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ON NEW DIPTERA PUPIPARA FROM THE ORIENTAL REGION[1]

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Abstract: In addition to the new subfamily Archinycteribiinae (of Nycteribiidae), 4 hippoboscid, 1 streblid and 12 nycteribiid species and subspecies are described as new in this paper. Synoptic keys are provided for the subfamilies of Nycteribiidae and for the species of the subgenus *Oncoposthia* and of the *Leptocyclopodia ferrarii* complex. Of the new species and subspecies, 1 each is from Nepal, Taiwan and Malaya (also Thailand and Java), 2 each are from Bhutan, Borneo and the Philippines, and 8 are from Celebes. The most outstanding are *Crataerina debilis*, the 2nd species of the subgenus *Stenepteryx*, and *Archinycteribia curvistyla*, the 3rd species of the genus *Archinycteribia* to be discovered.

ARCHINYCTERIBIINAE Maa, n. subfam.

The family Nycteribiidae was classified by Maa (1965) and Theodor (1967) into 2 subfamilies, Cyclopodiinae and Nycteribiinae, and for comparison of which, the latter author tabled 8 structural characters, viz., whether the head is cylindrical, or bilaterally or dorsoventrally compressed; tibiae cylindrical or strongly bilaterally compressed, and with weakly or strongly marked pale rings; notopleural sutures parallel, converging posteriorly or diverging posteriorly; notopleural setae well developed, reduced or absent, and uniseriate or multiseriate; tergites 1 and 2 fused or not, and in one or both sexes; segmentation of ♀ abdomen slightly or much reduced; setae fine or coarse and ctenidial teeth narrow or coarse, and pointed or blunt; ♂ genitalia of 1 or 3 types. Apparently none of these characters is clear-cut or constant within either subfamily, and this explains why Theodor did not provide a key to the 2 subfamilies. To make the classificatory scheme more workable (if not more natural), a study of characters among the various genera and species of the family was undertaken. This leads to the conclusion that the genus *Archinycteribia* Speiser should be removed from the Cyclopodiinae and made the type-genus of the new subfamily **Archinycteribiinae.** A key to the 3 subfamilies follows.

KEY TO SUBFAMILIES OF NYCTERIBIIDAE

1. Thoracic sternal plate with a continuous transverse suture and with concave anterolateral and posterolateral margins; thoracic ctenidium lying on an almost vertical plane, and clearly visible and much exposed in ventral view of thorax; mesopleuron much closer to anterior than to posterior thoracic spiracle; coxa 2 greatly modified, supra-anterior coxite subdivided into 2 short subequal sclerites while infra-anterior coxite very large and L-shaped; coxa 3 dorsally with a strong basal protuberance on mesial margin in opposition to metapleuron which is trapezoidal, only about as long as wide; head with an oblique fovea separating postgena from occiput, and with labial theca partly enclosed by postgena; ♂ anal segment with pair of strongly sclerotized posterolateral internal ribs, genital deck plate undefinable; ♀ anal segment completely enclosing abdominal spiracles 7. Parasitic on Megachiroptera; Oriental Region. ..... **Archinycteribiinae,** n. subfam.

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Thoracic sternal plate with 1, occasionally 2, pairs of oblique sutures joining at middle, and with convex anterolateral and posterolateral margins; thoracic ctenidium lying on an almost horizontal plane and not or hardly visible in ventral view of thorax; mesopleuron either equidistant to anterior and posterior thoracic spiracles, or much closer to latter; coxa 2 not as above, supra-anterior coxite undivided, infra-anterior coxite elongate, not L-shaped; coxa 3 without such protuberance; metapleuron longer than wide; head without such fovea, labial theca well exposed; ♂ anal segment without such ribs, genital deck plate well developed; ♀ anal segment not (very rarely partially) enclosing abdominal spiracles 7. ··· ····· 2

2. Coxa 1 in profile at least 2.5 × as long as wide; thoracic and abdominal ctenidia always well developed, with coarse blunt teeth; posterior thoracic spiracle very close to meeting point of mesopleuron and notopleural suture, lateral plate of notopleural suture hardly developed before but strongly developed behind that meeting point, notopleural setae (when present) forming very short row or small patch quite close to that spiracle; infra-anterior coxite of coxa 2 with 1 or 2 complete columns of setae; tibiae each with 2 or 3 rows of ventral bristles at or very close to midlength; tergite 1 always poorly definable from tergite 2 except for degree of pigmentation and sclerotization; ♀ tergite 2 normal in size, tergites 3–5 always and tergite 6 often absent. Parasitic on Megachiroptera; Palaeotropics. ····· ····· **Cyclopodiinae** Maa

Coxa 1 in profile at most 2 × as long as wide; thoracic and abdominal ctenidia occasionally absent, with slender pointed teeth (those of abdominal ctenidium very occasionally peg-like); meeting point of mesopleuron and notopleural suture either closer to anterior than to posterior thoracic spiracle, or about equidistant to these 2 spiracles, lateral plate of notopleural suture well developed along full length of suture, occasionally almost entirely absent, notopleural setae (when present) forming a longitudinal or oblique series or a small patch nearly equidistant to anterior and posterior thoracic spiracles; infra-anterior coxite of coxa 2 with at most 1 incomplete column of setae; tibiae each with 3–5 rows of ventral bristles at apical 1/2 or 2/3; tergite 1 clearly definable from tergite 2 and when occasionally not so, then either laterite 1 absent or thoracic sternal plate with 2 pairs of oblique sutures; ♀ either with tergite 2 much enlarged, or with 1 or more sclerites between tergite 2 and anal segment, tergite 6 always present. Parasitic on Microchiroptera; worldwide. ····· ·····**Nycteribiinae** (Samouelle)

Materials of the following new species and subspecies were received chiefly from Captain P.F.D. Van Peenan of the U. S. Naval Medical Research Unit No. 2 (NAMRU-2) and Dr H. E. McClure of the Migratory Animal Pathological Survey. Line drawings of the species will appear in a forthcoming issue of the *Pacif. Ins. Monogr.* The 1st 4, the 5th and the remaining new species and subspecies belong to the Hippoboscidae, Streblidae and Nycteribiidae, respectively.

Ornithomya alpicola Maa, n. sp.

Material. 3 ♂, 2 ♀. Holotype ♀ (BISHOP 10377) and paratypes in B. P. Bishop Museum. NEPAL: 3 ♂, 1 ♀ (holotype), Numaket District, Uring Ghang, S side of Gosainkund Pass, 3500 m (11,475 ft), ex *Ithaginis cruentus* (NP 1181), 6.IX.1968, R. M. Mitchell. 1 ♀, Sindhu District, Dkupu, 20 km N of Tarke Ghang, 3960 m (13,000 ft), ex *I. cruentus* (NP 3006), 13.VIII.1969, R. M. Mitchell.

Distribution. Nepal, highland, 3500–4000 m; probably endemic to the Himalayas.

Host. The only known host bird, *Ithaginis cruentus* Hardwicke, belongs to Galliformes: Phasianidae.

Affinities. This species is chiefly characterized by the wide face in combination with the very extensively microtrichiate wings. Apparently it is rather isolated. The body size, venation, alula and abdominal chaetotaxy suggest its affinities to *O. avicularia* (Linnaeus) and *O. fuscipennis* Bigot, while the number of scutellar bristles and the composition of the basal comb of the hind basitarsus are similar to those of *O. fringillina* Curtis and relatives.

Description. ♀. Head and thorax dorsally brown, slightly paler on humeral areas and along median scutal line; ventrally without distinct dark markings. Head with 3 or 4 moderately long vibrissal spines on each side, and with 6–9 gular spines. Postgena narrow; postoccipital setal line broadly interrupted at middle. Palpus rather short, with more numerous setae-bristles than in *avicularia* and *fuscipennis*. Maximum width of eye (in frontal view of head) 1/2 minimum interocular distance. Scutellum with 6 preapical bristles, those of outermost pair distinctly shorter and finer. Wing 6.5 mm long, with microtrichia uniformly covering upper surface of cells *2r* (apical 1/3), *3r* (except a very small bare area at base) and *1m* (except a narrow bare stripe along basal margin); under surface of cell *3r* bare at base and with a narrow bare stripe along vein M_{1+2}, otherwise uniformly microtrichiate; cell *2m* anteriorly with a triangular microtrichiate area which starts from the level of vein *im* and is widened apicad. Cell *2r* acute at apex; *2bc* apically 2 × as wide as at level of vein *mcu*; *3bc* long, antero-apically very acute. Alula long, similar to that of *avicularia*. Femur 1 much shorter (34:52) than 3, with chaetotaxy on anterior (interior) surface similar to that in *avicularia*. Segment 1 of tarsus 3 about as long as in *fuscipennis* (i.e. longer than in *avicularia*), with 10± sensory pores on anteroventral margin, and with ventral comb at base formed by a single row of strong setae; segments 2–4 ventrally each with a row of 4 shining black spines. Abdomen rather evenly setose; setae on tergites 3–5 subequal in length and robustness to neighboring connexival setae; setae on lateral areas of dorsal connexivum mixed with a number of bristles which are, as in *fuscipennis*, longer and somewhat more numerous than in *avicularia*; setae on apical areas of dorsal connexivum distinctly longer, more robust than elsewhere and each with a larger basal papilla; interspace between tergites 5 and 6 bare; no series of long setae lined near and parallel to exterior margins of side pieces of tergite 6 (these setal series are more or less developed in *avicularia* and *fuscipennis*). Tergites 3–6 fairly small, similar to those of *avicularia* and *fuscipennis*; side piece of tergite 6 partly enclosing spiracle 6. Laterite 2, as in *fuscipennis*, fringed with 15± long bristles on dorsal and apical margins, and with 6–9 setae-bristles, in 2 or 3 series, on surface. Spiracle 3 surrounded by about equal numbers of bristles and spinelike setae. Area between anus and spiracle 7 with patch of 6 or 7 small spinelike setae. Chaetotaxy of abdominal venter, and shape of pregenital plate and anal sclerites similar to those of *avicularia*.

♂. Scutellum with 6–8 preapical bristles (average for 3 specimens, 7 bristles). Wing 6.3–6.4 mm long. Abdomen, as in *fuscipennis*, with more abundant lateral bristles than in *avicularia*. Laterite 2 rather evenly covered with strong setae on surface. Genitalia practically inseparable from that of *avicularia* and *fuscipennis*. Other characters similar to those of ♀ described above.

Ornithomya chloropus montivaga Maa, n. ssp.

Material. 1 ♀. Holotype (BISHOP 10378) in B. P. Bishop Museum. TAIWAN: Nantou Hsien, Tsui-feng, 3000 m, ex *Carpodacus vinaceus formosanus* (7E 1597), 10.VI. 1967, Migr. Anim. Path. Surv.

Distribution. Taiwan, highland, 3000 m; probably endemic.

Host. Probably breeding chiefly on passerine birds. The only known host belongs to Passeriformes: Fringillidae.

