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REVIEW OF THE STREBLIDAE (Diptera) PARASITIC ON MEGACHIROPTERAN BATS [1]

By **T. C. Maa**[2]

Abstract. Of the 16 streblid species previously recorded as parasites of the Megachiroptera, only 6 are here considered to be correctly so associated. Five of these 6 species are re-assigned to a new genus and only 1 is retained in the genus *Brachytarsina* (=*Nycteribosca*). These 2 genera are each divided into 2 subgenera and their host relationships, distributional patterns and evolutionary trends are discussed. Earlier records of the species are critically reviewed and are incorporated with new data which are based on some 650 specimens. The new taxa described are *Megastrebla*, n. gen. (type *N. gigantea* Speiser); *Aoroura*, n. subgen. (type *N. nigriceps* Jobling); *Psilacris*, n. subgen. (type *N. longiarista* Jobling); *M.* (*A.*) *limbooliati*, n. sp. (Malaya, Borneo); *M.* (*M.*) *gigantea kaluwawae*, n. ssp. (Fergusson I.); *M.* (*M.*) *gigantea solomonis*, n. ssp. (Solomon Is.); *M.* (*M.*) *parvior papuae*, n. ssp. (New Guinea).

Streblid batflies are rarely found on the suborder Megachiroptera, composed of the single family Pteropodidae, whose members are generally referred to as fruit bats. Only 16 species have been recorded on these bats. A closer examination of the published records clearly indicates that 10 of these 16 species (see Appendix II) should not be considered true parasites of the Megachiroptera; available data support the concept that no streblids normally breed simultaneously on both the Megachiroptera and Microchiroptera, and among the 39 genera of the former suborder, only those which usually roost in partially illuminated caves and rock-crevices serve as normal breeding hosts of Streblidae. Taxonomically, the 6 remaining species were formerly lumped into the single genus *Brachytarsina* (=*Nycteribosca*). Five of these 6 species are so similar among themselves and different from the type-species of *Brachytarsina* that the erection of a new genus to contain them appears justifiable.

This study is based on about 650 specimens in the collections of Bernice P. Bishop Museum. A few additional specimens were loaned from the Australian Museum, Sydney (AM), British Museum (Natural History), London (BM), Field Museum of Natural History, Chicago (FMNH), Museo Civico di Storia Naturale, Genova (MSNG), South Australian Museum, Adelaide (SAM), U. S. National Museum, Washington D. C. (USNM) and the private collection of B. V. Peterson of Ottawa (BVP). The accompanying drawings, unless otherwise stated, were kindly prepared from microscopic preparations, with the aid of a camera lucida, by C. T. Lin and S. H. Kwang.

Megastrebla Maa, n. gen.

TYPE. *Nycteribosca gigantea* Speiser, 1900.

HOSTS. Exclusively parasitic on cave-dwelling Megachiroptera, viz. *Rousettus* (*Rousettus* s. str., *Stenonycteris*), *Dobsonia*, *Penthetor*, *Eonycteris* and possibly *Boneia*.

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Records from other hosts, particularly the Microchiroptera or insectivorous bats, must be considered accidental associations (contamination, straggling, mislabelling, misidentification, etc.). Four of the above-mentioned megachiropteran genera belong to the Pteropodinae. The 5th genus, *Eonycteris*, belongs to the Macroglossinae[3] and generally shares with certain *Rousettus* species the same roosting sites and the same *Megastrebla* parasite *M. parvior*. In Malaysia, *Rousettus* is rare (cf. Lord Medway. 1965. *Malayan Nature J.* **19**: 92) and *M. parvior* was found largely on *Eonycteris;* in the Philippines where *Rousettus* is about as abundant as *Eonycteris* (cf. C. C. Sanborn. 1952. *Fieldiana, Zool.* **33**: 87-158), this batfly was collected mostly from bats of the former genus (156 vs 35 records); and in India and other countries where *Eonycteris* is absent, *M. parvior* was found exclusively on *Rousettus*. This strongly suggests that *Rousettus* is the primary host and *Eonycteris* the secondary host of *M. parvior*, and that the presence of this particular streblid on *Eonycteris* is a consequence of the proximity of the roosting sites of the primary and secondary hosts, and the absence or scarcity of the primary host. Mr E. Hamilton-Smith (in litt.) kindly informed me that *Dobsonia moluccensis* does not roost in shallow caves in Australia as it does in New Guinea. This may account, at least in part, for the absence of *Megastrebla* in the former country and also may provide an example of ecological factors in bat roosting sites playing a more important role in host relationships than the bat species themselves.

Although the various *Megastrebla* species are yet to be adequately investigated regarding their respective host ranges and although most of them are known to have more than one normal host, it is almost certain that they are generally, in a given country, each confined to a single host species. They may often be found in association with other kinds of ectoparasites on the the same individual hosts. *M. parvior* on *Rousettus leschenaulti* in India, for instance, occurs with Spinturnicidae (*Meristaspis lateralis* Klnt., *Ancystropus indicus* Hireg. & Bal, *Oncoscelus kanheri* Hireg. & Bal), Myobiidae (*Foliomyobia jamesoni* Hireg. & Bal), Ixodidae (gen. & sp. indet.), Nycteribiidae (*Eucampsipoda latisternum* Sch. Stkh. & Hdbg.) and Ischnopsyllidae (*Thaumapsylla breviceps orientalis* Smit). In general, the Nycteribiidae are more strictly host-specific and may be listed below side by side with their respective *Megastrebla* counterparts (for each host association).

