

# THE GUNONG BENOM EXPEDITION 1967

## 4. NEW RECORDS OF MALAYAN BATS, WITH TAXONOMIC NOTES AND THE DESCRIPTION OF A NEW *PIPISTRELLUS*

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THE 1967 Expedition to Gunong Benom, Pahang, 1965 resulted in the accession of a number of specimens of bats of especial taxonomic interest, including one example that has proved to represent an undescribed species of *Pipistrellus*. Additionally, during recent years, specimens of similar interest or in some cases representing species new to Malaya have been received from Lord Medway, formerly of the Unit of Zoology, School of Biological Sciences, at the University of Malaya, Kuala Lumpur.

All measurements in this paper are in millimetres: where these refer to a series of specimens the minimum and maximum values are given, followed by the mean in parentheses.

### *Rhinolophus malayanus* Bonhote, 1903

♀ B.M. 68.812 (in alcohol, skull extracted). Wang Tangga, Kaki Bukit, Perlis, 6° 39' N, 100° 12' E. 2 January 1968.

♂ B.M. 68.816, ♀♀ B.M. 68.813-815 (all in alcohol, skulls extracted). Kisap Forest Reserve, Pulau Langkawi, Kedah, 6° 23' N, 99° 52' E. 31 December 1967.

*Rhinolophus malayanus* is not listed from the States of Malaya by Chasen (1940: 36) and does not appear to have been subsequently recorded. Described originally from Biserat, Patani, southern Thailand, its presence in Perlis and on Pulau Langkawi is not unexpected. The species is recorded from Koh Lak, on the east coast of southern Thailand rather to the north of Patani by Gyldenstolpe (1916: 13), from the Laos Mountains by Andersen (1905a: 89) and from Laos by Tate and Archbold (1939: 6) and by Phillips (1967: 634), while Osgood (1932: 218) records it provisionally from Muong Moun, Tonkin (North Vietnam).

These specimens from Perlis and Langkawi agree closely with the type specimen, having the lancet with slightly concave lateral margins and an elongate tip and with the lateral margins of the sella almost parallel. The connecting process is rounded and rises slightly above the tip of the sella: its point of insertion on the

posterior leaf is a little above the corresponding insertion on the back of the sella. The small anterior premaxillary ( $pm^2$ ) is in the toothrow but much reduced: the second lower premaxillary ( $pm_3$ ) is slightly extruded or is external to the toothrow, with  $pm_2$  and  $pm_4$  sometimes almost in contact.

MEASUREMENTS (B.M. 68.812, 68.816, 68.813-815, in that order): length of forearm 40.3, 39.6, 42.2, 41.2, 40.7; width of sella, 2.2, 2.0, 2.1, 2.0, 1.9; greatest length of skull 18.2, 18.5, 18.0, 17.9, 18.0; condylocanine length 15.3, 15.5, 15.2, 15.2, 15.1; supraorbital length (distance from junction of supraorbital ridges to median anterior point of nasal swellings) —, 4.9, 4.9, —, 4.8; width of nasal swellings —, 4.9, 5.1, 5.1, 5.0; zygomatic width 8.8, 8.9, 8.8, 8.5, 8.8; least interorbital width —, 2.2, 2.3, 2.3, 2.4, width of braincase 7.4, 7.4, 7.4, 7.4, 7.4; mastoid width 8.4, 8.4, 8.2, 8.3, 8.3;  $c^1-c^1$  4.4, 4.5, 4.4, 4.2, 4.3;  $m^3-m^3$  6.7, 6.5, 6.5, 6.4, 6.3;  $c-m^3$  6.8, 6.8, 6.6, 6.5, 6.6; length of mandible 11.3, —, —, 11.4;  $c-m_3$  6.9, 7.2, 6.9, 6.8, 6.8.

*Rhinolophus malayanus* is very similar to *R. borneensis*, differing chiefly in the size and shape of the median anterior nasal swellings, which in *malayanus* are more inflated, higher, wider and more clearly demarcated than in *borneensis*, extending laterally down the sides of the rostrum and thereby reducing the area of the lateral swellings as compared with that species. Robinson and Kloss (1915 : 116) recorded as *R. borneensis* (?) a specimen from Khao Nawng, Bandon, southern Thailand but this subsequently became the type specimen of *R. robinsoni* Andersen (1918 : 375). An examination of the type specimen of *R. chaseni* Sanborn (1939 : 38) from Con Son Island (Pulo Condore), off the southeast coast of Indochina indicates that *chaseni* should be considered a subspecies of *R. borneensis* rather than related to *R. malayanus* as was suggested by its describer or conspecific with it as thought by Phillips (1967 : 634) from the published description.

### *Rhinolophus robinsoni* Andersen, 1918

A single specimen from Fraser's Hill, Pahang (see below) resembles the nominal species *robinsoni* and *klossi* in its major features and although in some respects it differs slightly from these, in others it connects them. They have never been described in detail and rest on brief diagnoses by Andersen in a key published (on behalf of Andersen by Oldfield Thomas) in 1918. The examination of a limited number of specimens suggests that they are conspecific: *robinsoni* has line priority and becomes the specific name.

The species is relatively small with large, bluntly pointed ears; prominent anti-tragal lobe; large anterior leaf covering the muzzle; lancet cuneate; sella wide, its central part (excluding the basal lobes) expanded laterally so that its width at this point nearly equals or is greater than the width at its base, but sharply constricted a little above its central point; upper margin of sella slightly convex; connecting process low and rounded, its insertion on the posterior leaf level with or beneath its

insertion on the back of the sella; third, fourth and fifth metacarpals subequal; second phalanx of third digit short, its length less than one and one half times the length of the first phalanx; braincase elongate with low sagittal crest; supraorbital region relatively long, the supraorbital length (from junction of supraorbital crests to median anterior point of nasal swellings) exceeding the width across the lateral anterior nasal swellings; a clearly defined frontal depression; prominent nasal swellings, the median anterior pair high and globular; mesopterygoid fossa wide with deep mesopterygoid pit; anterior upper premolar ( $pm^2$ ) in the toothrow, usually in contact with canine and posterior premolar ( $pm^4$ ); second lower premolar ( $pm_3$ ) small, partially or wholly extruded, with  $pm_2$  and  $pm_4$  sometimes in contact or nearly so. Measurements appear in Tables 1 and 2.

The external and cranial features of *R. robinsoni* refer it to the *ferrumequinum* group of Tate and Archbold (1939 : 2) (the *simplex* group of Andersen (1905a : 75, 1905b : 648) or *megaphyllus* group of that author (1918 : 374). Its wing structure places it in either the *simplex* (more properly the *megaphyllus*) or *borneensis* subgroups of Tate and Archbold<sup>1</sup> and not in the *affinis* subgroup as these authors defined it and in which they listed both *robinsoni* and *klossi*. The long supraorbital region of *robinsoni* is characteristic of the *simplex* subgroup but its rounded sella, short palatal bridge and extruded second lower premolar ally it more closely to the *borneensis* subgroup and the species is evidently closely related to *R. borneensis* which in many respects it resembles. However, in *R. borneensis* the sella is narrower with its lateral margins parallel or nearly so and the connecting process is inserted on the posterior leaf at a point above its insertion on the back of the sella. The supraorbital region is shorter and the median anterior nasal swellings in *borneensis* less globular and wider, extending laterally to the sides of the rostrum.