Affinities. Montivaga appears to be intermediate between the 2 other subspecies of the species, *chloropus* Bergroth s. str. (Europe) and *extensa* Maa (Japan, Korea), and differs from the latter chiefly in having much fewer setae-bristles on laterite 2 and more

numerous small spinelike setae on the areas between the anus and spiracle 7. The wing microtrichia are about as extensive, and the side pieces of tergite 6 are about as short as in *extensa* whereas the marginal bristles on laterite 2 are about as long as in *chloropus* s. str. and much longer than in *extensa*.

Description. ♀. Brown; dark markings of head and thorax very poorly developed. Head with 4 or 5 rather long vibrissal spines on each side, and with 6 gular spines. Scutellum with 6 preapical bristles. Wing 5.0 mm long; cell *2r* apically microtrichiate up to level of apex of vein R_1; *3r*, as in *chloropus* s. str., extensively microtrichiate but with posterior bare stripe reaching hardly beyond midpoint of 3rd abscissa of vein M_{+1}; *1m* with 3 microtrichiate stripes, apical 1/2 of 1st 2 stripes confluent; *2m* microtrichiate at extreme apical corner, elsewhere bare; *2bc* with width at level of vein *mcu* about 8/15 that at level of *im*; *3bc* long, with fairly acute antero-apical angle; veins M_{1+2} and M_{3+4} both party microtrichiate. Tarsus 3 with 10± sensory pores on anteroventral margin of segment 1. Side piece of tergite 6 small, partly enclosing spiracle 6, with 2 strong bristles and a number of setae of varied lengths. Laterite 2 with 3 bristles plus 7–9 setae on dorsal and apical margins, and with 4 or 5 setae in a single series on surface. Bristles on margins of laterite 2 much longer than longest bristles at vicinities of spiracles 3 and 4 but shorter (and stouter) than those near spiracles 5 and 6; setae surrounding spiracle 3 mostly spinelike. Area between anus and spiracle 7 with a patch of 20± small spines (in *chloropus* s. str. with only 10±, while in *extensa* with 2 or 3 such spines). Palpus, postoccipital setal line, vein *im*, femur 1 and tergites 3–5 similar to those in *extensa*.

♂. Unknown.

Ornithomya medinalis Maa, n. sp.

Material. 1 ♀. Holotype (BISHOP 10379) in B. P. Bishop Museum. BHUTAN: Gedu, ex *Certhia discolor* (9E 0318), 19.X.1968, Migr. Anim. Path. Surv.

Distribution. Bhutan, highland; probably endemic to the Himalayas.

Host. Probably breeding chiefly on passerine birds. The only known host, *Certhia discolor* Blyth, belongs to Passeriformes: Certhiidae.

Affinities. Closely related to *O. fringillina* Curtis, and to a lesser extent, to *O. chloropus* Bergroth. The criteria for the recognition of this remarkable species are the relatively large size of the body (in combination with the single pair of scutellar bristles which may be somewhat variable in number), the relatively short basitarsi 3, and the presence of numerous bristles on laterites 2 and before the urogenital area. *Medinalis* may immediately be separated from *fringillina* by the much larger body size, and from *chloropus* by the much fewer scutellar bristles, the absence of long bristles closely around spiracles 3, and the presence of finer but more numerous bristles before the urogenital area.

Description. ♀. Brown; paler on scutellum and lower 1/2 of lateral surfaces of thorax. Head with 12± very long vibrissal spines on each side, and with 9 gular spines. Postgena narrow; postoccipital setal line complete or nearly so, setae not evenly spaced, those at middle section of this line more widely spaced than at both ends. Palpus slightly wider than in *fringillina*. Maximum width of eye 15/26 minimum interocular distance. Scutellum with only 2 preapical bristles. Wing 5.5 mm long, closely similar to *fringillina* in venation and in distribution of microtrichia; alula long, 13 × 5.5; width of cell *2bc* at apex 1.5 × that at level of vein *mcu*. Femur 1 much shorter (26:35) than 3, not significantly different from that of *fringillina* in chaetotaxy on anterior (interior) surface; femur and tibia 2 slightly shorter than 3. Segment 1 of tarsus 3 longer (7:5) than wide, with 7± sensory pores on anteroventral margin, and with a single row of strong setae at base to form a ventral comb; segments 2–4 ventrally each with a row of 4 shining black spines. Abdomen, as in *fringillina*, finely

setose; side pieces of tergite 6 each with 2 long strong bristles, ventral connexivum with 7± pairs of similar bristles near apex; lateral connexivum with mixture of spinelike setae and fine bristles, latter only about 1/2 as long as strong bristles on tergite 6 and on abdominal apex; laterite 2 with 12± strong bristles on dorsal and apical margins, and with 2 series of shorter bristles on surface; spinelike setae near spiracle 3 notably shorter than those near spiracles 4 and 5, urogenital area anteriorly fenced by a transverse patch of 30± fine bristles which are about as long as those near spiracles 4 and 5; area between anus and spiracle 7 with 2 small spinelike setae on each side. Pregenital plate roundish. Anal sclerites as in *fringillina*.

♂. Unknown.

Crataerina (Stenepteryx) debilis Maa, n. sp.

Material. 1 ♀. Holotype (BISHOP 10380) in B. P. Bishop Museum, with right palpus, right wing and abdomen mounted on slides #1258. BHUTAN (W.): Gedu, ex *Delichon nipalensis* (9E 0282), 20.X.1968, Migr. Anim. Path. Surv.

Distribution. Bhutan, highland; probably endemic to the Himalayas.

Host. Possibly parasitic specifically on *Delichon nipalensis* Horsfield & Moore (Passeriformes: Hirundinidae).

Affinities. This new species appears to be closely related to *C.* (*S.*) *hirundinis* (Linnaeus), type and the only previously known species of the subgenus *Stenepteryx* Leach. It can immediately be recognized by the almost evenly narrow wings and by the absence of long stout spines on the ♀ abdominal apex. To facilitate the comparison of the 2 species, characters of *hirundinis* are given in parentheses in the following description.

Description. ♀. Face moderately wide (slightly narrower). Palpus basally with rather numerous (fewer) setae. Wing 5 mm long, 11 × (6–7 ×) as long as wide, apical 2/3 scarcely (markedly) narrowed apicad; maximum width : width at level of apex of vein C: width at level of apex of vein M_{1+2}, 11:6:6 (15:5:8). Tibia 2 with 2 (4–7) sensory pores on posterior = interior surface; tibia 3 with 11 (16–22) sensory pores on anterior = exterior surface. Abdomen dorsomedially with rather long and fine (shorter and slightly stronger) setae and apically without any long stout spines (with 10–15 such spines); urogenital area flanked with spinelike setae which are about 2 × as long as (hardly longer than) those near laterite 2.

♂. Unknown.

Megastrebla (Aoroura) subtruncata Maa, n. sp.

Material. 1 ♂, 1 ♀. Holotype ♀ (BISHOP 10381) and paratype ♂ both in B. P. Bishop Museum. CELEBES (Sulawesi): Holotype ♀, S Sulawesi Prov., Palopo Kabapaten, Soroako, 385 m, ex *Rousettus celebensis* (DJM 3469), 22.IX.1972, P.F.D. Van Peenan; paratype ♂, same data but DJM 3310, 20.IX.1972.

Distribution. Celebes, lowland; probably endemic to Celebes and nearby islands. The type-locality Soroako (2° 31' S, 121° 20' E) is situated near the center of Celebes.

Host. True host not quite certain. Presumably the occurrence on *Rousettus celebensis* Andersen (Pteropodidae : Pteropodinae), as listed above, is incidental. Large numbers of this bat from different parts of Celebes have, since 1971, been collected and examined for batflies and other parasites by field teams of the U.S. Naval Medical Research Unit No. 2 Jakarta Detachment. But in addition to numerous specimens of 3 *Leptocyclopodia* species from many localities at various altitudes, only 2 specimens of this *Megastrebla* species were discovered in Soroako at 385 m.

Affinities. This new species stands intermediate between *M.* (*A.*) ***limbooliati*** Maa and *M.* (*A.*) ***nigriceps*** (Jobling). It shares with ***limbooliati*** the extensively bare prescutum and scutum and the scarcely modified femora 2, and shares with ***nigriceps*** the oblique 1st abscissa of vein R_{4+5}, the gently curved basal section of vein M_{3+4}, the relatively few dorsolateral abdominal bristles, the posteriorly subtruncate abdominal sternite 2, the subtriangular ♀ sternite 7, the small linear ♂ pregenital plate and the characters enumerated in 1st 1/2 of couplet 6 of the following key. The broadly truncate anterior prosternal process and the absence of an appendix of the anal cell in ***subtruncata*** are unique for the genus. The name of the new species refers to the posteriorly subtruncate abdominal sternite 2 in both sexes and sternite 7 in the ♀. For the inclusion of ***subtruncata*** and for its separation from ***limbooliati*** and ***nigriceps***, couplet 6 of my (1971) key to *Megastrebla* species may be revised as follows.

6. Anterior process of prosternum truncate or weakly bilobed; vein R_1 not angulate near base, anal cell with acute antero-apical angle; setae on ♀ ventral connexivum even in length and robustness; body relatively small, wing 2.6–3.5 mm long. 6a

   Anterior process of prosternum pointed or rounded; vein R_1 distinctly angulate near base, anterior margin of anal cell perpendicular to apical margin; setae on ♀ ventral connexivum clearly uneven in length and robustness; body relatively large, wing 3.8–5.0 mm long. 7

6a. Prescutum and scutum largely bare; setae on ♀ ventral and lateral connexiva even in length, robustness, density and each arising from a small basal papilla; anal cell without appendix; ♂ digitiform process in front view 2 × as long as wide and distinctly narrowed apicad. ..... **subtruncata**

   Prescutum and scutum rather evenly covered with setae-bristles of varied length and robustness; setae on ♀ lateral connexiva markedly longer, stronger, sparser and with larger basal papillae than setae on ♀ ventral connexivum; anal cell with an appendix; ♂ digitiform process in front view 1.5 × as long as wide, not narrowed apicad or scarcely so. ..... **nigriceps**

Description. Body rather slender, ♂ 3.3 mm, ♀ 3.6 mm long. Head: Postvertex ovoid or roundish, with 8 (in holotype) or 12 (in paratype) setae. Thorax: Prescutum and scutum largely bare, former with 20± long bristles on each anterolateral corner, and with a very broadly interrupted setal row immediately before transverse scutal suture. Prosternum with anterior process broadly truncate (in ***limbooliati*** pointed, in ***nigriceps*** narrowly truncate or weakly bilobed). Wing 3.0–3.2 mm long; veins R_1 and M_{3+4} (1st abscissa) gently curved, not angulate near base; R_{2+3} apically more curved than in ***limbooliati***, and closer (10:13) to apex of R_1 than to apex of R_{4+5}; 1st abscissa of R_{4+5} distinctly oblique; anal cell with antero-apical angle acute, and with posterior margin gently curved into apical margin and not thickened (or hardly so) to form an appendix; alula as long and narrow as in ***limbooliati***. Legs similar to those of ***limbooliati***, femur in profile hardly shorter and wider than femur 1, and with chaetotaxy practically same as in femora 1 and 3.

