BM(NH) 63.12.26.14) of *M. f. florium* but have a longer, slightly more pronounced rostral depression, the rostrum a little narrower anteriorly, with the narial and pre-palatal emarginations a fraction narrower. The rostral depression tends towards that found in *M. f. lanosa* Thomas, 1910, or in *M. toxopei* Thomas, 1923.

### **Murina florium lanosa** Thomas, 1910

*Murina lanosa* Thomas, 1910: 534 – Seram I., Moluccas.
(?)*Murina toxopei* Thomas, 1923: 254 – En Biloro, Buru, Moluccas.

Specimens examined. — RMNH 33381, ♀ (in alcohol, skull extracted), 10.v.1983, lower slopes of Gunung Sibela, inland from Ngame, near Wayaua, Bacan, N. Moluccas, 0° 47' S, 127° 35' E, primary forest, alt. c. 125 m, leg. F. G. Rozendaal; Queensland Museum JM 4423, ♂ (in alcohol, skull extracted), 6.x.1983, 2 km E. of Jack Gordon's Mine, Iron Range, Queensland, Australia, 12° 40' S, 143° 20' E, leg. S. Flavell, M. Adams & C. H. S. Watts.

Measurements and weights. — (RMNH 33381, JM 4423, in that order): length of forearm 34.3, 33.1; greatest length of skull 16.8, 16.1; condylobasal length 15.0, 14.6; condylocanine length 6.7, 6.5; palatal length 6.7, 6.5; length of palate to gnathion 8.0, 8.1; width across anteorbital foramina 4.4, 4.5; least postorbital width 4.3, 4.1; zygomatic width 9.1, 9.3; width of braincase 7.8, 7.6; mastoid width 8.1, 8.1; $c^1 - c^1$ (alveoli) 3.8, 3.9, (cingula) 4.0, 4.0; $m^3 - m^3$ 5.6, 5.4; $c - m^3$ 5.2, 5.2; length of complete mandible from condyles 10.8, 10.5; length right ramus from condyle 11.2, 10.9; $c - m_3$ 6.0, 5.8; weight (RMNH 33381) 5.4 g.

Discussion. — No specimen of Murina has been hitherto recorded from the island of Bacan or indeed from any of the islands of the North Moluccas. This example resembles the holotype (BM(NH) 10.3.4.24) of *M. f. lanosa* in almost

every essential respect: compared with the holotype of *M. f. florium* the braincase is slightly more elongate, the rostrum a little longer relatively and the palate relatively longer and narrower. The tail, hindlimbs and uropatagium are a little more densely haired: Thomas, in his descriptions of *lanosa* and *toxopei*, placed some weight on this feature. The specimen from Bacan is slightly smaller than examples from the islands of Seram and Goram, measured by Hill (1983: 193).

There is only one previous record of *Murina* from Australia: Richards et al. (1982: 148) referred a specimen from a locality on the Great Dividing Range, near Atherton, north Queensland ( at 17° 17' S 145° 25' E) to *M. florium*. The further example here reported is considerably smaller in some respects than the one previously recorded, in length of forearm and cranial size agreeing more closely with *M. f. florium* than with *M. f. lanosa* or *toxopei* from the Moluccas. However, the limited number of available specimens suggests that western examples of *M. florium* have a relatively wider palate than those from the eastern part of the range, although the difference is small. Also, the tail, hindlimbs and uropatagium of eastern specimens are rather more densely haired than in western examples.

There seem few if any consistent grounds for the retention of *toxopei* as a distinct subspecies, although the material on which this suggestion is based is scanty. Thomas (1910: 534; 1923: 254) diagnosed *lanosa* and *toxopei* on essentially the same character, namely the greater pilosity of the tail, hindlimbs and uropatagium when compared with *M. suilla* (Temminck, 1840) and *M. florium*. The holotypes of *lanosa* (BM(NH) 10.3.4.24) and *toxopei* (BM(NH) 23.1.2.27) are almost identical in size (Hill, 1983: 193). There are some slight cranial and dental differences. The holotype of *toxopei* has a broad, shallow, diffuse rostral sulcus, and the anterior upper premolar ($pm^2$) is slightly shortened and compressed in the toothrow. The rostral sulcus in the holotype of *lanosa* is longer, extending further towards the frontal region and towards the narial emargination, while $pm^2$ is somewhat less compressed. The specimen recorded here from Bacan almost exactly resembles the holotype of *lanosa* in the details of the rostral sulcus and of $pm^2$, except that this tooth is very slightly less compressed in the row. A second specimen from Seram (BM(NH) 7.1.1.482) has a short, broad sulcus like that of *toxopei* and its $pm^2$ is shortened and slightly compressed as in the holotype of *toxopei* and to some extent in the example from Bacan. An example from Goram Island (BM(NH) 10.3.4.115) has a short, shallow sulcus similar to that of *toxopei* and a slightly compressed $pm^2$: in this specimen the right $pm^2$ is shorter and more compressed than the corresponding tooth in the left side of the jaw. A specimen from Ruk Island, in the Bismarck Archipelago (BM(NH) 14.4.1.33) has a