#### *Rhinolophus robinsoni robinsoni* Andersen, 1918

*Rh[inolophus] robinsoni* Andersen, 1918 : 375. Khao Nawng, Bandon, Lower Thailand.  
Type specimen B.M. 18.8.2.1 (in alcohol (in bad condition), skull extracted).

Larger than *R.r. klossi* with slightly narrower lancet; width of sella as in *klossi*, not greater as stated by Andersen; palate wider; mesopterygoid fossa wider anteriorly; sphenoidal bridge very slightly wider; second lower premolar ( $pm_3$ ) completely extruded with  $pm_2$  and  $pm_4$  in contact.

#### *Rhinolophus robinsoni klossi* Andersen, 1918

*Rh[inolophus] klossi* Andersen, 1918 : 375. Pulau Pemanggil, Johore Archipelago, off east coast of Malaya. Type specimen B.M. 18.8.5.5 (in alcohol, skull extracted). June 1915.

(?) ♂ B.M. 67.214 (in alcohol, skull extracted). Pine Tree Hill, Fraser's Hill, Pahang, 3° 43' N, 101° 42' E, at 4500 ft. 10 October 1966.

<sup>1</sup> Tate and Archbold mistakenly noted (p. 5) that the second phalanx of the third digit is unshortened in the *simplex* and *borneensis* subgroups and shortened in the *affinis* and *ferrumequinum* subgroups; in fact, the reverse is true as indicated by Andersen (1905a).

Smaller than *R.r. robinsoni* with lancet slightly wider at its base; palate narrower; mesopterygoid fossa narrower anteriorly; sphenoidal bridge narrower; second premolar (pm<sub>3</sub>) partially or wholly extruded, pm<sub>2</sub> and pm<sub>4</sub> separated by a narrow space or in contact. One example (B.M. 55.1479, from Pulau Pemanggil) has the right pm<sub>3</sub> completely extruded but the left pm<sub>2</sub> has been lost and pm<sub>3</sub> in this ramus remains wholly in the toothrow. Specimens from Pulau Pemanggil and Pulau Aor have relatively small skulls: one specimen from Pulau Tioman has a slightly longer forearm and a larger skull approaching the skull of *robinsoni* in size but nevertheless this example retains the narrow palate, narrow mesopterygoid fossa and narrow sphenoidal bridge of *klossi*.

The specimen from Pahang is referred to *klossi* with some reservation. Externally, it almost exactly resembles this subspecies, but although its skull is similar to that of *klossi*, in size it approaches or in some respects exceeds the skull of *robinsoni* and the supraorbital region is longer and the mesopterygoid fossa narrower than in either of these. The material available, however, is totally inadequate for any attempt at evaluating the status of the northern and southern populations of *R. robinsoni* on the Malay Peninsula.

TABLE I  
EXTERNAL MEASUREMENTS OF *Rhinolophus robinsoni*

	<i>R.v. klossi</i>						
	<i>R.v. robinsoni</i> B.M. 18.8.2.1. Type Southern Thailand	B.M. 18.8.5.5. Type Pulau Pemanggil	B.M. 61.1709 Pulau Pemanggil	B.M. 61.1710 Pulau Pemanggil	B.M. 61.1711 Pulau Aor	B.M. 61.1712 Pulau Tioman	<i>R.v. (?) klossi</i> B.M. 67.214 Malaya
Length of forearm	45.3	41.8	40.9	—	42.2	43.6	41.8
IIIrd. metacarpal	34.0	31.3	30.6	31.1	31.0	32.8	31.3
III <sup>1</sup>	14.5	12.8	12.3	13.7	12.8	13.3	12.7
III <sup>2</sup>	19.7	17.6	16.8	18.3	18.1	19.1	18.3
IVth. metacarpal	33.8	32.0	—	33.1	32.1	34.1	32.9
IV <sup>1</sup>	11.4	9.5	9.2	10.0	9.3	10.3	9.5
IV <sup>2</sup>	12.1	10.3	10.1	11.3	11.4	11.5	11.2
Vth. metacarpal	33.8	31.8	31.1	32.1	32.2	34.2	32.0
V <sup>1</sup>	11.5	10.0	9.8	10.7	9.7	10.4	9.8
V <sup>2</sup>	12.5	10.8	10.2	11.3	10.9	11.2	11.4
Width of sella	2.7	2.5	2.8	2.7	3.0	2.9	2.8
Length of tibia	19.4	16.8	16.3	16.8	17.5	17.6	18.3

TABLE 2

CRANIAL MEASUREMENTS OF *Rhinolophus robinsoni*

	<i>R.r. klossi</i>						
	<i>R.r. robinsoni</i> B.M. 18.8.2.1. Type Southern Thailand	B.M. 18.8.5.5 Type Pulau Penanggil	B.M. 55.1479 Pulau Penanggil	B.M. 55.1480 Pulau Penanggil	B.M. 61.1711 Pulau Aor	B.M. 61.1712 Pulau Tioman	<i>R.r. (?) klossi</i> B.M. 67.214 Malaya
Greatest length of skull	—	—	—	18.2	18.0	19.8	20.3
Greatest length of skull to canine	19.2	—	—	18.0	17.5	19.0	19.2
Condylocanine length	17.2	—	—	16.0	15.5	16.9	17.0
Length of palatal bridge	2.0	2.0	2.0	2.0	1.8	2.1	2.1
Supraorbital length	5.3	5.2	5.1	5.3	5.2	5.5	6.0
Width of nasal swellings	5.2	5.0	4.9	5.0	5.0	5.2	5.5
Zygomatic width	9.7	9.3	9.2	9.4	9.1	9.5	9.7
Least interorbital width	2.6	2.5	2.4	2.3	2.6	2.5	2.6
Width of braincase	—	—	—	—	7.4	7.9	8.4
Mastoid width	9.2	—	—	—	8.5	8.9	9.2
Width of mesopterygoid fossa	3.2	2.8	2.8	2.9	2.9	2.9	2.7
Width of sphenoidal bridge	1.7	1.5	1.4	1.5	1.4	1.4	1.5
c <sup>1</sup> -c <sup>1</sup>	4.6	4.5	4.4	4.6	4.3	4.4	4.6
m <sup>3</sup> -m <sup>3</sup>	6.9	6.5	6.5	6.6	6.4	6.6	6.8
c-m <sup>3</sup>	7.2	6.8	6.6	6.8	6.6	7.2	7.3
Length of mandible	12.5	—	11.5	—	—	12.3	12.8
c-m <sub>3</sub>	7.6	7.3	7.1	7.3	7.0	7.6	7.8

*Rhinolophus macrotis dohrni* Andersen, 1907

♂ B.M. 67.1595 (in alcohol, skull extracted), ♀ B.M. 67.1596 (skin and skull). Base Camp, Gunong Benom, Pahang, 3° 51' N, 102° 11' E, 700 ft. 20-23 February 1967.