Abdomen of ♂: Dorsal connexivum flanked by 3 columns of bristles on each side, 1st (uppermost) column composed of very long, dark, robust bristles, 2nd column of moderately long, paler, rather fine bristles while 3rd column broadly interrupted at middle and also of paler and rather fine bristles. Lateral plate of tergite 6 about 1.5 × as long as wide, with 7± bristles. Sternite 2 subtruncate posteriorly, with setae forming posterior fringe uniformly fine and scarcely longer than those on surface, setae on posterolateral corners not noticeably denser and stronger than elsewhere. Sternite 7 not definable. Digitiform process in front view straight, 2 × as long as wide and distinctly narrowed apicad, in lateral view slightly curved. Pregenital plate linear, hardly definable in the unique ♂, smaller than and lying between right and left digitiform processes. Parameres very gently curved.

Abdomen of ♀: Dorsal connexivum as in ♂. Lateral plate of tergite 6 about 1.5 × as long as wide, with 10± bristles. Setae on lateral and ventral connexiva quite even in length, robustness and density, and each arising from a small basal papilla. Sternite 2 as in ♂ but setae forming posterior fringe each arising from a fairly large basal papilla. Sternite 7 moderately large, subtriangular, subtruncate posteriorly (not emarginate at middle), surface evenly setose, posterolateral area with 5± bristles (in 2 series). Sternite 8 fairly large, sternite 9 small, both elongate and sclerotized. Sternite 10 slightly longer than wide, with over 20 setae on surface and with 4 bristles posteriorly. Proctiger anteriorly parallel-sided, posteriorly with 4 dorsal bristles, and with 2 lateral bristles on each side.

Archinycteribia curvistyla Maa, n. sp.

Material. 1 ♂. Holotype mounted on slide, in Rijksmuseum van Natuurlijke Historie. Leiden. CELEBES (Sulawesi): Boné, coll. H. von Rosenberg, removed by me in 1963 from under base of upper arm off type ♂ of *Boneia bidens*.

Distribution. Celebes, lowland. The type-locality Boné (0° 32' N, 123° 08' E) is in N Celebes near Gorontalo, and is not to be confused with Bone (Boni) (4° 33' S, 120° 19' E) in S Celebes (cf. K. Andersen, 1912, *Cat. Chiroptera Colln. Brit. Mus.* 1: 66).

Host. *Boneia bidens* Jentink (Pteropodidae : Pteropodinae) is obviously the normal host. The genus *Boneia* is monobasic, endemic to Celebes and exceedingly rare in collections.

Affinities. Closely related to *A. actena* Speiser and differing from the latter species in being much smaller and having fewer setae, shorter tergite 6, more evenly sclerotized sternite 5+6, more numerous spinelike microsetae on claspers and distinctly curved parameres (for which the name *curvistyla* is suggested). In the relative size of tergite 6 and the degree of sclerotization of sternite 5+6, the new species is somewhat close to *A. octophthalma* Theodor while in the details of ♂ genitalia, it appears to be intermediate between *actena* and *octophthalma*. The new species is the 3rd one known to the genus.

Description. ♂. Length 2.0 mm. Brown. Head as in *actena* but eye elliptical. *Thorax* also as in *actena* but dorsolateral sclerite more significantly narrowed caudad, with its posterior lobe about as wide as anterior lobe which is much wider than in *actena*; notopleural setae rather short. Sternal plate transverse (44 × 49), fringed posteriorly with 12 strong setae, median suture widest at intermediate 1/3 and narrowest at posterior 1/3. Haltere brown (in *octophthalma* pitchy black). *Abdomen* sparsely covered with strong setae. Tergite 1 entire, very small, with 2 pairs of small setae. Laterite 1 squarish, with 2 small setae. Tergite 2 broadest at level of spiracles 2 where it is strongly angulately produced (in *actena* weakly rounded), surface with 3 setal rows, posterior margin evenly concave, fringed with 15 setae of which the lateralmost on each side are much more robust than remaining ones, posterolateral corner angulate. Tergite 3, as in 2, very slightly paler along median line, surface with 2 or 3 pairs of preapical setae. Tergites 4–6 subequal in length to one another, all short and bare on surface; tergites 4 and 5 (but not 6) clearly interrupted at middle. Anal segment (dorsal part) shorter than wide at base, with a pale triangular submembranous area posteriorly at middle, surface largely bare, with some setae of varied length and robustness on posterolateral corner. Sternite 1+2 with 5± rows of rather irregularly arranged setae on surface, with 25 setae along posterior margin. Sternite 3 slightly longer than 4. Sternite 5+6 rather evenly sclerotized and pigmented, with a paler, less sclerotized median strip which is as wide as median gap of posterior fringe; posterior margin distinctly concave. Anal segment (ventral part) with concave anterior margin, with anterior area medially pale and submembranous. Clasper long, slender, apex sharply pointed and extending beyond anterior margin of anal segment, apical 2/3 of ventrolateral surface covered with numerous spinelike microsetae. Basal arc with short apodeme; paramere partly fused with phallobase, curved in profile. Other characters similar to those of *actena*.

♀. Unknown.

Eucampsipoda lieftincki Maa, n. sp.

Material. 1 ♂. Holotype mounted on slide, in Rijksmuseum van Natuurlijke Historie, Leiden. CELEBES (Sulawesi): Gorontalo, V.1864, coll. H. von Rosenberg, removed by me in 1963 from underneath base of upper arm off type ♀ of *Callinycteris* [*Eonycteris*] *rosenbergi.*

Distribution. Celebes, lowland. The type-locality Gorontalo (Gorantalo) (0° 31' N, 123° 26' E) is in N Celebes.

Host. Eonycteris rosenbergi (Jentink) (Pteropodidae : Macroglossinae) is obviously the normal host. According to Laurie & Hill (1954, *List Land Mamm. New Guinea, Celebes etc.*: 44), this species of bat is "known apparently only from the type specimen".

Affinities. Insofar as the ♂ sex is concerned, *lieftincki* appears to be rather isolated — a fact in concordance with the isolated position of its host, *rosenbergi*, within the genus *Eonycteris* Dobson — and detailed comparison with other *Eucampsipoda* species must wait for the discovery of the ♀. The shape, relative size and chaetotaxy of the various tergites and sternites are similar to those of *Eu. sundaica* Theodor (on *Eo. spelaea* Dobson) but the claspers and aedeagus are different. The affinities with *Eu. philippinensis* Ferris (on *Eo. robusta* Miller) and *Eu. vanpeenani* n. sp. (on *Eo. major* Andersen) seem to be remote. The new species is respectfully named after Dr Mauritz A. Lieftinck, formerly of the Leiden Museum.

Description. ♂. Length 2.2 mm. *Head* dorsally slightly darkened and with 2 setae on anterior margin. Eye fairly large, rounded. Palp distinctly shorter than its terminal seta. Labella 2 × as long as theca. *Thorax* normal. Sternal plate scarcely shorter than wide (45 × 47). *Abdomen* rather profusely setose. Tergite 1+2 with 3 pairs of microsetae near anterior margin, and with 3 setal rows near posterior margin, setae of 1st 2 rows well spaced, rather irregularly arranged and some being out of alignment; posterior margin shallowly incised at middle, fringed with moderately long (some slightly shorter) setae, lateral setae not markedly longer than median ones. Tergite 3 with 2 setal rows on surface, median setae of posterior fringe nearly 2 × as long as lateral setae. Tergites 4 and 5 similar to tergite 3 in chaetotaxy but each with only 1 preapical setal row, and posterior fringe of tergite 5 with a pair of long submedian bristles which are about 1/2 longer than anal segment. Tergite 6 bare on surface, with similar posterior fringe as in tergite 5. Tergites 3–5 subequal in length to one another and slightly longer in proportion than in *sundaica*; tergite 6 about 1/2 longer and more sclerotized than its 3 preceding tergites; posterior fringes of tergites 4, 5 and 6 composed of 18, 14 and 17 setae-bristles respectively. Anal segment (dorsal part) moderately long, distinctly narrowed caudad, anterior 1/2 of surface virtually bare, posterior 1/2 with few fine scattered setae. Sternite 1+2 short (13 × 31), gently narrowed cephalad, posterior 1/2 of surface with 2 setal rows; ctenidium of 30 teeth. Sternite 3 with 3 setal rows on surface, with posterior fringe composed largely of rather short setae. Sternite 4 with 1 setal row on surface plus 2 or 3 extra setae on each side before that row; anterior margin parallel to posterior margin, very weakly convexly curved; posterior fringe composed largely of long setae. Sternite 5+6 about 1/2 longer than 4, with 3 or 4 setae at each side on surface; anterior margin very weakly concave, posterior margin weakly produced at middle; posterior fringe similar to that of sternite 4 but with small setae on median process. Clasper 0.33 mm long, slender, pointed and in profile weakly recurved at apex, ventral surface with a rather short bristle near base, no pegs but 1 or 2 series of microsetae on apical 1/2, and with 2 or 3 microsetae on lateral margin near base. Genital frame parallel-sided; basal arc with moderately long apodeme; deck plate widest at anterior end, slightly narrowed at posterior 1/3. Aedeagus 0.26 mm

long, with long "sleeve" at apex.

♀. Unknown.

Eucampsipoda vanpeenani Maa, n. sp.

Material. 5 ♂, 3 ♀. Holotype ♂ (BISHOP 10382) and 5 paratypes in B. P. Bishop Museum, 1 pair of paratypes from Hantakan in the U. S. National Museum. BORNEO (Kalimantan): 2 ♂ (incl. holotype), 1 ♀, S Kalimantan Prov., Tabalong Kabapaten, Puroi, 50–250 m, ex *Eonycteris major* (DJM 1386–87), 15.II.1971, P.F.D. Van Peenan. 3 ♂, 2 ♀, S Kalimantan Prov., Hulu Sungai Kabapaten, Hantakan, 50 m, ex *Eo. major* (DJM 1287), 4.II.1971, P.F.D. Van Peenan.

Distribution. Borneo, lowland. The localities Puroi (1° 53' S, 115° 41' E) and Hantakan (2° 38' S, 115° 27' E) are both in the central east part of Borneo.

Host. Eonycteris major Andersen (Pteropodidae : Macroglossinae) is obviously the normal host. This species of bat is also a rarity in collections. The field teams of the U. S. Naval Medical Research Unit No. 2 Jakarta Detachment managed to collect in 1971–1972 4 specimens, 2 from Puroi and 1 each from Hantakan and Maridan (1° 04' S, 116° 3' E).

Affinities. Closely related to *Eu. philippinensis* Ferris but easily recognizable from the latter species in that the ♂ has a complete setal row on the surface of each of sternites 4 and 5+6, and has no posteromedian process on sternite 5+6; and the ♀ has only a single pair of bristles on dorsal connexivum, and has 5–7 spinelike setae on each side of pregenital plate.