shallow longitudinal sulcus, with $pm^2$ slightly compressed: the Australian example recorded here has a very shallow sulcus but a strongly compressed $pm^2$ like that of the holotype of *toxopei* while the other Australian specimen, recorded by Richards et al. (1982: 148-149), apparently has a shallow sulcus and relatively uncompressed $pm^2$. Thus there appears to be little that is consistent for subspecies diagnosis and it seems likely that only one subspecies occurs in the eastern part of the range of *M. florium*.

**Kerivoula hardwickii hardwickii** (Horsfield, 1824)

*Vespertilio hardwickii* Horsfield, 1824: unpaginated – Java.

Specimens examined. — BM(NH) 84.2060, ♀, undated, Gomantong, 5° 31' N 118° 04' E, alt. 30 m; BM(NH) 84.2061, ♀, 8.xi.1982, Madai caves, 4° 43' N 118° 09' E, alt. 80 m; BM(NH) 84.2062, ♀, 19.xii.1982, near Park Headquarters, Mount Kinabalu, 6° 05' N 116° 33' E, alt. 1500 m; BM(NH) 84.2063, ♀, 31.i.1983, Lumerau, 5° 12' N 118° 52' E, alt. 40 m, all leg. C. M. Francis; all Sabah, Borneo (in alcohol, skulls of 84.2061 and 84.2062 extracted); RMNH 34896-34897, ♂, ♀ (in alcohol, skull of 34987 extracted), 10.iv.1985, Edwards' camp, Dumoga-Bone N. P., N. Sulawesi, 0° 37' N 123° 51' E, primary forest, alt. 664 m, leg. F. G. Rozendaal; RMNH 34895, ♀ (in alcohol, skull extracted), inland from Kuala Masing (Beo – Matahit), Karakelang I., Talaud Is., 4° 12' N 126° 48' E, disturbed primary forest, leg. F. G. Rozendaal; ZMB 92374-92375, unsexed (skins and skulls, both damaged), undated, Esang, Karakelang I., Talaud Is., leg. W. Cursham; MZB 138/38, 139/38, ♀, ♂ (skins and skulls), 6-7.ix.1938, NW. Noesa Penida, near Bali, E. of Java, leg. Bali-Expedition Baron Victor von Plessen, 1937/1938.

Measurements. — (BM(NH) 84.2060-2063, RMNH 34896-34897, 34995, ZMB 92374-92375, MZB 138/38-139/38; skulls of 84.2061- 84.2062, 34897, 34895, 92374-92375, 138/38-139/38, in that order): length of forearm 32.0, 31.6, 36.5, 32.9, 31.7, 35.6, 37.1, —, —, 34.4, 32.5; greatest length of skull 13.8, 14.8, 13.9, 14.5, —, —, 14.9, 14.5; condylobasal length 12.6, 13.8, 13.0, 13.5, —, —, 13.7, 13.3; condylocanine length 12.4, 13.6, 12.8, 13.3, —, —, 13.2, 12.9; width across anteorbital foramina 2.9, 3.5, 3.1, 3.4, —, —, 3.5, 3.4; least postorbital width 3.1, 3.5, 3.2, 3.4, 3.3, 3.3, 3.2, 3.3; zygomatic width 8.0, 9.1, 8.7, 9.0, —, —, 8.9, —; width of braincase 6.9, 7.4, 7.0, 6.9, —, —, 7.2, 7.3; depth of braincase 5.4, 5.8, 5.7, 5.8, —, —, —, 5.7; mastoid width 7.0, 7.8, 7.5, 7.5, —, —, 7.7, 7.5; $c^1 - c^1$ (alveoli) 3.2, 3.6, 3.3, 3.5, —, 3.5, 3.5, 3.4, (cingula) 3.3, 3.7, 3.5, 3.5, 3.6, —, 3.6, 3.7, 3.6; $m^3 - m^3$ 5.2, 5.6, 5.3, 5.6, —, 5.2, 5.5, 5.5; $c - m^3$ 5.2, 5.9, 5.5, 5.8, 5.7, 5.9, 5.6; length complete mandible from condyles —, 10.0, 9.9, 10.1, 10.0, 10.1, 10.4, 9.8; length right ramus from condyle 9.5, 10.6, 10.1, 10.5, —, 10.4, 10.6, 10.1; $c - m_3$ 5.6, 6.3, 5.9, 6.1, 6.1, 6.1, 6.2, 6.1.