M. g. gigantea	vs	*Archinycteribia a. actena* Speis., *Leptocyclopodia m. macrura* Speis.
M. g. solomonis	vs	*Arch. actena* ssp., *Lept. orthotricha* Theod.
M. parvior	vs	*Eucampsipoda latisternum* Sch. Stkh. & Hdbg. (when on *Rousettus leschenaulti*), *Euc. inermis* Theod. (when on *Rous. amplexicaudatus*), *Euc. sundaica* (when on *Eonycteris* spp.)
M. bequaerti	vs	*Dipseliopoda setosa* Theod.
M. wenzeli	vs	*Euc. madagascarensis* Theod. (in Madagascar), *Euc. theodori* Hurka (in Comoro Is.).
M. nigriceps	vs	*Euc. penthetoris* Theod.

3. Some mammalogists raise Macroglossinae to the family rank.

A shipment of ectoparasites off 35 infested *Dobsonia moluccensis magna* collected by W. H. Ewers within a 60 km radius of Port Moresby, SE New Guinea contained 21 specimens of *M. g. gigantea*, 109 *Arch. a. actena*, 111 *Lept. m. macrura* and ca 100 *Ornithodoros* sp. (immatures, det. N. A. Wilson). The total number of *Dobsonia* bats examined was unfortunately not on record. From the number of those found harboring ectoparasites, the average population density of these batflies and the tick per infested bat was 2.6, 5.2, 3.7 and 6.6 respectively, and the parasitism rate of those 35 bats by these 4 ectoparasites was 23, 60, 86 and 43% respectively. This means that the *Megastrebla*, perhaps due to its agility and the difficulty in collecting it, was lower in both numbers per infested host and infestation rate than the nycteribiids and tick. The *Leptocyclopodia* was the highest in frequency although its density per infested host was only slightly higher than in the *Megastrebla*. The infestations and the interspecific associations of these 4 ectoparasites were as follows:

Megastrebla	Archinycteribia	Leptocyclopodia	Ornithodoros	No. of hosts
+	−	−	−	1
+	+	+	−	4
+	−	+	+	1
+	−	+	−	2
−	+	−	−	1
−	+	+	+	8
−	+	+	−	6
−	+	−	+	2
−	−	+	−	6
−	−	+	+	3
−	−	−	+	1
				35

From the above table, it can be seen that the frequency of the *Megastrebla* (8 cases, out of a total of 35) was significantly lower than in the other 3 ectoparasites (21, 30 and 15 cases respectively); association of the *Megastrebla* with *Leptocyclopodia* (7 cases) was more often than with *Archinycteribia* (4 cases) and *Ornithodoros* (1 case); 100% dominance (i.e. in association with no other ectoparasites) of the *Megastrebla*, *Archinycteribia* and *Ornithodoros* (1 case each) was much less frequent than in *Leptocyclopodia* (6 cases). In the Philippines and other countries, *Megastrebla* spp. are also outnumbered by their nycteribiid counterparts, whereas the mites, ticks, fleas etc. vary in the frequency and population density but are rarely predominant.

The host specificity of the various *Megastrebla* species is fairly high (cf. Appendix I), and there is no probability that 2 or more forms of *Megastrebla* may coexist on the same individual hosts in the natural environment. In general, a *Megastrebla* is distributed less extensively and shows less geographical variation than its specific host. Only the 2 most widespread species, *M. gigantea* and *M. parvior*, are separable into 2 or more weakly differentiated races. The latter species may, as mentioned above, survive and breed on a secondary host under certain circumstances. Parallelism in the evolution of *Megastrebla* and megachiropteran bats is discussed in the section "Systematics."

DISTRIBUTION. Palaeotropical, from Kenya - Tanzania to New Britain - Solomon Is. The genus can also be expected to occur in Uganda, Ethiopia, Ceylon, Celebes, Molucca Is., New Ireland, etc. The number of *Megastrebla* species known to occur in individual countries or regions is 1 species each in Kenya, Tanzania, Comoro Is., Madagascar, India, Burma, Thailand, Sumatra, Java, Philippines, New Britain, D'Entrecasteaux Archip., Solomon Is.; and 2 species each in Malaya, Borneo, Sumba and New Guinea. The overall range of *Megastrebla*, particularly in the Ethiopian Region, is more restricted than the combined range of the 5 megachiropteran genera mentioned above. The presence or even the abundance of an appropriate host does not necessarily lead to the simultaneous occurrence of its host-specific *Megastrebla*. For instance, *Rousettus amplexicaudatus* and *Dobsonia moluccensis* occur in the Solomon Is. and Queensland respectively and, during the last decade, have been extensively examined for ectoparasites without revealing their respective specific flies, *M. parvior* and *M. gigantea*.