♂ B.M. 67.1597 (in alcohol). Above Camp 2, Gunong Benom, 2500 ft. 7 April 1967.

♂♂ B.M. 67.1598-1598A (in alcohol). Camp 3, Gunong Benom, 3500 ft. 7-8 March 1967.

♂♂ PM 45, PM 47-48 (skeletons), B.M. 67.1599 (in alcohol), PM 43 (in alcohol, returned to the University of Malaya). Camp 3, Gunong Benom, 3600 ft. 10-11 March 1967.

*Rhinolophus macrotis* has not previously been recorded from the States of Malaya although known from Sumatra (*R.m. dohrni*) and, following Tate (1943 : 2), from Thailand (*R.m. siamensis*), Fukien (*R.m. caldwelli*), Szechuan (*R.m. episcopus*), Nepal (*R.m. macrotis*) to the Philippines. However, according to Osgood (1932 : 219),

*caldwelli* and *siamensis* are apparently sympatric in Tonkin (North Vietnam) but the specimens he refers to *siamensis* are intermediate in size between *caldwelli* and the very much smaller *siamensis*. Specimens from Gunong Benom agree very closely with *R.m. dohrni* but are very slightly larger: among Malayan *Rhinolophus* the species may be readily recognized by its cuneate lancet, very broad, tongue-shaped sella which has a light covering of hairs on its anterior face, and low connecting process which originates below the apex of the sella. Cranially it is distinguished by its long palatal bridge and by the anterior upper premolar ( $pm^2$ ), which has a prominent, inwardly deflected cusp and which stands in the tooththrow and is divided from the canine and posterior premolar ( $pm^4$ ) by small interspaces.

Measurements of seven specimens in alcohol and five skulls (except where stated): length of forearm 44.5-45.3 (44.9); greatest length of skull 19.1-19.5 (19.4); greatest length of skull to front of canine 18.5-18.7 (18.6); condylocanine length 16.3-16.7 (16.5); basilar length to front of canine 14.6-14.9 (14.8); width of nasal swellings 5.0-5.2 (5.1); zygomatic width 8.3-8.6 (8.5); least interorbital width (four skulls) 2.4-2.6 (2.5); width of braincase 7.5-7.8 (7.6); mastoid width 8.8-9.2 (8.9);  $c^1-c^1$  4.0-4.3 (4.1);  $m^3-m^3$  5.7-5.9 (5.8);  $c-m^3$  6.6-6.8 (6.7); length of mandible (two skulls) 11.8;  $c-m_3$  6.8-7.0 (6.9).

### *Hipposideros lylei* Thomas, 1913

♂♀ B.M. 64.831-832 (in alcohol, skulls extracted). Wang Tangga, Kaki Bukit, Perlis, 6° 39' N, 100° 12' E. 7 March 1964.

Chasen (1940: 42) listed *H. lylei* from the States of Malay, apparently on the basis of two skins in the collection of the National Museum, Singapore from Bukit Chintamani, Pahang (Medway, in litt.). Described originally from Thailand, its occurrence in the northern part of the States of Malaya is not unexpected. Measurements (B.M. 64.831-832): length of forearm 78.2, 75.0; greatest length of skull 30.2, 29.0; condylobasal length 26.8, 25.5; condylocanine length 26.3, 25.3; rostral width 9.4, 9.3; zygomatic width 15.9, 15.9; least interorbital width 4.4, 4.2; width of braincase 12.0, 11.9; mastoid width 14.2, 14.1;  $c^1-c^1$  7.3, 7.1;  $m^3-m^3$  11.0, 10.7;  $c-m^3$  11.3, 11.0; length of mandible 19.9, 18.9;  $c-m_3$  12.4, 12.0.

### *Coelops frithii* Blyth, 1848

♂ B.M. 67.215 (in alcohol, skull extracted but fragmentary). 16th. mile, Ulu Gombak, Selangor, 3° 18' N, 101° 43' E. 27 October 1966.

This specimen constitutes the first definitive record of the species from the States of Malaya. Bats of the genus *Coelops* are rare in collections and its taxonomy seems uncertain: Tate (1941a: 5) reviewed it briefly and summarized its history but no subsequent work has appeared. The discovery of *C. frithii* in Malaya has led to an

examination of the material of *Coelops* in the collections of the British Museum (Natural History), which, although quite inadequate for any general revisionary treatment, has sufficed to show that two distinct species exist in that country and which has suggested the likely allocation of most of the remaining named forms.

The Malayan specimen agrees closely with *C. frithii* which may be characterized by: elongate, narrow outline of the lappets projecting from the supplementary leaflets flanking the anterior leaf; narial part of the anterior leaf not especially depressed and not sharply demarcated from the intermediate part of the leaf, the intervening ridges extending from the central process or 'sella' toward the lateral margins of the leaf low and indefinite; posterior part of the upper surface of the rostrum sloping anteriorly; rostral inflations low, separated by a shallow sulcus, in profile forming only a slight convexity; a definite pocket or recess within the maxillary root of the zygoma, the upper edge of which is shallowly curved anteriorly to terminate on the rostrum above the anterior face of the second molar; upper toothrows convergent anteriorly; posterior lower premolar ( $pm_4$ ) elongate and narrow; lower molars with prominent, horizontal external cingula. Named forms apparently conspecific with *frithii* are *bernsteini* Peters, *inflatus* Miller, *sinicus* G.M. Allen, and *formosanus* Horikawa. The range of the species extends from Bengal (*frithii*) to southern China (*sinicus*, *inflatus*), Formosa (*formosanus*) to Java and Bali (*bernsteini*: Tate (1941a : 7, 11) records specimens from Bali). Osgood (1932 : 226) records *inflatus* from Tonkin and Annam (North Vietnam) and there are specimens from Laos and Thailand in the British Museum (Natural History) which must be referred to *C. frithii*, previously recorded from Thailand by Gyldenstolpe (1916 : 15). The Malayan example thus fills a distributional hiatus but insufficient specimens are available to justify any attempt at elucidating the validity of subspecies or to allocate it at this level. Measurements of this specimen : length of forearm 43.8; of tibia 17.0; maxillary toothrow ( $c-m^3$ ) 5.7.