Remarks. — Specimens from the Philippines, Borneo and Sulawesi were thought by Hill (1965: 542) to tend to be smaller in some respects than

examples from Java, Sumatra and Malaya, but the differences are bridged or nullified by BM(NH) 84.2062 from Sabah, a larger Sulawesian example (BM(NH) 82.146) reported by Hill (1983: 194) and by the further material from that island reported here, and by specimens from the Talaud Islands, whence there appears to be no previous report of the species.

Field notes. — Specimen RMNH 34895 was one of c. ten bats found roosting under leaves, about one metre above the forest floor.

### **Kerivoula flora** Thomas, 1914

*Kerivoula flora* Thomas, 1914b: 441 – S. Flores, Lesser Sunda Islands.

Specimen examined. — BM(NH) 84.2081, ♀ (in alcohol, skull extracted), undated, Gomantong, Sabah, Borneo, 5° 31' N 118° 04' E, leg. C. M. Francis.

Measurements. — (Holotype of *K. flora* in parentheses): length of forearm 38.9 (38.7); greatest length of skull 15.3 (15.7); condylocanine length 14.0 (14.4); palatal length 7.2 (7.0); width across anteorbital foramina 3.5 (3.4); least postorbital width 3.3 (3.3); zygomatic width 9.8 (9.5); width of braincase 7.4 (7.7); depth of braincase 6.4 (6.1); mastoid width — (8.0); $c^1 - c^1$ (alveoli) 3.8 (3.7), (cingula) 3.9 (3.8); $m^3 - m^3$ 5.8 (5.7); $c - m^3$ 6.4 (6.1); length complete mandible from condyles 11.0 (11.0); length right ramus from condyle 11.4 (11.2); $c - m_3$ 7.2 (6.8).

Discussion. — Sody (1933: 76) suggested that *flora* might be a subspecies of *K. hardwickii*, a view adopted by Mertens (1936: 304) who recorded *K. hardwickii flora* from Sumbawa (Lesser Sunda Islands). It was listed as a subspecies of *K. papillosa* (Temminck, 1840) by Laurie & Hill (1954: 76) but is considerably smaller than *K. p. papillosa* or *K. p. malayana* Chasen, 1940. Hill (1965: 543) again associated it with *K. hardwickii* on grounds of size and on account of its relatively unwidened rostrum and unexpanded canines.

Apart from its slightly shorter skull this specimen from Sabah agrees in every material respect with the holotype (BM(NH) 97.4.18.22) of *flora*. Both differ from *K. hardwickii* in greater size; relatively longer, narrower rostrum; relatively narrower palate, more linear upper toothrows which are not pinched in at the posterior upper premolars ($pm^{4-4}$); and relatively narrow post-palatal extension and mesopterygoid fossa. A large example (BM(NH) 84.2062) of *K. hardwickii* was also obtained at Mount Kinabalu, but is equalled in most respects of size by a similarly large specimen (MZB 138/38) from the island of Nusa Penida, near Bali (see above). In the Bornean example of *flora* the narial emargination is slightly more V-shaped than in the holotype, the pre-palatal

emargination is a little narrower, and the teeth are slightly more massive. The nearly sympatric occurrence of *flora* with *K. hardwickii* thus necessitates the recognition of the former as a distinct species.

A large specimen (length of forearm 34, greatest length of skull 15.3, condylobasal length 11.6 (sic), palatal length 7.6, least postorbital width 3.6, zygomatic width 9.2, width of braincase 7.8, c – $m^3$ 6.2, c – $m_3$ 6.6) recorded by Sody (1933: 76) from Bali seems likely to represent *K. flora* rather than *K. hardwickii* to which he referred it. Mertens (1936: 282) lists *K. hardwickii* from Bali, probably following Sody (1933), but Tate (1941b: 597) reports a series of this species from that island, and specimens from the nearby island of Noesa Penida are recorded and measured in this paper.

### **Kerivoula myrella** Thomas, 1914

*Kerivoula myrella* Thomas, 1914a: 438 – Manus I., Admiralty Is.

Specimens examined. — RMNH 34137-34138, ♂, ♀ (in alcohol, skulls extracted; both damaged), undated, Wetar I., Lesser Sunda Islands, leg. K. Schädler.

Measurements. — (RMNH 34137, 34138, in that order): length of forearm 34.0, 31.3; greatest length of skull —, —; condylobasal length —, —; condylocanine length —, —; width across anteorbital foramina —, 3.8; least postorbital width —, —; zygomatic width —, 9.3; width of braincase —, —; depth of braincase —, —; mastoid width —, —; $c^1$ – $c^1$ (alveoli) —, 3.6, (cingula) —, 3.8; $m^3$ – $m^3$ —, 5.7; c – $m^3$ 5.8, 6.2; length complete mandible from condyles 9.9, —; length right ramus from condyle 10.1, 11.4; c – $m_3$ 6.3, 6.6.