The original distributional center of *Megastrebla* was probably, as it is today, in the Oriental rather than the Ethiopian Region. This presumption is supported by the following evidence. (1) The Ethiopian fauna of *Megastrebla* is much simpler and poorer than the Oriental fauna, and contains only 2 species which are closely related to but geographically well separated from each other; the Oriental forms are far more diversified and their distributional ranges overlap. (2) The population density of Ethiopian *Megastrebla* is exceedingly low and a total of less than 10 specimens have ever been recorded, while that of the Oriental *Megastrebla* may be relatively high and nearly 700 specimens are known. (3) The isolation of the Ethiopian *Megastrebla* has not been so effective as in those found in the New Guinea - D'Entrecasteaux Archip. - Solomon Is. area where the 2 *Megastrebla* species are each separable into weak though distinct geographical races. It may also be noted that the 2 sympatric *Megastrebla* species of Malaya and Borneo belong to 2 different subgenera while those of Sumba and New Guinea are in the same subgenus and are closely related to each other. This suggests that the *Megastrebla* fauna of the former countries is older than that of the latter 2 countries and that within the Oriental Region, the original center (in a strict sense) of the genus is the Malaysian Subregion.

SYSTEMATICS. *Megastrebla* is very closely related to and evidently more generalized than *Brachytarsina* with which it has the following characters in common: Head small, hardly flattened, anteriorly broad, ventrally without depressions for coxae 1; eye present, 1-facetted; postvertex distinct; arista of antenna flagelliform; palpus longer than wide, apex broadly rounded, not upturned; thorax spherical; transverse mesonotal suture complete; humeral callus insignificant; scutellum rather uniformly setose; mesepisternum not longitudinally depressed; wing more than 2 × as long as wide; vein C complete, R_1 about as fine as R_{2+3} and apically setose; anal cell present; alula well developed and fringed with numerous setae; tibiae uniformly adorned with short setae; tarsomere 1 shorter than wide, only slightly longer than tarsomere 2; tergite 7 (♀) and sternites 1 and 7 all distinct (sternite 7 in ♂ sometimes undefinable); aedeagus and its apodeme long, slender and not enclosed in a spicule-bearing membranous sheath; parameres at most weakly asymmetrical. These characters clearly indicate that *Megastrebla* and *Brachytarsina* are more generalized than the remaining genera (*Raymondia*, *Brachyotheca*, *Raymondioides*) of the subfamily Nycteriboscinae. The large, prominent eyes,

wide cervix, exposed prosternum, weak but distinct 6th longitudinal vein (Cu+1A), occasional traces of the segmentation of the ♂ abdominal connexivum, and the usually well developed ♂ pregenital plate and ♀ sternites 8-9 strongly suggest the primitiveness of *Megastrebla* to be more pronounced than that in *Brachytarsina*. Jobling (1951: 212-220) has shown that the Nycteriboscinae are more generalized than the Trichobiinae (incl. Nycterophiliinae) and Streblinae. It is obvious that the Ascodipterinae are highly specialized. Therefore *Megastrebla* may be considered to be the most generalized genus of the Streblidae.

Within the genus *Megastrebla*, evolution from the generalized to the specialized forms appears to have included the following trends: labella from very long to very short; mesonotal, mesepisternal and other thoracic setae from sparse to dense and from non-uniform to uniform in length and robustness; mesonotum from shallowly to deeply emarginated anteriorly; wing-veins R_1 and M_{3+4} from nearly straight to angulately bent near base; crossvein *rm* from preapical to apical position in 1st basal cell; 1st basal cell from strongly to weakly widened at apex; appendix of anal cell from long, broad to short and slender; legs from moderately long to short; femur 2 from similar to dissimilar in profile size and shape to femur 1; dorsolateral bristle-columns of abdominal connexivum from few to many and from incomplete or poorly developed to complete and well developed; sternite 1 from small to large; ♂ sternite 7 from very large to small or absent; digitiform process from short to long; ♂ pregenital plate from absent to linear or T-shaped; ♀ sternite 7 from small to large and from non-hanging to hanging under abdomen; ♀ sternite 8 from closely articulated to sternite 7 to entirely fused with latter and from horseshoe-shaped to transversely linear; ♀ sternite 9 from transverse to elongate; ♀ sternite 10 and proctiger from short to long; host range from wide to narrow; intraspecific diversification from significant to insignificant.

Contradictory to the so-called "law of reduction," the sternite 1 (and, to a less extent, the sternites 2 and 7) of *Megastrebla* is more reduced than that of *Brachytarsina* and within the former genus, it is more reduced in the more generalized rather than the more specialized forms (fig. 29-34). This is probably related to the relative flexibility of the abdominal connexivum. In gravid or engorged specimens of the more generalized *Megastrebla*, the abdomen is noticeably more strongly swollen and extended than in the more specialized *Megastrebla* and most *Brachytarsina* species. Probably only a strongly flexible abdomen may necessitate the strong reduction of such sternites. The roosting megachiropteran bats generally do not crowd together but keep some little distance from each other; the *Megastrebla* in question must, therefore, for the survival of the species, develop an enormous abdomen for storing a more plentiful blood-meal.