The type specimen of *C. robinsoni* Bonhote (1908 : 4) from the foot of Gunong Tahan, Pahang differs so markedly from *C. frithii* as to justify specific separation although Ellerman and Morrison-Scott (1951 : 132) considered the possibility that these might be conspecific. *Coelops robinsoni* may be distinguished from *C. frithii* by: rounded, wide outline of the lappets projecting from the supplementary leaflets; narial part of the leaf depressed and sharply demarcated from the intermediate leaf by prominent ridges extending from the central process or 'sella' toward the lateral margins of the leaf; posterior part of the upper surface of the rostrum nearly horizontal and only slightly inclined anteriorly; rostral elevations large, separated by a prominent sulcus, in profile forming a distinct convexity; a small foramen but no definite pocket or recess within the maxillary root of the zygoma, the upper edge of which is sharply curved anteriorly to terminate on the rostrum above the posterior face of the second molar; upper toothrows nearly parallel; posterior lower premolar ( $pm_4$ ) wide; lower molars with low, upwardly curving cingula.

The genus *Chilophylla* was described by Miller (1910 : 395) for the species *Chilophylla hirsuta*, described concurrently from the Alag River, Mindoro, Philippines, from a skin without skull. Later, this author (1912 : 117) referred a specimen

(United States National Museum 175000) from Port Swettenham, Malaya to *hirsuta* and described the cranial characters of the species from its skull. Subsequently, Miller (1928 : 85) agreed with an opinion originally advanced by Andersen (in litt.) that *Chilophylla* should be referred to the synonymy of *Coelops*, but the name has nevertheless persisted, Taylor (1934 : 247) using it in his account of the Philippine land mammals and Chasen (1940 : 48) including it in the Malaysian fauna, admittedly with the reservation that it seemed extremely close to *Coelops*. There can be no doubt from the meticulous descriptions of the skull of U.S.N.M. 175000 by Miller (1912 : 117) and Tate (1941a : 5) together with the plate in Howell (1929 : pl. 2, fig. 2e) which presumably depicts this skull (as *C. robinsoni*) that this specimen from Port Swettenham represents *C. robinsoni*. The status of *C. hirsuta* must remain uncertain until the features of its skull are known but its small size (length of forearm 33.8), the presence of a curved ridge extending laterally above each nostril towards the margin of the horseshoe and the statement by Miller (ibid.) that he could detect no external peculiarities that seemed of specific importance between *hirsuta* and the Port Swettenham specimen suggest affinity with *C. robinsoni*.

*Coelops robinsoni* is recorded from Teratau Island, Thailand by Chasen (1940 : 47) and from Khao Nawng, Bandon, southern Thailand by Robinson and Kloss (1915 : 116). The two specimens recorded by Robinson and Kloss are now in the British Museum (Natural History) (B.M. 68.605-606, formerly Federated Malay States Museum 531/12, 532/12): both are subadult and their skulls cannot now be found. From their external features both are referable to *C. frithii*, the length of the forearm in B.M. 68.605 being 39.4 and in B.M. 68.606 38.2 while the measurements of the skulls as quoted by Robinson and Kloss are in close agreement with those of that species.

### *Myotis siligorensis* (Horsfield, 1855)

♂ B.M. 67.219 (skin and skull). Cheras cave, Panching, near Kuantan, Pahang, 3° 53' N, 103° 09' E. 23 January 1967.

This is the first record of *Myotis siligorensis* from the States of Malaya. Although there are few specimens in collections the species has been recorded from Kumaon, Nepal and Sikkim (*M.s. siligorensis*), Fukien (*M.s. sowerbyi* Howell), Tonkin (North Vietnam) (*M.s. alticraniatus* Osgood) and Thailand (*M.s. thainus* Shamel). From descriptions this specimen is similar to *alticraniatus* or *thainus* but in the absence of comparative material no definitive subspecific determination can be made. The dorsal surface of the specimen is dark brown and the ventral surface of similar colour but slightly more buffy. Measurements: length of forearm (from collector) 29.6; greatest length of skull 12.2; condylobasal length 11.1; condylocanine length 10.4; zygomatic width 7.0; least interorbital width 3.0; width of braincase 6.0; depth of braincase 4.5; mastoid width 6.3; m<sup>3</sup>-m<sup>3</sup> 4.6; length of entire upper toothrow 5.1; c-m<sup>3</sup> 4.4. Bats of this species may be recognized by their small

size, high, domed braincase and much reduced canines, the lower tooth about equal in height to the posterior lower premolar ( $pm_4$ ), with the second lower premolar ( $pm_3$ ) in the axis of the toothrow.

***Myotis horsfieldii horsfieldii* (Temminck, 1840)**

♂♂ B.M. 65.320 (skin and skull), B.M. 65.321 (in alcohol, skull extracted). Ampang Reservoir, Kuala Lumpur, Selangor  $3^{\circ} 11' N$ ,  $101^{\circ} 49' E$ . 15 October 1964.

*Vespertilio horsfieldii* Temminck was considered a synonym of *Myotis adversus* (Horsfield, 1824) by Dobson (1878 : 291 et seq) and by Tate (1941b : 551, 558). However, Thomas (1910 : 385) identified a series of specimens from Java (which he (with Wroughton) had formerly (1909a : 381) determined as *M. hasseltii*) as *M. horsfieldii*, pointing out that this species could be distinguished from *M. adversus* by the attachment of the wing membrane to the metatarsus instead of to the end of the tibia as in *adversus*. It is clear from a drawing now preserved in the British Museum (Natural History) copy of Monographies de Mammalogie at Temminck's description of *horsfieldii* that Thomas had submitted illustrations of this feature in his "*adversus*" from Java and in the specimens of "*hasseltii*" which he had from the same collection to F. A. Jentink at the Rijksmuseum van Natuurlijke Historie, Leiden, wherein are Temminck's type specimens. Jentink indicates on this drawing that the insertion of the wing membrane in one of the "cotypes" of *horsfieldii* ('c' of his catalogues (1887 : 280, 1888 : 186)) is identical with the specimens which Thomas considered representative of *hasseltii* and which he subsequently recognised as *horsfieldii*.

*Myotis horsfieldii* is a relatively small species, the dorsal surface being blackish and the ventral surface blackish grey, with narrow, uninflated braincase, narrow interorbital region, interdental palate terminating anteriorly to a line joining the posterior faces of  $m^3$ - $3$ , long post-palatal extension, the median post-palatal spine supported by bony laminae. The second upper premolar ( $pm^3$ ) is large, one quarter to one third the crown area of  $pm^2$ , usually but not always completely intruded from the toothrow so that  $pm^2$  and  $pm^4$  are almost in contact, with  $pm^2$  not compressed in the row; second lower premolar ( $pm_3$ ) one third or a little more the crown area of  $pm_2$ , separating  $pm_2$  and  $pm_4$  but usually slightly intruded from the toothrow. The species may be distinguished from *M. adversus* and *M. hasseltii* by its small size, blackish coloration and narrow braincase. These specimens (and one other, ♀ B.M. 62.2133, also from Ampang Reservoir, obtained originally by the Institute for Medical Research, Kuala Lumpur) agree closely with *M.h. horsfieldii* and are rather larger than *M. deignani* Shamel, 1942, from Chiangmai, Thailand, which seems likely to be a subspecies of *M. horsfieldii*.