Discussion. — *Kerivoula myrella* was hitherto known only from the islands of Manus, Ruk, Duke of York and New Britain (Koopman, 1979: 10), off the north-eastern coast of New Guinea. These specimens from Wetar Island have canines which, though not quite as expanded at the base as those of the small representation of *myrella* in the British Museum (Natural History), are nevertheless more massive basally than those of *K. hardwickii* or *K. flora*. Also, as in *myrella*, the rostrum in these specimens is slightly broadened anteriorly, its narrowest width being across the second upper premolars ($pm^{3-3}$) rather than across the anterior pair ($pm^{2-2}$) as in *hardwickii* or *flora*, in which the rostrum tends to narrow anteriorly. In *hardwickii* and *flora* the width across the canine cingula is similar to or only slightly exceeds the width across $pm^{2-2}$; in *myrella* it considerably exceeds this distance. *K. hardwickii* extends eastwards to Kangean Island, Sulawesi and Peleng Island, and in the Lesser Sunda Islands at

least to Bali, Noesa Penida Island, and perhaps Sumba (Pohle, 1950: 334). Relatively few specimens of *Kerivoula* have been reported from the region east of Wallace's Line and more material may show that *myrella* is an eastern subspecies of *K. hardwickii* which it closely resembles except for those points already noted.

### **Kerivoula papillosa malayana** Chasen, 1940

*Kerivoula papillosa malayana* Chasen, 1940: 55 – Ginting Bedai, Selangor – Pahang boundary, Malaya, 2300 ft.

Specimens examined. — RMNH 34983, ♂ (in alcohol, skull extracted), 25/26.iii.1985, rentis area, Toraut, Dumoga-Bone N. P., N. Sulawesi, 0° 34' N 123° 54' E, alt. 225 m, leg. F. G. Rozendaal.

Measurements and weight. — Length of forearm 46.2; greatest length of skull 18.1; condylobasal length 17.2; condylocanine length 16.9; width across anteorbital foramina 4.2; least postorbital width 3.6; zygomatic width 11.5; width of braincase 8.5; depth of braincase 7.5; mastoid width 9.1; $c^1 - c^1$ (alveoli) 4.8, (cingula) 4.9; width inside $m^1 - m^1$ 3.2; $m^3 - m^3$ 7.0; $c - m^3$ 7.5; length complete mandible from condyles 13.1; length of right ramus from condyle 13.5; $c - m_3$ 8.0; weight 11.7 g.

Remarks. — This is the second record of *K. p. malayana* from Sulawesi, the first coming from the central part of the island at the River Ranu, 1° 51' N 121° 30' E (Hill, 1983: 194). For the present Sulawesian specimens are referred to *malayana*, since the nominate subspecies *K. p. papillosa* (Temminck, 1840) from Java is poorly known.

### **Tadarida (Mops) sarasinorum sarasinorum** (Meyer, 1899)

*Nyctinomus sarasinorum* Meyer, 1899: 16, pl. 4 figs. 4-6, pl. 10 figs. 3,4, 28, pl. 11 figs. 2, 2a – Batulappa, N. of Lake Tempa, SE. Central Sulawesi.

Specimen examined. — RMNH 34888, ♀ (in alcohol, skull extracted), 28/29.iii.1985, Sungei Tumpah, Dumoga-Bone N. P., N. Sulawesi, 0° 34' N 123° 54' E, primary forest, alt. 225 m, leg. F. G. Rozendaal.

Measurements and weight. — (RMNH 34888, AMNH 109063 (*sarasinorum*); 232 (*lanei*), in that order): length of forearm 38.3, —, —; greatest length of skull 18.4, 18.6, 19.4; condylobasal length 17.2, 18.0, 17.9; condylocanine length 16.5, 17.2, 17.3; palatal length 7.1, —, —; width across supraorbital tubercles 6.8, —, —; least postorbital width 4.3, 4.3, 4.5; zygoma-

tic width 11.9, 11.8, 12.0; width of braincase 9.7, 9.6, 10.1; mastoid width 11.0, 11.0, 11.4; $c^1 - c^1$ (alveoli) 4.7, 4.7, 4.7, (cingula) 4.8, —, —; $m^3 - m^3$ (alveoli) 8.4, 8.5, 8.4, (crowns) 8.4, —, —; $c - m^3$ (alveoli) 6.2, 6.8, 6.9, (crowns) 6.4, 6.8, 6.8; $pm^4 - m^3$ (alveoli) 5.0, 5.2, 5.2; $m^{1-3}$ 4.2, 4.3, 4.3; length complete mandible from condyles 12.2, —, 12.7; length right ramus from condyle 12.6, —, —; $c - m_3$ (crowns) 7.0, 7.3, 7.4. Measurements of *T. (M.) mops* appear in Hill (1961: 40); weight (RMNH 34888): 19.7 g.