Description. ♂. Length 2.5 mm. *Head* dorsally with only 2 setae on anterior margin. Eye slightly larger than in *philippinensis*. Labella 2 × as long as theca. *Thorax* as for the genus. *Abdomen*: Sternite 3 with 21–24 setae on posterior margin. Sternites 4 and 5+6 each with a complete setal row on surface; posterior margin of sternite 5+6 laterally with strong spinelike setae, medially evenly convexly curved (not distinctly produced) and with a row of 5 strong, rather blunt, closely arranged spines. Clasper 0.32 mm long, evenly narrowed apicad, ventral surface with scattered pegs on apical 1/2. Aedeagus 0.32 mm long, in profile almost evenly narrow, and about 8 × as long as wide. Other characters as in *philippinensis*.

♀. Length 2.5 mm. *Head* and *thorax* as in ♂. *Abdomen:* Tergite 1+2 with a few scattered small spinelike setae on surface; posterior margin angulately notched at middle, and lined with moderately long and a few small spinelike setae. Dorsal connexivum evenly covered with short setae which become slightly longer on posterior area; only 1 pair of long bristles which are in alignment with 3rd setal row from behind. Tergite 6 small, 1/2 as long as wide, bare on surface, with 4–6 bristles on posterior margin. Spiracles 6 not enclosed by tergite 6. Sternite 1+2 with 30–33 ctenidial teeth. Side piece of sternite 6 shorter than wide, with 4, less frequently 3, setae on surface, with 3 setae plus 3 bristles arranged alternately on posterior margin. Side piece of sternite 7 about as long as wide, widened cephalad, with 1–3 setae on surface. Pregenital plate transverse, ribbonlike, fringed with 5–7 evenly long spinelike setae on each side; postgenital plate small, narrow, connected with infra-anal plate which bears 2 (1+1) long setae at sides and 1 or 2 small setae at middle on posterior margin.

Eucampsipoda penthetoris bonae Maa, n. ssp.

Material. 18 ♂, 8 ♀, in 13 lots. Holotype ♀ (BISHOP 10383) and 19 paratypes in B. P. Bishop Museum; 2 ♂, 1 ♀ paratypes each in the U.S. National Museum and Museum Zoologicum Bogoriense. All specimens are from BORNEO (Kalimantan), those from

Sarawak were collected by Mr B. L. Lim whereas the remaining ones, by Capt. P.F.D. Van Peenan.

Ex *Penthetor lucasi:* Sarawak: 1 ♂, 2 ♀ (incl. holotype), Kuching, V.1964; 1 ♂, 2 ♀, Long Lubong, Batu Malien, V.1950. E Kalimantan Prov. (Kutai Kabapaten): 4 ♂, Kenangan, 50 m, X.1972; 4 ♂, 4 ♀, Sebulu, 100 m, XII.1972; 6 ♂, Sungai Beras, 70 m, XII.1972. — Ex other hosts: *Cynopterus brachyotis:* 1 ♂, Sarawak, Kuching, V.1964; *C. horsfieldi*: 1 ♂, S Kalimantan Prov., Hulu Sungai Kabapaten, Hantakan, 50 m, II.1971.

Distribution. Borneo, lowland; probably endemic.

Host. Obviously *Penthetor lucasi* Dobson (Pteropodidae: Macroglossinae) (11 records) serves as a normal host, and the 2 odd records ex *Cynopterus* bats are results of straggling or contamination.

Affinities. This subspecies differs from the nominate one chiefly in having fewer discal bristles on the ♀ dorsal connexivum.. Theodor (1967) described *Eu. penthetoris* on the bases of 2 ♂ from Singapore (1 of them was selected as the holotype) and 14 specimens from Sarawak, and the number of those discal bristles was given as 10–14 in the description, and as 8–10 in the key to species. This number is not applicable to the nominate subspecies, and the Bornean race is described below as new. The name *bonae* is derived from Bona Fortuna, an early name in Latin for Borneo (Kalimantan).

Description. ♂. Clasper in ventral view rather evenly tapering apicad, in profile more slender than in nominate subspecies; setulae on lateral surface shorter. ♀. Setae on posterior margin of tergite 2 shorter, some of them spinelike. Dorsal connexivum with shorter finer setae and discally with 7–14 bristles in 2, rarely 3, rows (in nominate subspecies, with 22–35 bristles in 5 or more rows).

Leptocyclopodia (Leptocyclopodia) ferrarii mabuhai Maa, n. ssp.

Material. 244 ♂, 291 ♀, in 236 lots, collected in the PHILIPPINES in 1963–1968 largely by D. S. Rabor, and partly by R. B. Gonzales, N. Wilson and the Migr. Anim. Path. Surv. Holotype ♂ (BISHOP 10384), selected from the series from Mindanao: Cotabato, Mt Tuduk, Glan, 60–300 m, ex *Cynopterus brachyotis luzoniensis* (#1262), 23.V.1966, D. S. Rabor, in B. P. Bishop Museum. Paratypes 2 ♂, 2 ♀ each in the U. S. National Museum and several other institutions, remainder in Bishop Museum.

Ex *Cynopterus brachyotis luzoniensis:* LUZON: 2 ♂, 3 ♀, Laguna, Balian; 5 ♂, 4 ♀, Mt Makiling. — ILOILO: 1 ♂, Concepcion, Pan de Azucar, Taloto-an. — GUIMARAS: 1 ♂, 3 ♀, Sta Rosario, Buenavista. — NEGROS (Negros Oriental): 7 ♂, 6 ♀, Siaton, Kandugay; 6 ♂, 1 ♀, Siaton, Zumalon; 2 ♂, Sibulan, Agan-an; 7 ♂, 3 ♀, Sibulan, San Antonio, Malindog; 33 ♂, 28 ♀, Valencia, Camp Lookout. — LEYTE: 36 ♂, 26 ♀, Burauen, Tambis, Mt Lobi Range; 2 ♀, Mahaplag, Mt Kabalanti-an, Bulog Peak. — CAMIGUIN: 9 ♂, 14 ♀, Cataman, Mt Mambajao, Sangsangan. — MINDANAO: 13 ♂, 17 ♀, Cotabato, Mt Tuduk, Glan; 89 ♂, 58 ♀, Davao, Mt Mayo, Limot Mati; 1 ♂, Davao del Sur, Malalag, Kibawalan.

Ex other bats: *Ptenochirus jagori:* 2 ♂, 4 ♀, Luzon, Mt Makiling: 1 ♂, Negros, Valencia; 1 ♂, Negros, Kandugay; 8 ♂, 5 ♀, Negros, Dumaguete City, Leduna; 2 ♂, Leyte, Mt Lobi Range. — *Haplonycteris fischeri:* 5 ♂, 5 ♀, Guimaras, Sta Rosario; 1 ♀, Negros, Valencia; 1 ♂, Mindanao, Mt Tuduk. — *Eonycteris spelaea glandifera:* 2 ♂, 1

♀, Negros, Valencia. — *Macroglossus lagochilus:* 3 ♂, Negros, Valencia; 1 ♀, Mindanao, Limot Mati. — *Hipposideros diadema:* 2 ♂, 1 ♀, Mindanao, Limot Mati. — Undetermined bats: 5 ♂, 4 ♀, Leyte, Mt Lobi Range; 3 ♀, Leyte, Mahaplag, Mt Kabalanti-an, Paniniklan; 1 ♀, Mindanao, Kibawalan.

Distribution. Philippines (Luzon, Iloilo, Guimaras, Negros, Leyte, Camiguin, Mindanao), 0–1000 m. Probably widespread all-over the Philippines except Palawan and adjacent islets where it is replaced by ssp. *palawanensis* Theodor.

Hosts. Evidently *Cynopterus brachyotis luzoniensis* Peters (Pteropodidae: Pteropodinae) (213 records) is the normal host. The other hosts recorded, viz., *Ptenochirus jagori* Peters (7 records), *Haplonycteris fischeri* Lawrence (7 records), *Eonycteris spelaea glandifera* Lawrence (3 records), *Macroglossus lagochilus* Matschie (4 records) and *Hipposideros diadema* Geoffroy (1 record), are apparently results of mislabeling, contamination, and incorrect field determination of the bats.

Affinities. This subspecies is intermediate between *ferrarii* Rondani s. str. (India, S China to Borneo, Java) and *wallacei* n. ssp. (Celebes) particularly in the shape of the anal segment and claspers in ♂. The comparatively short tergite 6 and numerous posterior marginal setae on tergites 3 and 4 in ♂ are similar to those of *ferrarii* s. str., while the short legs in both sexes, and the fine connexival setae and the small side pieces of sternites 5–7 in ♀ are similar to those of *wallacei.* The most convenient characters for the recognition of *mabuhai* are the comparatively short legs and claspers (♂), cf. discussions under *wallacei* and Tables 1–3.

Description. Legs comparatively short, tibia 3 short and wide in proportion. ♂: Tergites 3 and 4 averaged with 32 and 26 setae respectively on posterior margins. Tergite 6 relatively short (transversely narrow). Anal segment short, tapering apicad in dorsal view. Clasper short, slightly widened near apex. ♀: Setae on abdominal connexiva fine. Side pieces of sternites 5–7 small. Other characters as in nominate subspecies.

Leptocyclopodia (Leptocyclopodia) ferrarii wallacei Maa, n. ssp.

Material. 11 ♂, 10 ♀, in 10 lots. Holotype ♂ (BISHOP 10385) and paratypes in B. P. Bishop Museum. All specimens were collected by Capt. P. F. D. Van Peenan from CELEBES (Sulawesi): C Sulawesi Prov., Donggala Kabapaten, Gumbasa Valley.

Ex *Cynopterus brachyotis:* 1 ♂ (holotype), Gumbasa, 105 m, #G 90, 22.I.1973; 7 ♂,

Table 1. *Leptocyclopodia ferrarii* and relatives*: Numbers** of setae on posterior margins of tergites.

Species	Material examined	Tergite 3 (♂)	Tergite 4 (♂)	Tergite 6 (♀)
L. f. ferrarii	102 ♂, 68 ♀, Malaya	29 — 36 (31.9)	20 — 32 (26.3)	2 — 6 (4.2)
L. f. mabuhai	44 ♂, 40 ♀, Mindanao	30 — 34 (32.0)	23 — 33 (26.3)	4 — 6 (4.9)
L. f. wallacei	11 ♂, 10 ♀, Celebes	**16 — 23 (20.3)**	**16 — 21 (18.5)**	3 — 5 (4.1)
L. f. palawanensis	12 ♂, 20 ♀, Palawan	33 — 36 (33.9)	27 — 35 (31.6)	4 — 5 (4.5)
L. kuoi	13 ♂, 30 ♀, Malaya	32 — 30 (34.5)	24 — 31 (27.6)	4 — 8 (5.9)
L. haplotes	37 ♂, 146 ♀, Negros	34 — 41 (37.3)	27 — 38 (31.3)	4 — **11 (7.1)**
L. brevicula	33 ♂, 55 ♀, Mindanao	28 — 33 (30.9)	**17 — 21 (18.9)**	4 — 7 (5.8)

* Not including *L. thaii.*

** Outstanding figures in **bold-face** type; (averages in parentheses).

8 ♀, same data but #G 15–16, 58–59, 107 & 1045, dates 19, 21 & 23.I.1973 & 28.V.1973. 1 ♀, Palu, 5 m, #G 238, 28.I.1973. 2 ♂, Pandere, 100 m, #G 66 & 77, 21 & 22. I.1973. 1 ♂, Salua, 210 m, #G 172, 25.I.1973. – Ex *Scotophilus temmincki*: 1 ♀, Gumbasa, #G 1607, 17.X.1973.