In the following respects, the *Megastrebla* seem to be more or less parallel in evolution to the megachiropteran bats they specifically parasitize. (1) *Megastrebla* is, as mentioned above, evidently the most generalized genus of the entire Streblidae and the Megachiroptera are more generalized than the Microchiroptera (i.e., the family Pteropodidae is the most generalized of the Chiroptera). (2) When the various *Megastrebla* species are arranged in the sequence of their relative antiquity, with their respective host genera placed side by side, it will be found that the sequential arrangement of those genera of bats corresponds rather closely to the scheme set forth by K.

Andersen (1912. *Cat. Chiropt. Brit. Mus.* **1**: xiv-xvi) and G. G. Simpson (1945. *Bull. Amer. Mus. Nat. Hist.* **85**: 54-55).

Megastrebla is the largest, in body size, of the macropterous Streblidae and is confined to the megachiropteran bats; hence it is so named. It is slightly smaller than the brachypterous Neotropical genus *Joblingia* (body ca 5 mm, wing 1.2 mm long, on *Myotis*), and is divisible into 2 subgenera and 9 species - subspecies.

Terminology. Some remarks may be added on some of the structures of *Megastrebla* described and the terminology employed by earlier workers. The prescutum and scutum were termed by Ferris (1924a) the pronotum and mesonotum respectively, while the humeral vein (h) was labelled by him as Sc. The tergite 2 was described

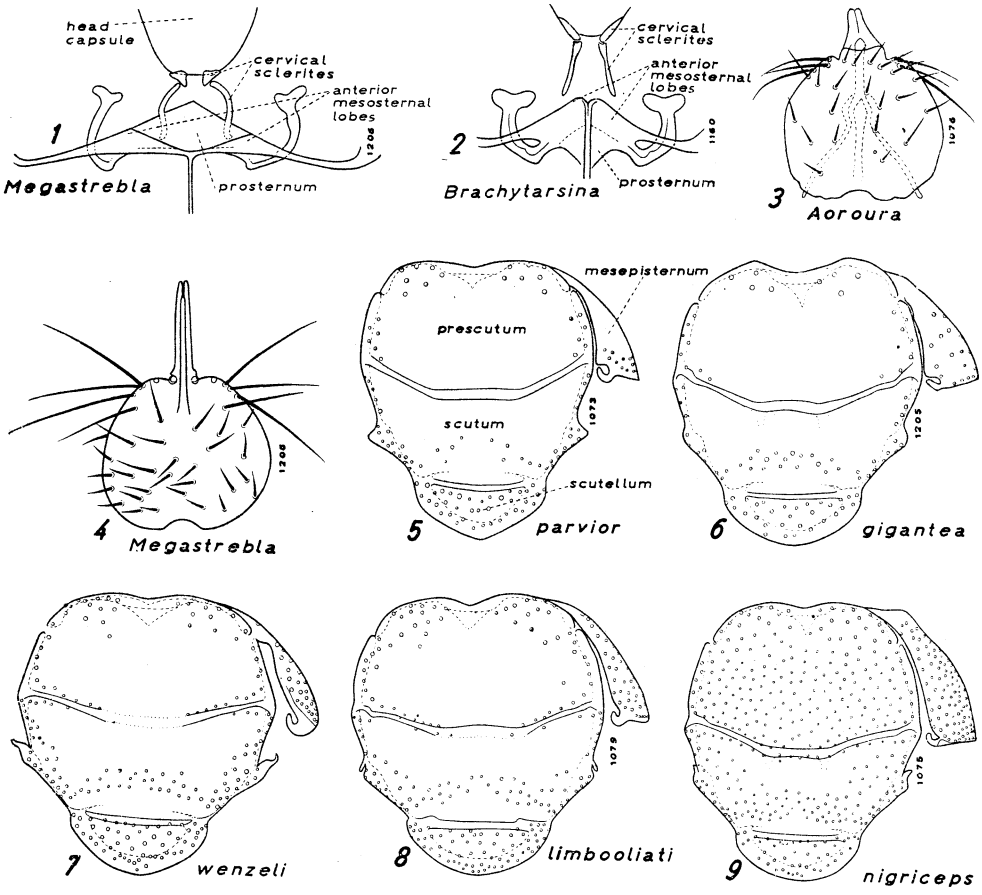

Fig. 1-9. *Megastrebla* (1, 3-9) and *Brachytarsina* (2). 1-2, *M. gigantea* and *B. amboiensis*, heads and thoraces, ventral, semidiagrammatic, showing the shape and position of cervical sclerites, prosterna and anterior mesosternal lobes in these 2 genera; 3-4, *M.* (*Aoroura*) *nigriceps* and *M.* (*Megastrebla*) *gigantea*, labellae and labial thecae, showing the chaetotaxy of the former and relative length of the latter in these 2 subgenera; 5-9. setal maps of thoracic dorsum.