Discussion. — This specimen agrees closely with the description of a series from Peleng Island by Tate (1941c: 3). Dorsally, it is chestnut brown, with a naked area at the back of the head behind the junction of the ears, but the fur is only slightly thinned on the neck just anterior to the scapulae. It has distinct supraorbital prominences or tubercles and shallow basial pits; the anterior upper premolar ($pm^2$) is lacking; $m^3$ is reduced, lacking a third commissure, with the second commissure about one third the length of the first, and the crown area of the anterior lower premolar ($pm_2$) is about one half or a little less the crown area of the second lower premolar ($pm_4$), and its height about three quarters the height of that tooth.

Hill (1961: 42) referred *Philippinopterus lanei* Taylor, 1934 from Saub, Cotabato, Mindanao Island, Philippines, to *Tadarida (Mops)*, but lacking specimens of either this species or of *T. (M.) sarasinorum* retained it as a valid species. Since then Freeman (1981: 160) considered *sarasinorum* and *lanei* to be conspecific, listing the latter as a valid subspecies but without providing supporting data. Through the courtesy of Dr. K. F. Koopman of the American Museum of Natural History in New York it was possible in 1970 to examine the skull of one of the specimens of *sarasinorum* from Peleng Island recorded by Tate (1941c: 3; ♀ AMNH 109063) and of an example (♂ 232) of *lanei* from Taylor's own collection and from the original series.

This comparison of *sarasinorum* and *lanei* shows no major points of difference apart from variations probably due to sex and age: the rostrum of the specimen of *sarasinorum* is a little lower and wider, the narial emargination a little wider posteriorly, and its cranial crests are slightly less substantial. It is, however, slightly smaller in some respects. There is therefore every reason to consider *sarasinorum* and *lanei* conspecific or even synonymous, but both differ from *T. (M.) mops* in smaller size, a narrower, less elongate braincase, a relatively shorter, narrower rostrum, and smaller teeth, the canines especially being less massive at the base.

Field notes. — Specimen RMNH 34888 was one of examples mistnetted high (c. 15 m) over the river Tumpah.

**Mormopterus beccarii beccarii** Peters, 1881

*Mormopterus beccarii* Peters, 1881: 484, fig. 5 – Ambon I., Moluccas.

Specimen examined. — RMNH 34891, ♀ (in alcohol, skull extracted), 31.viii/1.ix.1985, confluence of Jenama Ake and Akelamo rivers, E. of Akelamo, C. Halmahera, N. Moluccas, 0° 34' N 127° 37' E, primary forest, alt. 100 m, leg. F. G. Rozendaal.

Measurements and weight. — Length of forearm 33.8; greatest length of skull 17.0; condylobasal length 16.1; condylocanine length 15.9; palatal length 7.0; least postorbital width 4.5; zygomatic width —; width of braincase 8.0; mastoid width 10.2; $c^1 - c^1$ (alveoli) 4.3, (cingula) 4.4; $m^3 - m^3$ (alveoli) 7.4, (crowns) 7.5; $c - m^3$ (alveoli) 6.0, (crowns) 6.1; $pm^4 - m^3$ (alveoli) 4.6; length complete mandible from condyles 11.7; length right ramus from condyle 12.2; $c - m_3$ (crowns) 6.5; weight 12.0 g.

Remarks. — There is no previous record of *M. beccarii* from Halmahera. Although in many respects bridging the slight size differences between *M. b. beccarii* from Ambon Island and *M. b. astrolabiensis* (Meyer, 1899) from New Guinea, this example is referred to the former subspecies on account of its slightly smaller teeth. Hill (1983: 196-197) measured and discussed both subspecies.

Field notes. — The specimen was mistnetted c. 10 m high over the river Jenama Ake, in undisturbed primary forest.

## SUMMARY

This paper reports the following new distributional records of Australasian Microchiroptera:

Borneo (Sabah): *Kerivoula flora*.

Sulawesi: *Philetor brachypterus rohui*, *Murina florium florium*.

Malenge I., Togian Is., Sulawesi: *Myotis ater*.

Sangihe Is.: *Megaderma spasma celebensis*, *Rhinolophus celebensis celebensis*, *Hipposideros diadema speculator*.