Distribution. Celebes, lowland, 5–210 m. Most probably widespread all-over Celebes.

Hosts. Obviously the normal host is *Cynopterus brachyotis* Müller (Pteropodidae: Pteropodinae), and the occurrence on *Scotophilus temmincki* Horsfield (Vespertilionidae) is incidental.

Table 2. *Leptocyclopodia ferrarii* and relatives*: Numbers** of setae on side pieces of ♀ sternites.

Species	Material examined	Sternite 5	Sternite 6	Sternite 7
L. f. ferrarii	22 ♀, Thailand	4 (4.0)	3 – 5 (**3.4**)	4 – 6 (4.9)
do.	68 ♀, Malaya	3 – 5 (4.0)	3 – 6 (4.6)	4 – 5 (4.8)
do.	10 ♀, Borneo	4 (4.0)	4 – 5 (4.5)	4 – 6 (4.8)
do.	68 ♀, Java	3 – 5 (4.0)	3 – 6 (4.5)	4 – 5 (4.8)
L. f. mabuhai	40 ♀, Negros	3 – 5 (4.0)	4 – 6 (5.1)	3 – 6 (4.5)
do.	40 ♀, Leyte	3 – 5 (4.0)	5 – 6 (5.1)	4 – 5 (4.5)
do.	40 ♀, Mindanao	3 – 4 (3.9)	4 – 6 (5.0)	4 – 6 (4.9)
L. f. wallacei	10 ♀, Celebes	4 – 5 (4.1)	5 – 6 (5.1)	4 – 6 (5.0)
L. f. palawanensis	20 ♀, Palawan	4 (4.0)	4 – 5 (4.6)	5 – 6 (5.1)
L. kuoi	30 ♀, Malaya	3 – 5 (4.1)	3 – 6 (4.2)	4 – 7 (5.2)
L. haplotes	146 ♀, Negros	3 – 6 (4.1)	4 – 7 (**5.4**)	5 – **11** (**7.6**)
L. brevicula	55 ♀, Mindanao	3 – 4 (4.0)	5 – 6 (**5.3**)	4 – 6 (4.8)

* Not including *L. thaii*.
** Outstanding figures in **bold-face** type; (averages in parentheses).

Affinities. *L. ferrarii* Rondani is closely related to *L. kuoi* n. sp. (Malaya, Thailand), *L. thaii* Maa (India, Thailand), *L. haplotes* n. sp. (Philippines) and *L. brevicula* Maa (Philippines) but is far more widespread than the latter 4 species. The range of its distribution closely coincides with that of the host, i.e., the bat genus *Cynopterus* F. Cuvier. The species shows certain geographical variation and may be divided into 4 subspecies. The nominate subspecies occurs in most parts while the 3 others are confined to the peri-

Table 3. *Leptocyclopodia ferrarii* and relatives*: Lengths** of femora 3 and claspers.

Species	Material examined	Femur 3 (♂)	Femur 3 (♀)	Clasper (♂)
L. f. ferrarii	20 ♂, 20 ♀, Malaya	1.00–1.08 (1.04)	0.98–1.08 (1.03)	0.52–0.68 (0.58)
L. f. mabuhai	20 ♂, 20 ♀, Mindanao	0.94–1.04 (1.00)	0.92–1.06 (1.01)	0.50–0.54 (0.55)
L. f. wallacei	11 ♂, 10 ♀, Celebes	0.90–0.96 (**0.93**)	0.92–0.96 (**0.94**)	0.56–0.60 (0.57)
L. f. palawanensis	12 ♂, 12 ♀, Palawan	1.02–1.22 (1.17)	1.08–1.23 (1.14)	0.60–0.64 (0.63)
L. kuoi	14 ♂, 16 ♀, Malaya	0.98–1.10 (1.03)	1.00–1.16 (1.08)	0.52–0.58 (0.55)
L. *haplotes*	19 ♂, 20 ♀, Negros	0.96–1.04 (1.01)	0.96–1.06 (1.02)	0.56–0.66 (**0.62**)
L. brevicula	20 ♂, 20 ♀, Mindanao	**1.28–1.40** (**1.33**)	**1.30–1.48** (**1.41**)	0.54–0.58 (0.56)

* Not including *L. thaii*.
** In mm; outstanding figures in **bold-face** type; (averages in parentheses).

pheral areas within the range of the species. The criteria for the recognition of ssp. ***wallacei*** are the short legs (♂ ♀), fewer posterior marginal setae on tergites 3 and 4 (♂) and long, evenly narrow claspers (♂). Cf. discussions under ***mabuhai*** n. ssp. The name is for A. R. Wallace who first recognized the zoogeographical importance of Celebes.

Description. Legs comparatively short, tibia 3 short and wide in profile. ♂: Tergites 3 and 4 averagedly with only 20 and 19 setae respectively on posterior margins. Tergite 6 relatively short (transversely narrow). Anal segment fairly long, in dorsal view almost parallel-sided. Clasper long, evenly narrow. ♀: Setae on abdominal connexiva fine. Side pieces of sternites 5–7 small. Other characters as in nominate subspecies.

Leptocyclopodia (Leptocyclopodia) kuoi Maa, n. sp.

Material. 35 ♂, 40 ♀, in 45 lots. Holotype ♀ (BISHOP 10386) and most paratypes in B. P. Bishop Museum; 1 pair of paratypes each in the U. S. National Museum, Museum Zoologicum Bogoriense and British Museum (Nat. Hist.). The Malayan specimens were collected by H. E. McClure, B. L. Lim and A. G. Marshall; the Thai specimens, by the Migr. Anim. Path. Surv. and Kitti Thonglongya; and the single Javanese specimen, by P. F. D. Van Peenan (NAMRU-2). All specimens ex hosts other than ***Megaerops*** are from Malaya.

Ex ***Megaerops ecaudatus:*** MALAYA: 10 ♂, 6 ♀ (incl. holotype), Pahang, Cameron Highlands, Mt Brinchang. 5 ♂, 10 ♀, Selangor, Fraser's Hill. — THAILAND: 1 ♂, 3 ♀, Chiengmai, Doi Pui; 1 ♂, Chiengmai, Phrao, Ban Pa Hin. 2 ♂, 2 ♀, Chonburi, Khaosoidaotai; 1 ♂, Chonburi, Sattahi, Koh Khram Yai. 10 ♂, 8 ♀, Korat, Sakaerat, Pak Thong Chai. 1 ♀, Petchabun, Thung Salang Luang. — JAVA: 1 ♀, Gunong Baluran, 620 m.

Ex other bats: ***Cynopterus brachyotis:*** 1 ♂, 2 ♀, Selangor, Kuala Langat, Kampong Batu Lang; 1 ♀, Selangor, Subang; 2 ♀, "Selangor". — ***Chironax melanocephalus:*** 1 ♀, Pahang, Mt Brinchang; 1 ♂, Selangor, Fraser's Hill. — ***Balionycteris maculata:*** 1 ♂, Pahang, Mt Brinchang; 1 ♀, Selangor, Subang. — Ex ***Macroglossus minimus:*** 1 ♀, Pahang, Mt Brinchang. — Undetermined bats: 1 ♂, 1 ♀, Kedah, Gunong Jerai; 1 ♂, "Malaya".

Distribution. Thailand, Malaya, Java; lowland.

Hosts. Most probably ***Megaerops ecaudatus*** Temminck (Pteropodidae: Pteropodinae) (34 records) is the normal host. The 9 records of occurrence on other bats (***Cynopterus***, 4; ***Chironax***, 2; ***Balionycteris***, 2; ***Macroglossus***, 1) are apparently results of contamination and incorrect field determination of the bats.

Affinities. This new species is closely related to ***L. ferrarii*** (Rondani) and ***L. thaii*** Maa with both of which it coexists in Thailand, and with ***ferrarii*** it coexists within its entire range. The species is similar to ***thaii*** and to ***L. haplotes*** n. sp. and ***L. brevicula*** Maa of the Philippines in the absence of outstandingly long setae on ♀ lateral connexiva at the level of sternite 5. The most remarkable characters of ***kuoi*** are, in addition to the very dark color pattern, the very short setae on ♀ connexiva and the poorly developed posterior fringe on ♂ tergites 5 and 6. Besides these 2 characters, ***kuoi*** differs from ***ferrarii*** chiefly in the relative length-width of legs, the absence of above-mentioned outstandingly long connexival setae (♀) and the curvature of the phallobase (♂) in profile; from ***thaii*** chiefly in the relative length-width of legs, and the shape of sternites 6 and 7 (♀)

and of claspers (♂); and from ***haplotes*** and ***brevicula*** chiefly in the notched anterior margin of sternite 1+2 and the shape of sternite 7 (♀) and the anal segment (♂). The species is named in honor of my former colleague Dr J. S. Kuo who quite patiently counted the tergal and sternal setae and who first noted the striking interspecific differences in the *ferrarii* complex.

Description. Length 2.5 mm. Very dark brown in fresh matured specimens. Legs relatively short and broad in profile. *Abdomen of* ♀: Ctenidium with 40± teeth. Connexival setae fairly strong, mostly shorter than diameter of their respective basal papillae, no outstandingly long setae on lateral connexiva at level of sternite 5. Side piece of sternite 5 small, with small setae, length of which all less than width of the sclerite itself; side piece of sternite 6 also small and with small setae, with length about 3 × that of sternite 5, posterior margin slightly oblique; side piece of sternite 7 nearly semicircular, scarcely longer than wide, with setae as long as or slightly longer than the sclerite itself. *Abdomen of* ♂: Tergite 4 interrupted at middle; tergites 5 and 6 with posterior marginal setae scarcely longer and stronger than longest setae on surface of tergite 5. Ctenidium as in ♀. Anal segment relatively short, very weakly tapering apicad, lateral surface without a transverse groove near base, but with anterior margin strongly angulately produced near spiracle 7. Clasper relatively short and broad, very slightly widened near apex. Phallobase in profile with ventral margin almost straight near apex. Other characters similar to that of *ferrarii*.

Leptocyclopodia (Leptocyclopodia) haplotes Maa, n. sp.

Material. 79 ♂, 78 ♀, in 88 lots. All specimens were collected in the PHILIPPINES in 1963–1968 by Dr D. S. Rabor except for 1 ♂, 5 ♀ from Mindanao: Kibawalan which were collected by Dr R. B. Gonzales. Holotype ♀ (BISHOP 10387) and most paratypes in B. P. Bishop Museum, some paratypes will be distributed to the U. S. National Museum and other institutions. Collection data of the holotype read "Negros Oriental, Valencia, Camp Lookout, ex *Haplonycteris fischeri* (M 5618), 3.IX.1964, D. S. Rabor."