MEASUREMENTS (B.M. 65.320-321, 62.2133 (forearm only), in that order): length of forearm 38.7, 37.8, 36.4, 36.9; greatest length of skull 15.7, 15.9, 15.2; condylobasal length 14.3, 14.2, 13.7; condylocanine length 13.6, 13.6, 13.1; zygomatic width —,

9.3, —; least interorbital width 3.6, 3.5, 3.4; width of braincase 7.3, 7.3, 6.9; mastoid width 7.9, 7.9, 7.5;  $c^1-c^1$  4.3, 4.2, —;  $m^3-m^3$  6.1, 6.1, 5.7;  $c-m^3$  5.7, 5.9, 5.6.

*Myotis hasseltii* (Temminck, 1840)

♀ B.M. 65,322 (skin and skull). Kuala Gula, Perak, 4° 52' N, 100° 32' E. 8 November 1964.

♂ B.M. 68,842, ♀ B.M. 68,843 (both in alcohol, skulls extracted). Kuah, Pulau Langkawi, Kedah 6° 16' N, 99° 50' E. 1 January 1968.

♀ subadult B.M. 68,844 (in alcohol). Kangar, Perlis, 6° 27' N, 100° 12' E. 1 January 1968.

These specimens agree closely with those from Lekop, Karimon Island, Riau Archipelago, Indonesia recorded by Thomas and Wroughton (1909b : 110) as '*Myotis adversus* (Horsf.) (?)' and subsequently identified by Thomas (1916 : 4) as *Leuconoe hasseltii*, and also with two specimens from Java labelled as originating from the Rijksmuseum van Natuurlijke Historie, Leiden prior to 1844 and thereby possibly examined by Temminck. They may be distinguished from specimens attributed to the otherwise similar species *adversus* by their short and not woolly pelage, short post-palatal extension lacking thin bony laminae supporting the post-palatal spine and in having a minute second upper premolar ( $pm^3$ ) with the second lower premolar ( $pm_3$ ) very small, usually intruded from the toothrow sometimes to the extent that  $pm_2$  and  $pm_4$  are in contact. There exist apparently two colour variants: two specimens from Java (both old) are brownish above and below as is one from Karimon Island but two others from that island and four from Malaya are greyish brown dorsally and paler greyish white or greyish buff ventrally.

MEASUREMENTS (B.M. 65,322, B.M. 68,842-843); length of forearm 40.2, 40.7, 41.2; length of foot 8.5, 10.0, 9.5; greatest length of skull —, 16.3, 16.1; condylo-basal length 14.2, 15.0, 14.8; condylocanine length 13.5, 14.3, 14.0; zygomatic width —, 10.3, —, least interorbital width 3.8, 4.2, 3.9; width of braincase 7.6, 8.0, 8.0; mastoid width 8.0, 8.7, 8.6;  $c^1-c^1$  4.1, 4.6, 4.5;  $m^3-m^3$  6.1, 6.6, 6.6;  $c-m^3$  5.7, 6.1, 6.0.

The named forms of large-footed *Myotis* (sometimes referred to a subgenus, *Leuconoe*) from southeastern Asia need detailed revision but unfortunately the majority seem represented by no more than a few isolated specimens or by a series from no more than one or a few localities. There seems little doubt that *horsfieldii* is a distinct species (Medway, 1965 : 60) despite the views of Dobson (1876 : 127, 1878 : 292) and Tate (1941b : 551, 598) that it is a synonym of *adversus*. The relationship between *hasseltii* and *adversus* as here understood is obscure and it may be that the advent of further Javan specimens and an examination of the type material in Leiden might well alter their taxonomy. Meanwhile, *hasseltii* is used for those bats in which  $pm_3$  is very small and usually intruded or fully intruded from the toothrow, *adversus* for those in which this tooth is larger and stands within the

tooththrow or is only slightly intruded, and which have rather long, woolly pelage and a long post-palatal extension, its median spine supported by thin bony laminae.

*Pipistrellus javanicus javanicus* (Gray, 1838)

♂ (skin and skull) B.M. 71.813. Camp 2, Gunong Benom, Pahang 3° 51' N, 100° 11' E, 1700 ft. 31 January 1968.

The small anterior upper premolar is sometimes lacking from the tooththrows of *Pipistrellus* (Kuzynkin, 1944 : 101, 1950 : 338 et seq., 1965 : 103); on the other hand, it may sometimes be present in those of *Eptesicus* (Hayman, 1954 : 289, 290; Hill, 1966 : 303). However, this specimen is noteworthy for the presence of a small supernumerary premolar in the right tooththrow, situated internally in a shallow angle formed by the postero-internal face of the canine and the antero-internal face of the anterior upper premolar normal to this species, which is situated more nearly in the line of the tooththrow than the corresponding tooth in the other row. The supernumerary tooth is small, with a narrow cingulum and a slender conical cusp slightly exceeding the normal anterior premolar in height and just visible externally. It is tightly in contact with the canine and the normal anterior premolar, with a basal area of one half that of this tooth. There are no peculiarities in the mandibular dentition.

*Pipistrellus ridleyi* Thomas, 1898<sup>1</sup>

♂ B.M. 67.1604 (skin and skull). Base Camp, Gunong Benom, Pahang, 3° 51' N, 102° 11' E, 700 ft. 16 February 1967.

This species has been represented hitherto in the collections of the British Museum (Natural History) only by the type and paratype specimens, B.M. 98.3.15.5-6, from Selangor. The teeth of the example from Gunong Benom are less worn than are those of the type specimen and agree closely with those of the paratype, the skull of which has now been prepared from the specimen in alcohol. The description of the incisors by Thomas is based solely on the type specimen and an examination of specimens in which wear is less evident enables some additional features to be noted. The inner upper incisor (*i*<sup>2</sup>) is low, short and wide, narrow anteriorly but wider posteriorly, its length at the cingulum only slightly exceeding its greatest width. The principal cusp is projected forward beyond the premaxilla and is directed slightly inwardly rather than anteriorly: in profile its anterior surface is strongly convex and its posterior face slightly concave so that it is hooked posteriorly. There are low, paired posterior accessory cusps; the labial cusp is smaller than the lingual cusp and in the type specimen is almost worn away so that the inner cusp becomes readily visible from the side. The outer upper incisor (*i*<sup>3</sup>) is short and wide, its width exceeding its length, and has a principal cusp hooked posteriorly so that the tooth has a caniniform appearance. The principal cusp is equal in height to the principal cusp of *i*<sup>2</sup> and is flanked by two lateral accessory cingulum cusps:

<sup>1</sup> Further study of this species indicates that it should be transferred to *Myotis* (Hill & Topal, in press).

the lingual cusp is well-developed and prominent but the labial cusp is smaller, less obvious and in the type specimen has been worn away. The anterior upper premolar ( $pm^2$ ) is large, in the toothrow and separated from  $pm^4$  by a narrow diastema. The lower incisors are tricuspid and stand in the line of the toothrow: as remarked by Thomas, the third is considerably more massive than the other two. The anterior lower premolar ( $pm_2$ ) is not greatly reduced and is not extruded from the toothrow.