Talaud Is.: *Rhinolophus celebensis celebensis*, *Hipposideros cervinus cervinus*, *H. diadema speculator*, *Myotis adversus moluccarum*, *Pipistrellus javanicus*, *Kerivoula hardwickii hardwickii*.

Halmahera I., North Moluccas: *Rhinolophus euryotis timidus*, *Hipposideros papua*, *Mormopterus beccarii beccarii*.

Bacan I., North Moluccas: *Hipposideros papua*, *Murina florium lanosa*.

Yamdena I., Tanimbar Is., South Moluccas: *Emballonura alecto alecto*, *Hipposideros diadema diadema*, *Miniopterus pusillus macrocneme*.

Flores I., Lesser Sunda Islands: *Rhinolophus affinis princeps*, *Hipposideros bicolor bicolor*, *Myotis adversus adversus*, *Pipistrellus javanicus*.

Solor I., Lesser Sunda Islands: *Rhinolophus affinis princeps*.

Wetar I., Lesser Sunda Islands: *Kerivoula myrella*.

Further records of *Emballonura nigrescens papuana* from Halmahera, *Taphozous (Saccolaimus) saccolaimus*, *Hipposideros cervinus cervinus*, *Myotis muricola browni*, *Kerivoula papillosa malayana* and *Tadarida (Mops) sarasinorum sarasinorum* from Sulawesi, *Hipposideros papua* from Irian Jaya, New Guinea, and *Murina florium lanosa* from Australia are also reported.

Taxonomic notes include the description of further specimens of *Hipposideros papua*, hitherto known only from its original material; the deletion of Java from the known distribution of *Philetor brachypterus*; a brief review of *Murina* occurring east of Sulawesi, *M. toxopei* Thomas, 1923 from Buru being considered a probable synonym of *M. florium lanosa* Thomas, 1910 from the nearby island of Seram; a re-examination of the status of *Kerivoula flora* Thomas, 1914 and its recognition as a species distinct from *K. hardwickii* and *K. papillosa* with which at times it has been associated as a subspecies; and a comparison of *Tadarida (Mops) sarasinorum* from the Philippines and Sulawesi. Dental anomalies in a specimen of *Myotis ater* (absence of $pm^{3-3}$ and $pm_{3-3}$) and one of *Philetor brachypterus rohui* (presence of $pm^{2-2}$) are reported and discussed.

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## REFERENCES

Andersen, K., 1905a. On some bats of the genus Rhinolophus with remarks on their mutual affinities, and descriptions of twenty-six new forms. – Proc. zool. Soc. Lond. 2: 75-145, 3 figs., 12 tabs., 2 pls.

Andersen, K., 1905b. On the bats of the Rhinolophus arcuatus group, with descriptions of five new forms. – Ann. Mag. nat. Hist. (7) 16: 281-288.

Andersen, K., 1918. Diagnoses of new bats of the families Rhinolophidae and Megadermatidae. – Ann. Mag. nat. Hist. (9) 2: 374-384.

Bergmans, W. & F. G. Rozendaal, 1988. Notes on collections of fruit bats from Sulawesi and some off-lying islands (Mammalia, Megachiroptera). – Zool. Verh. Leiden 248: 1-74, 14 figs., 14 tabs.

Bergmans, W. & P. J. H. van Bree, 1986. On a collection of bats and rats from the Kangean Islands, Indonesia (Mammalia: Chiroptera and Rodentia). – Z. Säugetierk. 51: 329-344, 1 fig., 2 tabs.

Chasen, F. N., 1940. A handlist of Malaysian mammals. – Bull. Raffles Mus. 15: i-xx, 1-209, map.

Cuvier, F., 1832. Essai de classification naturelle des vespertilions, et description de plusieurs espèces de ce genre. – Nouv. Ann. Mus. Hist. nat. Paris 1: 1-21, 2 pls.

Dobson, G. E., 1871. Note on nine new species of Indian and Indo-Chinese Vespertilionidae, with remarks on the synonymy and classification of some other species of the same family. – Proc. Asiatic Soc. Bengal: 210-215.

Eydoux, F. & P. Gervais, 1836. Voyage autour du monde de la corvette Favorite. Nycticée Alecto. Vespertilio (Nycticeius) alecto, Nob. – Mag. Zool. Paris 6: 7-8.

Feiler, A., 1980. Taphozous saccolaimus Temminck, 1841 auf Sulawesi (Celebes) (Mammalia, Chiroptera, Emballonuridae). – Zool. Abh. st. Mus. Tierk. Dresden 8: 143-145, 4 figs.

Francis, C. M. & J. E. Hill, 1986. A review of the Bornean Pipistrellus (Mammalia: Chiroptera). – Mammalia 50: 43-55, 3 figs., 1 tab.