Ex *Haplonycteris fischeri:* NEGROS: 30 ♂, 16 ♀, Negros Oriental, Sibulan, San Antonio, Malindog; 14 ♂, 28 ♀ (incl. holotype), Negros Oriental, Valencia, Camp Lookout. — MINDANAO: 1 ♂, Agusan, Mt Hilong-Hilong, Cabadbaran, Balang-Balang; 2 ♀, Agusan, Mt Hilong-Hilong, Siwod; 2 ♂, 1 ♀, Cotabato, Mt Matutum, Tupi, Kablon; 2 ♂, 2 ♀, Davao, Mt Mayo, Ihahanan Mati; 1 ♀, Davao, Mt Mayo, Peak Mati.

Ex other hosts: *Cynopterus brachyotis luzoniensis:* 5 ♂, 4 ♀, Negros, Malindog; 10 ♂, 7 ♀, Negros, Valencia. 1 ♂, Mindanao, Tupi. — *Ptenochirus jagori*: 2 ♂, 2 ♀, Negros, Malindog. 1 ♀, Mindanao, Siwod; 1 ♂, 5 ♀, Mindanao, Davao del Sur, Malalag, Kibawalan. — *Macroglossus lagochilus:* 3 ♂, 1 ♀, Negros, Malindog; 2 ♂, 2 ♀, Negros, Valencia. — *Rousettus amplexicaudatus*: 1 ♂, Negros, Malindog; 1 ♂, 1 ♀, Negros, Valencia. 1 ♂, 1 ♀, Mindanao, Kibawalan. — *Macropygia phasianells tenuirostris:* 1 ♂, Mindanao, Davao, Mt Mayo, Limot Mati.

Distribution. Philippines (Mindanao, Negros), highland.

Hosts. An analysis of the above-listed data clearly shows that *Haplonycteris fischeri* Lawrence (Pteropodidae: Pteropodinae) (56 records) is the normal host, and that the 32 records from other hosts are not reliable. Probably the 16 and 6 records from *Cynopterus* and *Ptenochirus* are results of incorrect field determination for *Haplonycteris* because of close superficial similarities of these 3 species of bats; and the odd record from a *Macropygia* dove is to be discarded.

Affinities. *L. haplotes* coexists in the Philippines with both *L. ferrarii mabuhai* n. ssp. and *L. brevicula* Maa, and stands intermediate between the latter 2 species. It differs from *ferrarii* chiefly in having the anterior margin of sternite 1+2 not deeply notched at middle, abdominal ctenidial teeth more numerous, setae on ♀ lateral connexiva uniformly short, ♂ tergite 4 medially interrupted, and ♂ claspers long and almost parallel-sided; and from *brevicula* chiefly in having legs shorter and wider in profile, ♀ sternite 6 shorter (transversely narrower), ♀ sternite 7 normal, ♂ anal segment not modified to form a sub-basal constriction and a strong anterior projection on the lateral surface, and ♂ claspers almost parallel-sided. The name *haplotes* (Greek, *singleness*) alludes to the strict host specificity on the single species of *Haplonycteris*.

Description. Length 2.5 mm. Dark brown in fresh matured specimens. Legs relatively short and broad in profile. *Abdomen of* ♀: Ctenidium of 40± teeth. Connexival setae moderately short and strong, mostly 1.5 × as long as diameter of their respective basal papillae, no outstandingly long setae on lateral connexiva at level of sternite 5. Anterior margin of sternite 1+2 not notched at middle. Side pieces of sternites 5–7 similar in shape to but slightly larger in size than in *ferrarii*, those of sternite 6 with transverse (not oblique) posterior margin while those of sternite 7 nearly semicircular. *Abdomen of* ♂: Tergite 4 interrupted medially; posterior marginal setae on tergites 5 and 6 rather fine. Ctenidium as in ♀. Anal segment moderately long, gently tapering apicad, without sub-basal constriction, with lateral surface anteriorly broadly rounded near spiracle 7, not strongly angulately produced. Clasper long, virtually parallel-sided. Phallobase in profile with ventral margin less curved near apex than in *ferrarii*. Other characters similar to those of *ferrarii* and *brevicula*.

KEY TO SPECIES OF *Leptocyclopodia ferrarii* COMPLEX

1. Lateral connexiva (♀) with a row of 2–4 outstandingly long setae at level of sternite 5; tergite 4 (♂) entire; anterior margin of sternite 1+2 deeply notched or incised at middle. On *Cynopterus* spp. ..... **ferrarii** (Rondani)

   Lateral connexiva (♀) without such outstandingly long setae; tergite 4 (♂) interrupted at middle; anterior margin of sternite 1+2 either notched or not at middle. 2

2. Anterior margin of sternite 1+2 deeply notched or incised at middle; either ♀ connexival setae mostly shorter than diameter of their respective basal papillae, or side piece of ♀ sternite 7 triangular and as long as wide; lateral surface of ♂ anal segment with anterior margin strongly angulately produced near spiracle 7, no transverse groove near base. Non-Philippine species. 3

   Anterior margin of sternite 1+2 entire, not notched or incised at middle; ♀ connexival setae and sternite 7 longer than above-described; lateral surface of ♂ anal segment anteriorly weakly roundly produced (when strongly so, then with a distinct transverse groove near base). Philippine species. 4

3. Connexival setae (♀) moderately short, mostly 1.5–2.0 × as long as diameter of their respective basal papillae; side piece of ♀ sternite 7 triangular, as long as wide; setae on posterior margins of ♂ tergites 5 and 6 distinctly longer than longest setae on surface of tergite 5; clasper (♂) in ventral view not widened near apex. On *Sphaerias blanfordi*. ..... **thaii** Maa

   Connexival setae (♀) exceedingly short, mostly shorter than diameter of their respective basal papillae; side piece of ♀ sternite 7 semicircular, much longer than wide; setae on posterior margins of ♂ tergites 5 and 6 scarcely longer than longest setae on surface of tergite 5; clasper (♂) slightly widened near apex. On *Megaerops ecaudatus*. ..... **kuoi** n. sp.

4. Side piece of ♀ sternite 7 with posterior 1/2 abruptly narrowed and strongly elevated; lateral surface of ♂ anal segment with a deep transverse groove near base hence sub-basal constriction of the segment clearly visible in dorsal and ventral views; clasper (♂) short, broad; legs relatively long and narrow in profile. On *Ptenochirus jagori*. ..... **brevicula** Maa

Side piece of ♀ sternite 7 almost semicircular, evenly elevated; anal segment (♂) without sub-basal constriction in dorsal or ventral view; clasper (♂) long, narrow; legs relatively short and broad in profile. On *Haplonycteris fischeri*. ..... **haplotes** n. sp.

Leptocyclopodia (Oncoposthia) submacrura Maa, n. sp.

Material. 46 ♂, 38 ♀, in 49 lots. Holotype (BISHOP 10388) from Lake Lindu and bearing the field number DJM 3151, date 23.VII.1972, deposited in B. P. Bishop Museum; paratypes largely in Bishop Museum, 4 pairs in the Museum Zoologicum Bogoriense and 2 pairs each in the U.S. National Museum and British Museum (Nat. Hist.). All specimens were collected in central CELEBES (Sulawesi) in 1971–1973 by Capt. P.F.D. Van Peenan; the exceptions are 5 ♂, 4 ♀, in 2 lots, which were collected by the Museum Zoologicum Bogoriense from Lolu.

Ex *Rousettus celebensis*. 1 ♂, 3 ♀, Dodolo, 975 m; 7 ♂, 8 ♀, Gumbasa, 105 m; 4 ♂, 1 ♀, Hanggira, 1130 m; 2 ♂, 3 ♀, Kalamanta, 1100 m; 1 ♀, Kantewu, 1000 m; 1 ♂, Kulawi, 500 m; 23 ♂, 20 ♀, Lake Lindu (incl. Langko and Tomado), 950 m; 2 ♂, 1 ♀, Lolu, 10 m; 3 ♂, Mamu, 1060 m; 1 ♂, Omu, 130 m; 1 ♂, 1 ♀, Sedoa, 1130 m; 1 ♂, Tamadue, 1070 m. — Ex *Cynopterus brachyotis:* 3 ♂, 3 ♀, Lolu.

Distribution. Celebes, 10–1130 m; at present known from C. Sulawesi Prov.: Donggala Kabapaten (Gumbasa, Kalamanta, Kantewu, Kulawi, Lake Lindu, Lolu, Mamu, Omu), Luwu Kabapaten (Dodolo) and Poso Kabapaten (Hanggira, Sedoa, Tamadue). All these localities are situated in the area 0° 55' to 2° 06' S, and 119° 52' to 120° 24' E.

Hosts. Obviously *Rousettus celebensis* Andersen (Pteropodidae: Pteropodinae) (48 records) is the normal host, and the single record from *Cynopterus brachyotis* resulted from straggling or contamination.

Affinities. This new species is so named because of the superficial similarities to *L. macrura* (Speiser). It is almost inseparable from *L. discispinosa* n. sp. in structural details and shares with the latter species the following characters which are unique within the subgenus: labella shorter than palpus, "comb" of clasper (♂) very close to apex and in double series, spines on phallobase (♂) in single series and all sharply pointed, and spiracle 7 (♀) enclosed by anal segment. For the differences from *macrura* and *discispinosa*, confer the key to species of the subgenus, p. 483.

Description. Length 4.0± mm, non-gravid ♀ smaller. Brown. Palpus longer than labella which is only about 1.5 × as long as theca. Thoracic sternal plate slightly shorter than wide (34 × 37), anteromedian angle of metasternum slightly less than 90°, posterior fringe seemingly broadly interrupted at middle because all setae except 6 longer ones on each side situated rather far from posterior margin. Legs longer than in *macrura;* coxa 1 much shorter (23:40) than femur 1; femur and tibia 2 in profile 49 × 10 and 45 × 6 respectively; femur, tibia and basitarsus 3 with relative lengths 49:46:32; basitarsus 3 about 2.5 × as long as its succeeding tarsomeres together, with 20± pale rings. Femur 2 dorsally with 8± while femur 3 with 16± sensory pores which are situated largely apicad to femoral pale ring and are arranged generally in a single zigzagged column.

Abdomen of ♂: Posterior fringes of tergites 2–6 complete; surface of tergite 2 with 1 short row of small setae, that of tergites 3–5 with 2–3 longer rows of long setae, that of tergite 6 bare; posterolateral corner of tergite 5 with 5± shining black, very strong spines. Relative median lengths of tergites 3–6, $5^1/_2$:7:$13^1/_2$:3. Anal segment about 25 × 13 in dorsal view, weakly tapering apicad, anterolateral articulations with synsternite 5+6 not modified. Synsternite 1+2 with rather fine setae (not spinelike ones as found in *macrura*) on surface, and with 40± teeth on ctenidium. Setae on

surface of sternite 3 also rather fine, those on sternites 4 and 5+6 slightly stronger; posterior fringe of sternite 3 composed of long and slightly shorter ordinary setae (not spinelike ones as found in *macrura*), that of sternite 4 similar but with longer setae; preapical bristles on lateral parts of sternite 3 distinctly finer and shorter than those on sternite 4 (in *macrura* bristles on sternites 3 and 4 are equally long and strong). Relative median lengths of sternites 3, 4 and 5+6, 6:7:9 (in *macrura* sternite 4 only 1/2 as long as 5+6). Surface of sternite 5+6 evenly setose, without a large posteromedian bare area. Clasper 1.1± mm long, slender, widest at a point of apical 1/5; apex darkened, acute, recurved; "comb" with 8± long strong spines which are arranged in double series and reach much anterior to level of apex of clasper. Phallobase with apex not decurved, and with single series of pointed spines arranged on lateral margin; genital deck plate anteriorly broad, about 2 × as wide as posterior 1/2.