by Hiregaudar & Bal (1956) as composed of 2 plates on either side; and the sternite 2, termed and labelled as the sternite 1+2. These are not accepted here. The prosternum in *M. bequaerti* was said by Theodor (1968b) to be much less reduced than in *Brachytarsina* (as hereby redefined). As easily observable in cleared specimens and in fig. 1-2, this sclerite is practically the same in size in these 2 genera. The notation and homology of the 5th longitudinal and its connecting veins are confusing and debatable. Ferris (loc. cit.) and Jobling (1934a), respectively, labelled the 5th longitudinal as M_3+Cu_1 and M_4+Cu_1. In addition, the former worker labelled the apical margin of the anal cell as Cu_2 while the latter worker labelled the apical transverse vein joining the 4th and 5th longitudinals as M_{3+4} and the posterior margin of the anal cell as 1A+2A. For descriptive purposes, I am labelling the 5th longitudinal as M_{3+4} of the Tillyardian (1926) system rather than M_3+Cu_1 or M_4+Cu_1 of the Comstockian (1924) system. For the same reason, the 6th longitudinal is here labelled Cu+1A. The sclerotized area resembling a sternite and lying immediately before the ♂ hypopygium and ventral to the abdominal spiracle 7 was considered by Jobling (1951: 216) as a secondary structure because it is devoid of any cuticular appendages. In fact, it is distinctly setose in *M. limbooliati* - *M. nigriceps* (bare in *M. gigantea* - *M. parvior* and undefinable in *M. bequaerti* - *M. wenzeli*). For convenience, it is here termed sternite 7. The sclerite lying medially between the 2 digitiform processes (= sensory sclerites of Jobl. 1951, claspers of Jobl. 1954a) is called the pregenital plate. The absence of this plate in *M. gigantea* and *M. parvior* is due to the close proximity to each other of the 2 processes in these 2 species and is compensated by the presence of the enormous sternite 7 (both the sternite and the plate are present and rather small in *M. limbooliati* and *M. nigriceps*). The surstyli in ♂ (Jobl. 1951, 1954a) are concealed within the hypopygium when the genitalia are retracted and are everted-exposed when the genitalia are extended. They are connected indirectly to the parameres through the "anal sclerite" (which is possibly homologous with the "basal plate" or genital deckplate in the Nycteribiidae) and when exposed, they are situated between the anus and digitiform processes. It seems more appropriate to term the pair of small narrow sclerites on the sides of the anus as the cerci (Jobl. 1951, 1954a) or anal frame.

DESCRIPTION. Large-sized, wing 2.6-5.0 mm long. Head slightly narrowed posteriorly both in dorsal and lateral views; cervix (fig. 1) broad; eye large, very prominent; latero- and postvertices distinctly darker than other parts of body. Arista of antenna with short branches at apical 1/2. Palpus setose on both surfaces; labella either very short and hardly protruding, or about as long as labial theca. Prescutum and scutum largely bare, seldom with dense small setae on discal area; metanotum broadly rounded posterolaterally, never produced into calli or conical processes. Prosternum (fig. 1) entirely exposed, situated anterior to mesosternum; mesosternum (=sternopleura) broadly emarginate anteriorly; metasternum (=pleurotrochantin) produced anteriorly beyond level of coxal cavities 2. Wing with 1st abscissa of vein M_{1+2} as long as or slightly longer than 2nd abscissa; apical sections of R_{4+5} and M_{1+2} parallel to each other (Jobling 1934a described those of ***nigriceps*** as slightly divergent near wing-apex); M_{3+4} usually subangulate near base; Cu+1A weak but partly distinct beyond apex of anal cell. Coxae 1 widely separated; dorsal tibial setae not longer than tarsal setae. Abdomen often with poorly developed or incomplete bristle-columns flanking dorsomedial bare area of connexivum; ventral connexivum in ♂ sometimes with traces of segmentation; sternite 1 small; ♂ sternite 7 and pregenital plate generally present; ♀ sternite 8 distinct, either fused with or in close contact to sternite 7 and in strongly engorged specimens, lying perpendicularly to latter sternite; ♀ sternite 9 also distinct, either separate from or fused partly with sternite 10. Other characters, as listed under the preceding section "Systematice," are similar to those of ***Brachytarsina.***

Key to Megastrebla Species

1. Labella (fig. 4) almost as long as labial theca; upper part of mesepisternum (fig. 10-11) bare at anterior 1/3 or 3/4, which at most with 1-4 scattered setae; vein R_1 (fig.15-16) not bent near base; ♂ sternite 7 (fig. 35) large, triangular, bare on surface; ♀ sternite 7 (fig. 48) in lateral view in line with general curvature of abdominal venter, proctiger short, generally shorter than wide in dorsal view. Subgenus *Megastrebla* s. str 2

   Labella (fig. 3) at most 1/4 as long as labial theca; upper part of mesepisternum (fig. 12-13) evenly covered with setae; vein R_1 (fig. 14, 17-20) distinctly bent near base; ♂ sternite 7 (fig. 36-38) either undefinable or transverse and setose; ♀ sternite 7 (fig. 49-50) in lateral view hanging well below general curvature of abdominal venter, proctiger long, generally longer than wide in dorsal view. Subgenus *Aoroura* 6