Measurements of B.M. 67.1604, followed by those of the type and paratype specimens: length of forearm 28.8, 28.5, 29.1; greatest length of skull 12.3, 12.7, 12.3; condylobasal length 11.6, 11.8, 11.5; condylocanine length 10.9, 11.2, 11.1; width across anteorbital foramina 3.6, 3.5, 3.7; zygomatic width —, 8.0, —; least interorbital width 2.9, 3.0, 3.3; width of braincase 6.2, 6.3, 6.2; mastoid width 6.7, 6.7, 6.8;  $c^1$ - $c^1$  3.4, 3.3, 3.4;  $m^3$ - $m^3$  5.4; 5.3, 5.3;  $c$ - $m^3$  4.4, 4.5, 4.4; length of mandible —, 8.7, 8.7;  $c$ - $m_3$  4.7, 4.8, 4.7.

### *Pipistrellus societatis* sp. nov.

TYPE AND ONLY SPECIMEN: ♂ B.M. 67.1605 (in alcohol, skull extracted). Base Camp, Gunong Benom, Pahang, Malaya, 3° 51' N, 102° 11' E, 800 ft. Collected 15 March 1967 by Lim Boo Liat and Yong Hoi Sen for the Gunong Benom Expedition, 1967. Original number BM 225.

DIAGNOSIS: Allied to and externally closely resembling *Pipistrellus circumdatus* (Temminck), but differing in smaller size; in greater inflation of the anterior part of the braincase; in its shorter, narrower rostrum which is more inflated laterally; in the absence of well-defined supraorbital ridges; in its more abruptly curved supraorbital margin; in the absence of a deeply excavated frontal depression; narrower narial emargination which is not constricted posteriorly; in having a shorter post-palatal extension with the pterygoid region widened posteriorly; in shallow basal pits which are not sharply excised into the basisphenoid; in shorter toothrows, less massive dentition and much reduced third upper molar, in which the metacone and third commissure have been all but lost.

DESCRIPTION: Externally almost exactly like *P. circumdatus* but with slightly shorter forearm. Dorsal pelage predominantly blackish brown, heavily overlaid by orange or bronze tipping, the individual hairs basally brown, blackish brown for most of their length and profusely but irregularly tipped with orange or bronze. Crown pelage orange tipped but with a small area of straw-coloured, dark brown tipped hairs just anterior to the junction of the aural anterior margin with the head, a feature not so far noted in *circumdatus*. Ventral pelage dark brown, the hairs tipped with greyish white: there is a small wart bearing a few longer, darker hairs medianly situated on the throat just anterior to a line joining the angles of the mouth. Fur extending a little on to the uropatagium but tibia not especially hairy, the digits with a sparse cover of moderate hairs.

Ears large and bluntly rounded, their anterior margin strongly convex in the proximal half, with prominent, posteriorly directed basal lobule. Distal half of

anterior margin almost straight, upper part of posterior margin similarly nearly straight but becoming convex with an emargination opposite the base of the tragus and terminating in a wide, quadrangular antitragal lobe, its anterior edge standing squarely to the margin of the ear and to the cheek, inserted a little behind and below the angle of the mouth, forming a small downwardly directed pendent lobule similar to that of *Chalinolobus gouldi*. Tragus large, its sharply concave anterior margin terminating in a rounded, anteriorly directed point: posterior margin strongly convex, its upper part almost horizontal, terminating basally in a large, rounded lobule. Ear margins, especially anteriorly, yellowish white, a feature remarked by Temminck in the original account of *P. circumdatus* and evident to some extent in dried specimens.

Skull short, wide, with rounded, rather globular braincase, inflated and elevated in the frontal region, the lambdoid crests not especially prominent and the sagittal crest lacking. Interorbital region wide, the supraorbital crests only faintly defined, terminating in small tubercles. Frontal depression shallow, with weakly defined boundaries extending anteriorly as a very shallow median sulcus, bordered by wide, low lateral swellings which contrast with the higher, more ridge-like lateral swellings of *circumdatus*. Rostrum short and wide, inflated laterally above anteorbital foramen, the rostrum in frontal aspect having a rounded rather than angular profile as in that species. Supraorbital ridges curving abruptly from the interorbital region to join the anterior margin of the orbit which forms a flange at the side of the rostrum. Narial emargination parallel-sided, almost square posteriorly. Palate short with a narrow anterior emargination a little wider than the distance between the inner faces of  $i^2-2$ , extending posteriorly to a line joining the back of the canines. Post-palatal extension short, with apparently narrow post-palatal spine, the pterygoid wings divergent posteriorly. Basial pits shallow, not sharply excised into the basisphenoid.

Teeth of type specimen heavily worn: inner upper incisor ( $i^2$ ) massive, faintly bifid at tip, with small posterior cingulum cusp, outer upper incisor ( $i^3$ ) approximately one third basal area of  $i^2$  with large central cusp flanked by smaller lateral cusps, its tip reaching slightly above cingulum of  $i^2$ , separated from canine by a narrow diastema and pushed forward so that the upper incisors lie almost in a straight line. Anterior upper premolar ( $pm^2$ ) very small, completely intruded from toothrow: in the type specimen  $pm^2$  is lacking from the right toothrow but a small alveolus can be discerned. Third upper molar ( $m^3$ ) reduced, narrow, platelet-like: in the type specimen the complete loss of the third commissure is clearly due to wear but it is obvious that this and the metacone are much reduced. Inner ( $i_1$ ) and second ( $i_2$ ) lower incisors incipiently four-cusped;  $i_3$  shorter and wider than these, tricuspid. Anterior lower premolar ( $pm_2$ ) one fourth crown area of  $pm_4$ : hypoconid and entoconid of  $m_3$  slightly reduced. Measurements of *P. societatis* and *P. circumdatus* appear in Table 3.

REMARKS: This new species is clearly very closely related to *P. circumdatus*, a poorly known species apparently so far represented only by the female type specimen from Tapos, Java in the Rijksmuseum van Natuurlijke Historie, Leiden (Jentink,

1887 : 277, 1888 : 178); a specimen (B.M. 7.1.1.401) labelled "Java" from the Tomes Collection, now in the British Museum (Natural History) and possibly one of the original specimens; an example (B.M. 61.12.10.1) without skull labelled "India" and also in the British Museum (Natural History); and from a specimen from Pyepat, Upper Burma, recorded by Anthony (1941 : 81) and Tate (1942 : 250) and now part of the collection of the American Museum of Natural History.<sup>1</sup> Through the courtesy of the authorities of the Rijksmuseum van Natuurlijke Historie I have been able to examine the type specimen and I am indebted to Dr. K. F. Koopman who has arranged the loan of the Burmese specimen from the American Museum of Natural History.