Abdomen of ♀: Dorsal connexivum posteriorly with 2–3 rows of very long bristles, elsewhere evenly covered with long setae which become gradually shorter on approaching anterior and lateral areas (setae of 2 median columns generally slightly shorter than those of neighboring columns). Lateral connexivum with short setae, posteriorly with 2 rows of practically straight bristles which are as long as bristles on tergite 6 and on posterior parts of dorsal connexivum, one of these 2 rows lined before, and another behind spiracle 6. Tergite 6 transverse, rectangular or trapezoidal, anterior margin often concavely curved, posterior margin with complete fringe of very long bristles, surface generally with 4–8 bristles. Anal segment with complete posterior fringe of very long bristles, dorsal surface almost transversely linear, lateral surface 1.5–2.0 × as long as wide and enclosing spiracle 7. Sternites 4 and 5 medially each represented by 4± rows of setae and/or bristles, hindmost row of sternite 4 containing 1 or 2 pairs of moderately long bristles, that of sternite 5 composed entirely of bristles; no definable side piece of sternite 5. Side piece of sternite 6 small, transversely elliptical, with 8± strong setae in 2 rows. Sternite 7 triangular, small, distinctly narrower (7:10) than femur 3 in profile, with 1 row of 6± bristles on surface and 1 row of 6± setae of varied length on posterior margin. Infra-anal plate long, obpyriform, posteriorly with 2 bristles and 2–6 setae. Paraanal tubercle rather small, broadly fused with anal segment. Anal ring lined with setulae, often with 1 pair of ventral bristles. (Scale of relative measurements 25 units = 1 mm).

Leptocyclopodia (Oncoposthia) discispinosa Maa, n. sp.

Material. 3 ♂, 3 ♀. Holotype ♀ (BISHOP 10389) and paratypes in B. P. Bishop Museum. All specimens were collected by Capt. P.F.D. Van Peenan from CELEBES (Sulawesi): S Sulawesi Prov., Palopo Kabapaten. 1 ♂, 1 ♀ (holotype), Soroako, 385 m, ex *Rousettus celebensis* (DJM 3310), 20.IX.1972; 1 ♂, 1 ♀, same data but field #3469, date 22.IX.1972. 1 ♂, 1 ♀, Tokalosi, 300 m, ex *R. celebensis* (DJM 3415), 23.IX.1972.

Distribution. Celebes; at present known only from S Sulawesi Prov., Palopo Kabapaten and at 300–400 m altitude. The localities Soroako (2° 31' S, 121° 20' E) and Tokalosi (2° 38' S, 121° 32' E) are very close to the known range of *L. submacrura* n. sp. (q.v.) and most probably the distribution of these 2 species overlaps.

Host. The role of *Rousettus celebensis* Andersen (Pteropodidae: Pteropodinae) as a normal host is to be verified. In 1 of the 3 lots of specimens, *L. discispinosa* was found in association with *L. ferrisiana* Maa while in another 2 lots, it was in association with *Megastrebla subtruncata* n. sp. which breeds probably on a cavernicolous megachiropteron other than *R. celebensis*.

Affinities. The 3 ♂, 3 ♀ of this form were, at the first glance, thought to represent merely geographical or even individual variation of the preceding species particularly because the ♂ is scarcely distinguishable and the recorded hosts were the same.

A closer examination revealed some slight but apparently constant differences other than the presence of discal spines on the ♀ dorsal connexivum. It is therefore recognized as a new species. Results of further collecting in Celebes might prove or disprove the overlap in distribution and the disparity in host specificity of these 2 forms.

Description. Length 3.6± mm. Thoracic sternal plate as long as wide (33 × 33); relative lengths of femur, tibia and basitarsus 3, 43:41:32.

Abdomen of ♂: Phallobase slightly widened preapically, shorter in proportion and with fewer spines than in *submacrura.*

Abdomen of ♀: Dorsal connexivum largely with moderately long setae, discally with a patch of 23–27 short, shining black spines, posteromedially (i.e. posterior to the discal spine patch) with a bare strip, and posteriorly with 3 rows of long bristles; above-mentioned setae only about 1/3 as long as (in *submacrura* not shorter than) longest femoral setae, spines arranged in 4 or 5 rows and mostly subequal in length to diameter of their respective basal papillae, bare strip about as wide as space occupied by a row of 3 or 4 spines, rows of bristles with a median "gap" whereas bristles situated immediately next to that gap being slightly shorter than those on lateral areas. Tergite 6 with surface bare and with posterior margin distinctly convexly curved. Lateral connexival setae short, those anterior to level of spiracle 4 obviously shorter than diameter of their respective basal papillae. Ventral connexivum with more numerous setae than in *submacrura;* sternites 3, 4 and 5 (in holotype) medially represented by 7, 5 and 4 rows of setae (mixed with a few bristles), respectively. Sternite 3 with most setae of hindmost row about 3 × as long as those of preceding rows; setae on lateral areas of sternite 4 much shorter than diameter of their respective basal papillae; sternite 6 with 15± setae in 3 or 4 rows on each side lateral to side piece. Other characters similar to *submacrura.* (Scale of relative measurements 25 units = 1 mm).

Leptocyclopodia (Oncoposthia) zelotypa exoletae Maa, n. ssp.

Material. 19 ♂, 13 ♀, in 7 lots. Holotype ♀ (BISHOP 10390) and 27 paratypes in B.P. Bishop Museum, 1 pair of paratypes each in the U. S. National Museum and Museum Zoologicum Bogoriense. All specimens were collected by Capt. P.F.D. Van Peenan in CELEBES (Sulawesi): C. Sulawesi Prov. (Donggala and Poso Kabapatens) and S Sulawesi Prov. (Palopo Kabapaten).

Ex *Dobsonia exoleta:* 4 ♂, 2 ♀ (incl. holotype), Donggala Kabapaten, Gumbasa, 100 m, G–87, 22.I.1973; 1 ♀, Donggala Kabapaten, Pandere, 100 m, G–48, 21.I.1973; 2 ♂, 1 ♀, Donggala Kabapaten, Kalamanta, 1100 m, SS–175, 12.VIII.1973. 4 ♂, 3 ♀, Poso Kabapaten, Hanggira, 1130 m, N–192, 6.VIII.1973. 6 ♂, 6 ♀, Palopo Kabapaten, Lampesue, 350 m, DJM 3498–99, 27.IX.1972. – Ex other hosts: 2 ♂, Gumbasa, ex *Thoopterus nigrescens* (G–105), 23.I.1973. 1 ♂, Donggala Kabapaten, Pakuli, 120 m, ex *Suncus murinus* (G–86), 22.I.1973.

Distribution. Celebes, 100–1130 m; probably endemic.

Hosts. Obviously *Dobsonia exoleta* Andersen (Pteropodidae: Pteropodinae) (5 records) serves as the normal host and the occurrence on *Thoopterus* bat and *Suncus* shrew is incidental. The nominate subspecies is parasitic specifically on *Dobsonia peroni* Geoffroy and occurs in Komodo, Sumba and Timor.

Description. Differing from typical *zelotypa* in having fewer bristles on the ♀ dorsal connexivum. The 4 anterior patches of bristles (i.e. the 2 pairs of patches at levels of spiracles 3 and 4) each consists of 2 or 3, very rarely 4, bristles (in typical *zelotypa* 6–10 bristles). The ♂ is inseparable from that of typical *zelotypa.*

KEY TO SPECIES OF *Leptocyclopodia* (*Oncoposthia*)

1. ♂: Synsternite 5+6 strongly modified, discal area deeply concave, anterolateral area very densely setose while posterolateral area very sparsely so, posterolateral lobe exceedingly strongly produced, slightly longer than wide, armed with 2 rows of strong spines and clearly visible in dorsal view of the segment; lateral surface of anal segment basally with a deep, sharply rimmed receptaculum for above-mentioned posterolateral lobe of synsternite 5+6, and with a broad tooth-like lobe for placing of spiracle 7; tergite 6 much narrower than posterior parts of tergite 5; clasper without "comb" of long spines. ♀: Dorsal connexivum entirely covered with moderately short setae except for a discal patch of 10± long bristles; lateral connexivum posteriorly without rows of long bristles; side piece of sternite 5 present. Femora 2 and 3, from bases to apices, dorsally each with 30± sensory pores which are arranged largely in 2 columns. On *Thoopterus nigrescens;* Celebes. ..... **laminata** Maa

   ♂: Synsternite 5+6 and anal segment not modified as described above; spiracle 7 not lying on a tooth-like lobe; tergite 6 not or scarcely narrower than posterior parts of tergite 5; clasper (except in *planiseta*, see next couplet) with a "comb" of long spines near apex. ♀: Dorsal connexivum with 5 or 6 patches while lateral connexivum with 1 patch of long bristles; side piece of sternite 5 undefinable. Femur 2 dorsally with much fewer (not more than 10) sensory pores than on femur 3, and these never arranged in 2 columns from base to apex. 2

2. ♂: Clasper evenly tapering apicad, with only ordinary setae, no "comb" of long spines; synsternite 5+6 medially less than 1.5 × as long as sternite 4 and without a large posteromedian bare area. ♀: Sternite 7 pentagonal, very large, wider than femur 3 in profile; para-anal tubercle well separated from anal segment and connected with latter only through a narrow "neck" region. On *Dobsonia praedatrix;* New Britain. ..... **planiseta** Maa

   ♂: Clasper widened preapically and with a distinct "comb" of long spines on lateral margin near apex; synsternite 5+6 (except in *submacrura* and *discispinosa* the spines of which are unique in being arranged in double series and reaching much anterior to level of apex of clasper, see next couplet) medially 1.5–2.0 × as long as sternite 4 and with a large posteromedian bare area. ♀: Sternite 7 triangular or squarish, small, much narrower than femur 3 in profile; para-anal tubercle broadly fused to anal segment. 3

3. ♂: Synsternite 5+6 medially about 1.5 × as long as sternite 4, surface evenly setose, without a large posteromedian bare area; clasper with spines of "comb" arranged in double series and reaching much anterior to level of apex of clasper proper. ♀: Dorsal and lateral connexiva posteriorly each with 2 or 3 rows of long bristles which are about as long as those on tergite 6, and dorsal ones of which are not noticeably shorter than lateral ones; lateral surface of anal segment much longer than wide and enclosing spiracle 7. 4

   ♂: Synsternite 5+6 medially 1.7–2.0 × as long as sternite 4 and with a large posteromedian bare area; spines of "comb" in single series and reaching only to level of apex of clasper proper. ♀: Dorsal and lateral connexiva posteriorly each either with a single row of long bristles, or with 2 rows but dorsal bristles distinctly shorter than lateral ones; lateral surface of anal segment not longer than wide and clearly not enclosing spiracle 7. 5

4. Length 4.0± mm; thoracic sternal plate slightly shorter (ca 34:37) than wide. ♂: Phallobase not widened preapically. ♀: Dorsal connexivum discally without any short black spines; posterior margin of sternite 3 indicated by a row of short setae which are not longer than those of preceding rows; setae on lateral areas of sternite 4 and corresponding lateral connexivum as long as or longer than diameter of their respective basal papillae. On *Rousettus celebensis;* C. Celebes. ..... **submacrura** n. sp.