2. Upper part of mesepisternum (fig. 10) very extensively bare, only with 2, rarely 3, curved rows of setae along posterior margin and, in addition, occasionally with 1-4 scattered setae on discal area; postvertex distinctly longer than wide; abdominal connexivum (fig 51) in both sexes with only 1 quite incomplete column of 2-4 moderately long bristles on either side of dorsomedial bare area in addition to numerous small fine setae; ♀ sternite 10 (fig. 55) about as long as wide. On *Rousettus* and *Eonycteris* 3

   Upper part of mesepisternum (fig. 11) bare only at anterior 1/3; postvertex as long as or hardly longer than wide; abdominal connexivum in ♂ with, in addition to numerous small setae, 1 column of 7 ± very long bristles which are interspaced by some moderately long ones and are lined on either side of dorsomedial bare area; abdominal connexivum in ♀ (fig. 53), on either side of dorsomedial bare area, with 1 complete column of very long and 3-4 columns of successively shorter bristles and then numerous small setae; ♀ sternite 10 (fig. 57) distinctly longer than wide. On *Dobsonia* 4

3. Anterior margin of sternite 2 (fig. 29) clearly convexly curved, laterally convergent to posterior margin; femur 2 (fig. 21a) dorsally with relatively longer, more numerous setae; ♂ parameres as in fig. 41; lateral plate of ♀ tergite 7 about 2× (very seldom 1.5×) as long as wide and bearing 6-8, rarely 9, strong setae. India to Sumba ..... **parvior parvior**

   Anterior and posterior margins of sternite 2 (fig. 30) subparallel to each other; femur 2 (fig. 21b) dorsally with relatively shorter, less numerous setae; ♂ parameres as in fig. 42; lateral plate of ♀ tergite 7 always 1.5× as long as wide and bearing 5, rarely 4 or 6, strong setae. New Guinea ..... **parvior papuae**

4. Size larger, wing 3.9-4.3 mm long; humeral area with 5-9 setae; lateral plate of ♂ tergite 6 with 15 ± setae, that of ♀ tergite 7 with 12-16 setae; ♀ sternite 7 with 9-21 setae (av. 14.2), anterior ones of which short and fine while posterior ones long and robust, in rather strong contrast 5

   Size smaller, wing 3.5-3.9 mm long; humeral area with 4-6 setae; lateral plate of ♂ tergite 6 with 10 ± setae, that of ♀ tergite 7 with 8-12 setae; ♀ sternite 7 with 5-13 setae (av. 8.2), all of which long and robust, no short fine ones. (Other characters as in *M. gigantea gigantea*). On *Dobsonia inermis;* Solomon Is. ..... **gigantea solomonis**

5. First basal cell (fig. 16a) longer, narrower in proportion, less strongly narrowed near base; 1st abscissa of vein R_{4+5} as long as or hardly shorter (very seldom distinctly shorter) than rm; setae - bristles on abdominal dorsum relatively shorter, e.g., those on lateral plate of ♀ tergite 7 less than 0.5 mm long. On *Dobsonia moluccensis, D. praedatrix,* (?) *D. peronii;* New Guinea, New Britain, (?) Sumba ..... **gigantea gigantea**

   First basal cell (fig. 16b) shorter, wider in proportion, very strongly narrowed near base; 1st abscissa of vein R_{4+5} distinctly shorter than rm; setae - bristles on abdominal dorsum relatively longer, e.g., longest ones on lateral plate of ♀ tergite 7 about 0.6 mm long. On "flying fox"; Fergusson I ..... **gigantea kaluwawae**

6. Posterior 2/3 of prescutum (fig. 7, 8) extensively bare, with only a few long marginal setae; femur 2 (fig. 23) in profile equal in length and width to femur 1; apical margin of anal cell (fig. 14, 17-19) perpendicular to anterior margin, or nearly so; ventral connexivum of ♀ abdomen (fig. 56) not uniformly setose, either with pair(s) of micropustular patches or with setae of hindmost rows markedly long and robust; size larger, wing 3.8-5.0 mm long.....7

Posterior 2/3 of prescutum (fig. 9) evenly covered with small setae (those on discal area pale, very fine and inconspicuous); femur 2 (fig. 24) distinctly shorter and, in profile, distinctly wider in proportion than femur 1; apical margin of anal cell (fig. 20) distinctly oblique to anterior margin; ventral connexivum of ♀ abdomen (fig. 58) uniformly covered with small setae; size smaller, wing 2.6-2.5 mm long. On *Penthetor lucasi;* Malaya, Borneo. ..... **nigriceps**

7. In ♂ (fig. 37), sternite 7 distinct, transverse, setose; digitiform process strongly curved in.... anterior view. In ♀, ventral connexivum (fig. 56) with setae of hindmost rows straight and markedly longer than those of anterior rows, no micropustular patches; sternite 7 trapezoidal, wider anteriorly. Host (?); Malaya, Borneo..... **limbooliati**