Both *P. circumdatus* and *P. societatis* may be readily recognized by their striking coloration, the blackish dorsal pelage having characteristic orange or bronze tips. The skull of *circumdatus*, however, does not seem to have been described except in so far as Tate (1942 : 250) based his group definition on the skull of A.M.N.H. 114850 from Burma. Cranially, *circumdatus* is more massive than *societatis*, its braincase less inflated frontally and with a low sagittal crest. The supraorbital ridges are prominent, terminating in small tubercles, enclosing a deeply excavated frontal depression which extends anteriorly as a shallow rostral sulcus, bound laterally by low longitudinal inflations which converge to merge anteriorly. Rostrum longer and broader than in *societatis*, the area above the anteorbital foramen uninflated but instead sloping more abruptly from the inflations bordering the rostral sulcus to give the rostrum in frontal aspect an angular rather than rounded outline. Supraorbital ridges curving less abruptly from the interorbital region than in *societatis*, the anterior margin of the orbit forming a flange as in that species. Narial emargination narrowed posteriorly with a rounded apex, the anterior palatal emargination equal in width to the distance between the inner faces of  $i^2-2$  or slightly exceeding it and extending posteriorly almost to a line joining the posterior faces of the canines. Post-palatal extension slightly longer than in *societatis*, with narrow post-palatal spine, the pterygoid wings parallel: basial pits prominent, deep, sharply excised into the basisphenoid. Dentition as described for *P. societatis* but teeth larger and more massive,  $m^3$  not reduced but with well-developed metacone and clearly evident third commissure, while  $m^3$  has the hyoponid and entoconid unreduced. The skull of the Burmese example differs from the skulls of the type and second Javan specimens in slightly smaller size, less prominent cranial crests, its supraorbital ridges terminating in slight tubercles which are barely evident in the Javan examples, in a shallower frontal depression, shorter post-palatal extension and narrower post-palatal spine, and slightly less massive dentition. It is possible therefore that adequate series of specimens may show the mainland and Javan populations to be subspecifically distinct.<sup>1</sup>

The name of the new species is selected in allusion to the combined effort of the several members of differing nationalities and institutions who constituted the Gunong Benom Expedition, 1967.

<sup>1</sup> Lord Medway has now obtained (1971) a specimen of *P. circumdatus* from Fraser's Hill, Pahang. It agrees closely with the Burmese example.

TABLE 3

MEASUREMENTS OF *Pipistrellus societatis* AND *P. circumdatus*

	<i>Pipistrellus societatis</i> B.M. 67.1605 Malaya	<i>Pipistrellus circumdatus</i> Leiden "a." Java	<i>Pipistrellus circumdatus</i> B.M. 7.1.1.401 Java	<i>Pipistrellus circumdatus</i> A.M.N.H. 114850 Burma
Length of forearm	37.6	42*	43.6	41.6
Greatest length of skull	15.3	—	—	15.5
Condylobasal length	14.4	—	15.7	14.9
Condylocanine length	14.1	—	15.4	14.7
Palatal length (excluding post-palatal spine)	6.6	—	8.4	7.6
Length palatal bridge (excluding post-palatal spine)	5.0	—	6.6	6.1
Length orbit - gnathion	3.6	4.2	4.2	4.3
Width across anteorbital foramina	5.1	5.5	5.6	5.3
Lachrymal width	6.7	7.2	7.4	7.3
Width across supraorbital tubercles	6.0	6.7	6.6	6.7
Zygomatic width	10.4	—	—	10.8
Least interorbital width	4.3	4.2	4.4	4.4
Width of braincase	7.9	—	—	7.9
Mastoid width	8.5	—	—	8.5
c <sup>1</sup> -c <sup>1</sup>	4.6	5.2	5.2	4.9**
m <sup>3</sup> -m <sup>3</sup>	6.7	—	7.5	7.1
c-m <sup>3</sup>	5.2	6.2	6.4	6.0
Length of mandible	10.4	—	12.1	—
c-m <sub>3</sub>	5.6	6.5	6.7	6.4

\* From Tate (1949: 292)

\*\* Right upper canine damaged

***Hesperoptenus blanfordi* (Dobson, 1877)**

♀ B.M. 65.345 (in alcohol, skull extracted). Jenka, Temerloh, Pahang, 3° 37' N, 102° 30' E. Collected and presented by the Earl of Cranbrook.

Described originally from Tenasserim, this species is relatively rare in collections but is recorded by Anderson (1881: 133) from Johore and by Robinson and Kloss (1915: 116) from Khao Nawng, Bandon, Lower Thailand, while Thomas (1916: 2) lists specimens from the Semangkko Pass, below Fraser's Hill, on the Selangor-Pahang boundary; Gunong Tampin, Negri Sembilan; Telok Bahang (= Rahang), Penang, and from Kuala Lumpur, Selangor. The specimen listed from Khao Nawng by this author is doubtless that previously recorded by Robinson and Kloss. The species is easily recognized by its small size (length of forearm 26-28), the

presence of a broad, well-developed pad at the base of the thumb extending to the base of the second metacarpal, and by the small size and extreme displacement of the outer upper incisor ( $i^3$ ) which is intruded from the toothrow to the extent that it lies directly behind the large inner upper incisor ( $i^2$ ), in contact with the posterior face of that tooth and with the lingual face of the canine.

Davis (1962 : 42) recorded a specimen from the Sapagaya Forest Reserve, Sandakan, Sabah ( $5^{\circ} 37' N$ ,  $118^{\circ} 04' E$ ) as *Hesperoptenus doriae*. Through the kindness of Dr. J. C. Moore of the Field Museum of Natural History, Chicago, I have been able to borrow and examine this specimen, F.M. 77025. As Davis points out, it is a juvenile male. However, it is much larger than the adult type specimen of *Hesperoptenus doriae* and agrees very closely with the type specimen of *H. tomesi*, described by Thomas (1905 : 575) from Malacca, to which it must be referred. *Hesperoptenus tomesi* has been known hitherto only from the type specimen and the example from Sabah is therefore the first record for Borneo. It may be recognized by its large size (length of forearm c. 50) which is similar to that of the Indian *H. tickelli*, by its rich, dark brown colour, by its displaced outer upper incisor and by its strongly imbricated lower incisors. *Hesperoptenus doriae* is smaller (length of forearm 38.0) and is (from specimen in spirit) pale brown, with the outer upper incisor not displaced from the toothrow and the lower incisors not much imbricated.

#### *Murina huttoni* (Peters, 1872)

♂ B.M. 67.1606 (in alcohol, skull extracted). Near Camp 4, Gunong Benom, Pahang,  $3^{\circ} 51' N$ ,  $102^{\circ} 11' E$ , 4800 ft. 17 March 1967.