Freeman, P., 1981. A multivariate study of the family Molossidae (Mammalia, Chiroptera): morphology, ecology, evolution. – Fieldiana Zool. Pub. 1316 (n.s. no. 7): i-viii, 1-178, 25 figs., 12 tabs.

Geoffroy, E., 1813. Sur un genre de chauve-souris sous le nom de Rhinolophus (1). – Ann. Mus. Hist. nat. Paris 20: 254-266, 2 pls.

Goodwin, R. E., 1979. The bats of Timor: systematics and ecology. – Bull. Am. Mus. nat. Hist. 163: 73-122, 4 figs., 3 tabs.

Gould, J., 1855-1863. The mammals of Australia, 3. Taylor & Francis, London.

Gray, J. E., 1838. A revision of the genera of bats (Vespertilionidae), and the description of some new genera and species. – Mag. Zool. Bot. 2: 483-505.

Hill, J. E., 1961. Indo-Australian bats of the genus Tadarida. – Mammalia 25: 29-56.

Hill, J. E., 1963. A revision of the genus Hipposideros. – Bull. Br. Mus. nat. Hist. (Zool.) 11: 1-129, 41 figs., 2 tabs.

Hill, J. E., 1965. Asiatic bats of the genera Kerivoula and Phoniscus (Vespertilionidae), with a note on Kerivoula aerosa Tomes. – Mammalia 29: 524-556.

Hill, J. E., 1971. The status of Vespertilio brachypterus Temminck, 1840 (Chiroptera: Vespertilionidae). – Zool. Med. Leiden 45: 139-146.

Hill, J. E., 1983. Bats (Mammalia: Chiroptera) from Indo-Australia. – Bull. Br. Mus. nat. Hist. (Zool.) 45: 103-208, 14 tabs.

Hill, J. E. & G. Topál, 1973. The affinities of Pipistrellus ridleyi Thomas, 1898 and Glischropus rosseti Oey, 1951 (Chiroptera: Vespertilionidae). – Bull. Br. Mus. nat. Hist. (Zool.) 24: 447-456.

Hill, J. E., A. Zubaid & G. W. H. Davison (1986). The taxonomy of leaf-nosed bats of the Hipposideros bicolor group (Chiroptera: Hipposideridae) from southeastern Asia. – Mamma lia 50: 535-540, 1 tab.

Horsfield, T., 1822-1824. Zoological researches in Java, and the neighbouring islands. Kingsbury, Parbury & Allen, London. Unpaginated.

Jenkins, P. D. & J. E. Hill, 1981. The status of Hipposideros galeritus Cantor, 1846 and Hipposideros cervinus (Gould, 1854) (Chiroptera: Hipposideridae). – Bull. Br. Mus. nat. Hist. (Zool.) 41: 279-294, 3 figs.

Kitchener, D. J. & S. Foley, 1985. Notes on a collection of bats (Mammalia: Chiroptera) from Bali I., Indonesia. – Rec. Western Austr. Mus. 12: 223-232, 2 tabs.

Kock, D., 1981. Philetor brachypterus auf Neu-Britanien und den Philippinen (Mammalia: Chiroptera: Vespertilionidae). – Senckenberg. biol. 61: 313-319, 4 figs., 1 tab., map.

Koopman, K. F., 1979. Zoogeography of mammals from islands off the northeastern coast of New Guinea. – Am. Mus. Novit. 2690: 1-17, 1 fig., 3 tabs.

Koopman, K. F., 1983. A significant range extension for Philetor (Chiroptera, Vespertilionidae) with remarks on geographical variation. – J. Mammal. 64: 525-526.

Laurie, E. M. O. & J. E. Hill, 1954. List of land mammals of New Guinea, Celebes and adjacent islands 1758 – 1952. British Museum (Natural History), London.

Mertens, R., 1936. Die Säugetiere der Inseln Bali, Lombok, Sumbawa und Flores (Beiträge zur Fauna der Kleinen Sunda- Inseln, II). – Zool. Jahrb. (Syst.) 68: 273-324, 2 pls.

Meyer, A. B., 1899. Säugethiere von Celebes und Philippinen-Archipel; II. Celebes-Sammlungen der Herren Sarasin. – Abh. Ber. K. zool. anthrop.-ethn. Mus. Dresden 7: 1-55, 7 pls.

Peters, W., 1867. Über einige neue oder weniger bekannte Flederthiere. – Mber. K. preuss. Akad. Wiss. Berl. (1866): 16-25.

Peters, W., 1881. Über die Chiropterengattung Mormopterus und die dahin gehörigen Arten. – Mber. K. preuss. Akad. Wiss. Berl.: 482-485, 5 figs.