In ♂ (fig. 36), sternite 7 undefinable; digitiform process straight in anterior view. In ♀, ventral connexivum with 1 or 2 pairs of micropustular patches, with setae on posterolateral areas distinctly curved but only slightly longer than those on anterior area; sternite 7 (fig. 59, 60) obcordiform 8

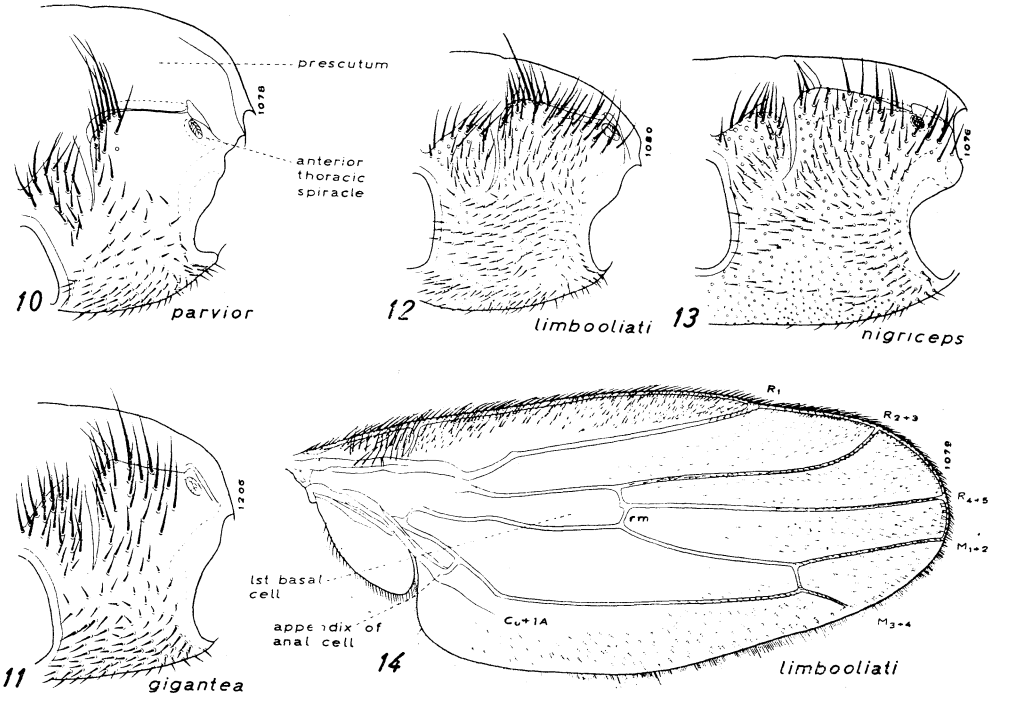

Fig. 10-14. *Megastrebla.* 10-13, thoraces, lateral; 14, right wing of *M. limbooliati* showing the venation and terminology.

8. Postvertex as long as or hardly longer than wide, angulately or acutely produced anteriorly; ♂ pregenital plate longitudinally linear; ♀ ventral connexivum with 2 pairs of micropustular patches, one at midlength of lateral areas and another on sides of sternite 7; size larger, wing 4.9-5.0 mm long. On *Rousettus lanosus;* Kenya, Tanzania..... **bequaerti**

Postvertex distinctly longer than wide, rounded anteriorly; ♂ pregenital plate (fig. 36) T-shaped; ♀ ventral connexivum with 1 pair of micropustular patches on sides of sternite 7, no such patches at midlength of lateral areas; size smaller, wing 3.8-4.1 mm long. On *Rousettus madagascariensis;* Comoro Is., Madagascar..... **wenzeli**

Subgenus **Megastrebla** s. str.

This subgenus is parasitic on *Rousettus, Dobsonia* and *Eonycteris,* and is confined to the Oriental Region. It appears to be more generalized than the next subgenus and may readily be recognized by the characters mentioned in couplet 1 of the key. Two species are included which are closely related to each other and are each divisible into 2 or 3 weakly differentiated geographical races.

DESCRIPTION. Labella scarcely shorter than labial theca [Jobling 1934a described the labella of *gigantea,* as being "as long as or a little longer," but measurements of his drawing and fresh specimens showed it to be actually slightly shorter than theca]; theca with more than 7 short setae on each side of surface and with 5 ± pairs of long setae on anterior margin. Prescutum with only 5-9 setae on humeral area; upper part of mesepisternum anteriorly bare, not evenly covered with setae. Vein R_1 almost straight except at apex, no bend near base; 1st basal cell strongly widened apicad; anal cell with long wide appendix. Abdomen of ♂ dorsolaterally with only a single incomplete column of long bristles on either side of dorsomedial bare area of connexivum; sternite 7 very large, triangular, bare on surface; surstylus about as long as digitiform process; pregenital plate undefinable (? merged into sternite 7). Abdomen of ♀ with short proctiger (shorter than wide in dorsal view); sternite 7 normal, not protruding under general curvature of abdominal venter in profile; sternite 8 large, horseshoe-shaped, with anterior arms closely articulated with sternite 7; sternite 9 transverse, separated from sternite 10.