This species establishes the presence of *M. huttoni* in Malaya, whence *M. suilla*, *M. cyclotis* and the striking *M. aenea* have already been recorded (Hill, 1964). Although very similar to *M. cyclotis peninsularis* in external appearance, this species may be readily distinguished by the features of its molar teeth, the mesostyles of  $m^{1-2}$  being more developed than in *M.c. peninsularis* with the paracones and protocones less reduced, and especially by the unreduced hypoconids and entoconids of  $m_{1-2}$ , which are separated from the protoconids and metaconids by a wide trough. These features indubitably refer the specimen to *huttoni*: in *cyclotis* the mesostyles, paracones and protocones of  $m^{1-2}$  are reduced and in  $m_{1-2}$  the hypoconids and entoconids are much reduced, sometimes barely evident, and are only narrowly separated from the protoconids and metaconids. The degree of reduction is less apparent in  $m_3$ . Subspecific determination of the specimen is less certain: in dorsal coloration it resembles *M.h. rubella* from Fukien, the hairs with bright golden brown sub-terminal annulations as in that subspecies.

MEASUREMENTS: length of forearm 34.1; greatest length of skull 17.5; condylo-basal length 15.6; palatal length 8.5; length orbit-gnathion 4.5; rostral width 5.5; zygomatic width 9.4; least interorbital width 4.3; width of braincase 7.5; height of braincase 6.1; mastoid width 8.0;  $c^1-c^1$  4.3;  $m^3-m^3$  5.5,  $c-m^3$  5.8.

*Murina cyclotis peninsularis* Hill, 1964

♀ B.M. 67.1607 (skin and skull). Base Camp, Gunong Benom, Pahang, 3° 51' N, 102° 11' E, 700 ft. 20 February 1967.

♂ B.M. 68.845 (in alcohol, skull extracted). Waterworks Road, Batu Pahat, Kangar, Perlis, c. 6° 27' N, 100° 12' E. 4 January 1968.

These specimens are the first examples of this subspecies to be recorded since its description (Hill, 1964). Although in some dimensions the specimen from Perlis is similar to *M.c. cyclotis*, it agrees with *M.c. peninsularis* in having the rostrum wide anteriorly, with toothrows which are not especially convergent, and in massive canines, premolars and molars. Measurements (B.M. 67.1607, B.M. 68.845): length of forearm 38.8, 34.7; greatest length of skull 18.6, 17.4; condylobasal length 16.7, 15.4; length orbit-gnathion 4.5, 4.3; palatal length 9.2, 8.2; rostral width 6.0, 5.8; zygomatic width 10.9, 9.9; least interorbital width 4.5, 4.3; width of braincase 8.1; 8.0; height of braincase 6.7, 6.7; mastoid width 9.1, 8.5; c<sup>1</sup>-c<sup>1</sup> 5.1, 4.5 m<sup>3</sup>-m<sup>3</sup> 6.0, 5.6; c-m<sup>3</sup> 6.2, 5.5.

Shamel (1942 : 327) recorded two specimens from northern Thailand as *M. toxopei*, described by Thomas (1923 : 254) from the island of Buru in the Moluccas. From the description and measurements given by Shamel it seems more probable that these specimens represent *M. cyclotis*.

*Miniopterus schreibersii blepotis* (Temminck, 1840)

♂♂ B.M. 67.216-217 (skins and skulls). Pine Tree Hill, Fraser's Hill, Pahang, 3° 43' N, 101° 42' E, 4250 ft. 12 October 1966.

♂ B.M. 67.218 (in alcohol). Fraser's Hill, 4750 ft. 22 October 1966.

Although known to occur from mainland localities as far south as Koh Lak in southern Thailand (specimen in British Museum (Natural History)) and from Sumatra, Java and Borneo, there seems to be no published record of *M. schreibersii* from Malaya, whence these specimens now establish it. Measurements of B.M. 67.216-217: length of forearm 44.8, 50.8; condylobasal length 15.0, 16.3; condylocanine length 14.1, 15.5; zygomatic width 9.0, 9.4; least interorbital width 4.0, 4.2; width of braincase 8.1, 8.5; m<sup>3</sup>-m<sup>3</sup> 6.6, 7.4; c-m<sup>3</sup> 6.0, 6.5. The length of forearm in B.M. 67.218 is 49.3. The large example (B.M. 67.217) agrees almost exactly with a similarly large specimen from Kok Lak, further north on the east coast of Lower Thailand.

Small specimens of *M. schreibersii* are difficult to distinguish from large examples of the sympatric species *M. medius*. However, apart from its usually longer forearm, *M. schreibersii* differs from *medius* in longer skull and wider palate: specimens from Java, Malaya and Indochina have a length of forearm of 43.6-50.8, condylobasal length 14.7-16.3, condylocanine length 13.8-15.5 and m<sup>3</sup>-m<sup>3</sup> 6.5-7.4 while specimens of *medius* from Java and Pulau Kaban (off the east coast of Johore, States of Malaya) have a length of forearm of 40.8-43.1, condylobasal length 13.8-14.3, condylocanine length 13.1-13.5 and m<sup>3</sup>-m<sup>3</sup> 5.8-6.3.

*Miniopterus medius* Thomas and Wroughton, 1909

♀ B.M. 67.1610 (skin and skull). Bukit Cheras, Panching, near Kuantan, Pahang, 3° 53' N, 103° 09' E. 17 February 1967.

This is a further Malayan record for the species, hitherto known on the mainland only from Gunong Pondok, Perak (Chasen, 1926 : 156) but also recorded from Pulau Kaban, off the east coast of Johore, and from Pulau Terutau, southern Thailand by Thomas (1916 : 4). Measurements: length of forearm 42.2; greatest length of skull 14.4; condylobasal length 13.8; condylocanine length 13.0; zygomatic width —; least interorbital width 3.7; width of braincase 7.7; mastoid width 8.1;  $c^1-c^1$  4.0;  $m^3-m^3$  5.9;  $c-m^3$  5.4. Measurements of other specimens from eastern Pahang (supplied by Lord Medway) (♂♂♀ Medway 66.46-48) length of forearm (Medway 66.47-48 only) 43; condylobasal length 13.8-14.0; condylocanine length 12.9-13.2;  $m^3-m^3$  5.8-5.9.

## SUMMARY

Taxonomic notes on the more unusual species of bats obtained by the 1967 Expedition to Gunong Benom are presented in this paper, with similar accounts of other specimens of taxonomic interest obtained in recent years in Malaya by Lord Medway and his associates. The genus *Coelops* is reviewed so far as available material permits, with the recognition of two valid species, *C. frithii* and *C. robinsoni*. A new species, *Pipistrellus societatis*, is described from Gunong Benom: *Rhinolophus malayanus*, *R. robinsoni* (?) *klossi*, *R. macrotis dohrni*, *Coelops frithii*, *Myotis sili-gorensis* and *Murina huttoni* are added to the bat fauna of the States of Malaya while additional specimens of *Hipposideros lylei*, *Myotis horsfieldii horsfieldii*, *Myotis hasseltii*, *Pipistrellus ridleyi*, *Hesperoptenus blanfordi*, *Murina cyclotis peninsularis*, *Miniopterus schreibersii blepotis* and *M. medius* are recorded. *Hesperoptenus tomesi* is recorded for the first time from Borneo from a specimen hitherto thought to be *H. doriae* and an example of anomalous dentition in *Pipistrellus javanicus* is described.

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