Pohle, H., 1950. Zur Säugetiergeographie der Kleinen Sundainseln. In Jordans, A. Von & F. Peus (eds.). Kleinschmidt Syllegomena Biologica, Leipzig. Festschrift zum 80. Geburtstage von Herrn Pastor Dr. Med. H. C. Otto Kleinschmidt: 319-346, 3 figs., 5 tabs.

Revilliod, P., 1914. Les mammifères de la Nouvelle-Calédonie et des îles Loyalty. – Nova Caledonia 1: 341-365, 1 pl.

Richards, G. C., L. H. Hall, P. M. Helman & S. K. Churchill, 1982. First discovery of a specimen of the rare tube-nosed bats (Murina) in Australia. – Aust. Mamm. 5: 149-151, 1 fig.

Rozendaal, F. G., 1984. Notes on macroglossine bats from Sulawesi and the Moluccas, Indonesia, with the description of a new species of Syconycteris Matschie, 1899 from Halmahera (Mammalia; Megachiroptera). – Zool. Med. Leiden 58: 187-212, 5 figs., 7 tabs.

Shamel, H. H., 1940. The insectivorous bats collected by H. C. Raven in Celebes. – J. Mammal. 21: 352-354.

Sody, H. J. V., 1933. On the mammals of Bali (with a note on the races of Callosciurus of Java). – Natuurk. Tijdschr. Ned.-Ind. 93: 56-95.

Strien, N. J. van, 1986. Abbreviated checklist of the mammals of the Australasian archipelago. School of Environmental Conservation Management, Bogor.

Tate, G. H. H., 1941a. Results of the Archbold Expeditions. No. 35. A review of the genus Hipposideros with special reference to Indo-Australian species. – Bull. Am. Mus. nat. Hist. 78: 353-393, 5 figs.

Tate, G. H. H., 1941b. Results of the Archbold Expeditions. No. 40. Notes on vespertilionid bats. – Bull. Am. Mus. nat. Hist. 78: 567-597, 4 figs.

Tate, G. H. H., 1941c. Results of the Archbold Expeditions. No. 38. Molossid bats of the Archbold Collections. – Am. Mus. Novit. 1142: 1-4.

Tate, G. H. H., 1942. Results of the Archbold Expeditions. No. 47. Review of the vespertilionine bats, with special attention to genera and species of the Archbold Collections. – Bull. Am. Mus. nat. Hist. 80: 221-297, 5 figs.

Taylor, E. H., 1934. Philippine land mammals. Monogr. Bureau of Science, Manila 30: 1-548, 25 figs., 25 pls.

Temminck, C. J., 1824-1841. Monographies de Mammalogie (Vol. I 1824-1827; Vol. II 1835-1841). D'Ocagne & Dufour, Paris.

Temminck, C. J., 1834. Over een geslacht der vleugelhandige zoogdieren, Bladneus genaamd. (Rhinolophus Geoff., Cuv., Illig., Desm.; Vespertilio Linn., Erxl.; Noctilio Kuhl). – Tijdschr. Natuurl. Gesch. Physiol. 1: 1-30, 1 pl.

Temminck, C. J., 1838. Over de geslachten Taphozous, Emballonura, Urocryptus en Diclidurus. – Tijdschr. Natuurl. Gesch. Physiol. 5: 1-34, 1 pl.

Thomas, O., 1902. On a new genus of vespertilionine bat from New Guinea. – Ann. Mag. nat. Hist. (7) 9: 220-222.

Thomas, O., 1908. New bats and rodents in the British Museum Collection. – Ann. Mag. nat. Hist. (8) 2: 370-375.

Thomas, O., 1910. Three new Asiatic mammals. – Ann. Mag. nat. Hist. (8) 5: 534-536.

Thomas, O., 1914a. On mammals from Manus Island, Admiralty group, and Ruk Island, Bismarck Archipelago. – Ann. Mag. nat. Hist. (8) 8: 434-439.

Thomas, O., 1914b. New Asiatic and Australian bats and a new bandicoot. – Ann. Mag. nat. Hist. (8) 8: 439-444.

Thomas, O., 1915. Two new species of Leuconoe. – Ann. Mag. nat. Hist. (8) 15: 170-172.

Thomas, O., 1923. On some small mammals, chiefly bats, from the East Indian archipelago. – Ann. Mag. nat. Hist. (9) 11: 250-255.

Thomas, O. & G. Doria, 1886. Note intorno ad alcuni chirotteri appartenenti al Museo Civico di Genoa e descrizione di due nuove specie del genere Phyllorhina. – Annali Mus. civ. Stor. nat. Genova (2) 4: 201-207, 1 fig.

Tomes, R. F., 1858. A monograph of the genus Miniopterus. – Proc. zool. Soc. Lond.: 115-128, 1 pl.