   Length 3.6± mm; thoracic sternal plate as long as wide. ♂: Phallobase slightly widened preapically in ventral view. ♀: Dorsal connexivum discally with a patch of 23–27 short,

shining black spines in 4 or 5 rows; posterior margin of sternite 3 indicated by a row of long setae which are 2–3 × as long as those of preceding rows; setae on lateral areas of sternite 4 and corresponding lateral connexivum distinctly shorter than diameter of their respective basal papillae. On (?) *Rousettus celebensis;* S. Celebes. ..... **discispinosa** n. sp.

5. Legs long and slender, femur 3 much longer than thoracic sternal plate, femur and tibia 3 together 3.5± mm long; femur 3 dorsally with a single column of less than 15 well spaced sensory pores (including a few pores out of alignment). ♂: Clasper 1.4± mm long, widest at a point of apical 2/7. ♀: Lateral connexival bristles strongly curved (with apical 1/3 almost perpendicular to basal 2/3) and arranged in 3 rows, 2 of which situated posterior to level of spiracle 6. On *Dobsonia moluccensis;* New Britain, New Guinea, Ambon, Ceram. ..... **macrura** (Speiser)

Legs relatively short and robust, femur 3 as long as or scarcely longer than thoracic sternal plate, femur and tibia 3 together 2.7± mm long; femur 3 dorsally with a patch of over 20 very dense sensory pores arranged in 2 or 3 columns. ♂: Clasper 1.0± mm long, widest at a point of apical 3/7. ♀: Lateral connexival bristles straight or weakly curved, and arranged in 2 rows, only 1 of which situated posterior to level of spiracle 6. 6

6. ♂: Synsternite 5+6 medially 2 × as long as sternite 4, its anterior margin distinctly retreating at middle; lateralmost 4 or 5 spines of posterior fringes of tergites 3 and 4 only about 1/2 as long as longest spines of same fringe; clasper relatively narrower. ♀: Sternite 4 represented by 4 rows of 45± setae plus 1 pair of bristles (which are at ends of hindmost row), with setae of anterior rows only slightly shorter than those of posterior rows; sternite 5 represented by 1 pair of side pieces plus an anterior row of 12± short setae; lateral connexival bristles distinctly curved, those lined anterior to level of spiracle 6 subequal in length to those lined posterior to that level, and also subequal in length to bristles on tergite 6. On *Dobsonia peroni* and *D. exoleta;* Komodo, Sumba, Timor, Celebes. ..... **zelotypa** Maa

♂: Synsternite 5+6 medially about 1.7 × as long as sternite 4, virtually truncate anteriorly; lateralmost 4 or 5 spines of posterior fringes of tergites 3 and 4 scarcely shorter than longest spines of same fringe; clasper relatively broader. ♀: Sternite 4 represented by 3 rows of setae plus 1 pair of bristles at ends of hindmost row, setae of 1st 2 rows exceedingly short, only about 1/3 as long as those of 3rd row; sternite 5 represented solely by 1 pair of side pieces; lateral connexival bristles straight, those lined posterior to level of spiracle 6 distinctly shorter than those anterior to that level and than bristles on tergite 6. On *Dobsonia inermis;* Solomon Is. ..... **orthotricha** (Theodor)

Penicillidia sulawesii Maa, n. sp.

Material. 6 ♂, 9 ♀. Holotype ♀ (BISHOP 10391) and paratypes in B. P. Bishop Museum. CELEBES (Sulawesi): 4 ♀ (incl. holotype), S Sulawesi Prov., Palopo Kabapaten, Wawondula, 600 m, ex *Miniopterus tristis* (DJM 3601), 29.IX.1972; 5 ♂, 3 ♀, same data but DJM 3556–60, 3597–3600 & 3602; 1 ♀, same data but ex *Rhinolophus euryotis* (DJM 3573–78); 1 ♂, 1 ♀, same data but ex mixture of *Min. tristis* (DJM 3561–63 & 3567), *Min. medius* (DJM 3565–66) and *Myotis horsfieldi* (DJM 3564). All collected by Capt. P.F.D. Van Peenan.

Distribution. Celebes, lowland; probably endemic.

Hosts. Evidently *Miniopterus tristis* Waterhouse (Vespertilionidae) serves as the normal host. The occurrence on the other 3 species of bats, as recorded above, is apparently incidental. According to the collector's notes, 95 bats were collected in Wawondula (2° 38' S, 121° 21' E) on 28–29.IX.1972. Of these, 16 were *Min. tristis;* 14, *Min. medius;* 1, *Min. australis;* 1, *Myotis horsfieldi;* 55, *Rhinolophus euryotis;* 6, *Hipposideros galeritus;* 2, *Taphozous*

melanopogon. Probably all these bats (with possible exception of *Myotis*) were roosting together in the same caves when they were collected.

Affinities. This is the 1st species of the genus ever known from Celebes (Sulawesi). The most remarkable character appears to be the presence of a pair of flap-like appendages at the base of ♀ abdomen. The species is most closely related to *P. jenynsii* (Westwood) from which it differs chiefly in the following characters: ♂ with more well developed notopleural setae, numerous long setae on surface of tergite 1 and shorter spines on sternite 5+6; ♀ with more numerous posterior setae on tergite 2, medially interrupted tergal plate 3 and undefinable abdominal ctenidium. The absence of the abdominal ctenidium in ♀ is shared by *P. actedona* Theodor but the latter species is much larger (length 3.5 mm) and has apically rounded parameres (♂) and entire tergal plate 3 (♀). In Theodor's (1967) key to species of the genus, the ♂ of *sulawesii* runs to near *jenynsii* and *P. leptothrinax* Speiser (Madagascar) while the ♀ runs to near *jenynsii* and *P. buxtoni* Scott (New Hebrides). Both *leptothrinax* and *buxtoni* are quite different particularly in ♀; the former species has a well developed abdominal ctenidium, dorsomedially interrupted anal segment and well defined side pieces of sternite 6; the latter species has only 2–4 posterior setae on tergite 2, and the median areas of sternites 3 and 4 together represented by a single row of setae.

Description. Length 2.5± mm. Yellowish. Dorsal surface of head capsule anteriorly with 4–6 rows of bristles, posteriorly often with a number of short setae (in 1 ♂, setae covering entire posterior 1/2 of dorsum); lateral surface with double series of setae along anterior ventral margin. Labella 1/3 as long as theca. Thorax with 1 or 2 long notopleural setae (plus 1–3 hardly discernible setulae) in ♂, with 3 or 4 long such setae in ♀; sternal plate transverse, about 25 × 32; ctenidium small, narrower than tibia 1 in profile. Anterior surface of femora 2 and 3 in ♂ evenly covered with setae (apically with a few bristles), setae on femur 2 about 2 × as long as on femur 3; median areas of anterior surface of femora 2 and 3 in ♀ sparsely setose, setae on femur 2 slightly longer than on femur 3. Tibia 3 about 7 × as long as wide in profile; relative lengths of femur, tibia and basitarsus 3, 34:28:21.

Abdomen of ♂: Finely setose. Tergite 1 anteriorly with 1 transverse patch of 25± moderately short, erect setae in 3 or 4 rows; tergites 2–6 evenly setose on surface; posterior fringe of tergite 2 composed entirely of moderately long setae, that of tergites 3–6 each containing 8–10 strong bristles at middle. Relative median lengths of tergites 3–6, 7:3:1½:1. Anal segment about 8 × 14, subconical, anterior margin of dorsal surface strongly concave, posterior 1/2 of dorsal and lateral surfaces setose. Sternite 1+2 evenly setose, with 10± long fine preapical bristles, and with 32± ctenidial teeth of which the median ones are smaller. Sternites 3 and 4 each medially with 1 row of setae (laterally 2–3 rows) on surface, and each with 10± long fine bristles and a number of setae on posterior margin. Posterior margin of sternite 5+6 slightly concave at middle, and lined with 25–32 short pointed spines in 2 rows, median spines slightly shorter. Relative median lengths of sternites 1+2, 3, 4 and 5+6, 8:4:3:5. Clasper slender, with darkened, curved and pointed apex; ventral surface with a lateral and a mesial series of setae, lateral setae only 1/3 as long as mesial ones. Basal arc with long basal apodeme; genital deck plate short, strongly narrowed posteriorly, with deeply concave anterior margin. Aedeagus and paramere similar to those of *jenynsii* but in profile more strongly curved.

Abdomen of ♀: Tergite 1 anteriorly with patch of 25± setae as in ♂, posterior margin with 20± moderately long setae of which the median ones hardly longer than lateral ones; anterior 1/2 of lateral margins anteriorly converging, posterior 1/2 parallel. Tergite 2 medially with patch of short dense setae which vary greatly in extent (in 1 ♀ almost covering entire surface) and when patch small, then lateral areas of the surface with 1 or more rows of preapical setae. Posterior fringe of

tergite 2 laterally composed of strong setae and medially of 10± strong bristles which are longer than those on tergal plate 3 and anal segment. Tergal plate 3 (i.e. plate at level intermediate between spiracles 4 and 5) divided into pair of small sclerites each about 3 × 7 and bearing 2 rows of setae on surface and 4± strong bristles (plus 3± strong setae) on posterior margin. Dorsal connexivum entirely bare. Anal segment about 9 × 14, subconical, dorsally entire, dorsal and lateral surfaces anteriorly with 2–3 rows of setae, posteriorly bare, posterior fringe containing 8± strong bristles and some setae. Spiracle 1 lying on base of a flap-like appendage which is weakly sclerotized, about aslarge as above-mentioned sclerite of tergal plate 3; and apical 1/2 of appendage free. Lateral connexivum largely bare, with patch of setulae ventral to level of spiracle 3, with 2–3 rows of ordinary setae behind that setula patch (i.e. at level of spiracle 4) and with patch of very dense, erect setae between spiracle 7 and anal segment. Abdominal ctenidium undefinable but posterior fringe of sternite 1+2 containing 2 (1+1) (in 1 ♀ containing 3) small spines besides 10± long fine bristles and a number of moderately long setae. Sternite 3 represented by 3 pairs of long fine bristles and 7± rows of setae; sternite 4 represented by 1 pair of similar bristles and 2 rows of longer stronger setae. Side piece of sternite 5 obliquely placed, with 3 or 4 rows of setae on surface, and with some strong setae and bristles on posterior margin. Sternite 7 anteriorly fused with sternite 6, posteriorly bilobed, as in *jennynsii*. Postgenital plate triangular, with 1, rarely 2, pairs of setae. (Scale of relative measurements 25 units = 1 mm).

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