Megastrebla (Megastrebla) parvior parvior (Maa), n. comb.

Fig. 5, 10, 15, 21a, 25, 29, 41, 51, 55.

Nycteribosca gigantea (misidentification), Speis. 1900b: 60 (pt.) (Burma & Sumatra rec.); 1900e: 153 (larva). — Ferr. 1924a: 73, fig. 1, 2, ♀ ♂ (des., Luzon rec.). — Pendl. 1929: 377 (Malaya rec.). — Bal & Ahmad 1949a: 179 (India rec.). — Jobl. 1951: 227, 230 (pt.), fig. 1 (A-E), 6 (G, H) (key, Java, Palawan & Mindanao rec.). — Param. 1951: 757 (pt.) (key). — Hireg. & Bal 1956: 68, fig. 95-99, ♀ ♂ (des., India rec.)

Nycteribosca prob. *gigantea,* McClure 1965: 73 (Malaya rec.). — McClure et al. 1967: 425 (Malaya rec.)

Nycteribosca parvior Maa 1962: 433, ♂ ♀, type ♂ (Bishop Mus.) ex *Eonycteris spelaea,* Malaya: Selangor, Batu Caves.

Brachytarsina parvior, Maa 1965b: 383 (list).

PREVIOUS RECORDS. Ex *Rousettus leschenaulti,* India: Bombay (Bal et al. 1949a, Hireg. et al. 1956); ex *R. amplexicaudatus,* Mindanao (mixed with *Eonycteris spelaea*) (Jobl. 1951), Sumba (Maa 1962); ex *Eo. spelaea,* Burma: Tenasserim (Speis. 1900b), Mindanao (mixed with *R. amplexicaudatus*) (Jobl. 1951), Malaya (Maa 1962); ex *Eo. robusta,* Mindanao (Jobl. 1951); ex *Cynopterus* sp., Java (Jobl. 1951); ex *Hipposideros diadema griseus,* Mindanao (Jobl. 1951); ex *Hipposideros* sp., Malaya (Maa 1962); ex mixture of *Miniopterus schreibersi* & *M. australis,* Mindanao (Jobl. 1951); ex "bats", Sumatra (Speis. 1900b), Luzon (Ferr. 1924a).

MATERIAL EXAMINED. 210 ♂ 211 ♀ in 258 lots, not including the type series and the Philippine material (FMNH) recorded as *gigantea* by Jobling (1951). The 2 pairs of specimens from Burma and Sumatra, and the single ♀ from Luzon, listed below, have been determined and reported on by Speiser (1900b) and Ferris (1924a) respectively.

Ex *Rousettus leschenaulti:* INDIA: 1 ♀, Poona, Manjiri Farm, 1964, K. R. P. Singh.

Ex *Rousettus a. amplexicaudatus:* MALAYA: 1 ♂ 1 ♀, Kedah, Pulau Langkawi, Kisap For. Reserve, 1967, A. Marshall. 1 ♀, Pahang, Cameron Highlands, Mt Brinchang, 1962, H. E. McClure. 1 ♂ 1 ♀ in 2 lots, Selangor, Peretak, 1970, G. C. Yang. — NEGROS: 2 ♀ in 2 lots, Nonas Kabankalan, 1968, R. B. Gonzales. 1 ♂ 1 ♀, Piapi, Dumaguete City, 1970, A. Caborda. 7 ♂ 11 ♀ in 11 lots, Siaton, Kandugay, 1964, D. S. Rabor. 19 ♂ 17 ♀ in 24 lots, Sibulan, Agan-an, 1964, Rabor; 8 ♂ 8 ♀ in 14 lots, Sibulan, San Antonio, 1964, Rabor. 23 ♂ 27 ♀ in 40 lots, Valencia, Camp Lookout, 1964-65, Rabor. — CEBU: 2 ♂, Cebu City SW, Minglanilla, 1962, L. & S. Quate. — LEYTE: 4 ♂ 2 ♀ in 4 lots, Mahaplag, Pagang-Pagang, Paril, 1924, Rabor; 1 ♂ 3 ♀ in 3 lots, Mahaplag, Sta Cruz, 1964, Rabor. — MINDANAO: 3 ♂ 2 ♀ in 5 lots, Cotabato, Mt Tuduk, Glan, 1966, Rabor; 14 ♂ 20 ♀ in 25 lots, Cotabato, Mt Matutum, Tupi, Kablon, 1966, N. Wilson. 21 ♂ 26 ♀ in 34 lots, Davao, Mt Mayo, Limot Mati, 1965, Rabor; 2 ♂, Davao del Sur, Kibawalan, Malalag, 1967, R. B. Gonzales. 1 ♂, Zamboanga del Norte, Mt Malindang, Masawan, 1962, Rabor. — BALABAC: 1 ♂ 2 ♀ in 2 lots, Palawan Bay, Minagas Point, 1962, M. Thompson. — SUMBA: 4 ♂, Praijawang, Matawaikenor, 1949, A. Bühler & Sutter.

Ex *Eonycteris s. spelaea:* MALAYA: 26 ♂ 25 ♀ in 5 lots, Selangor, Batu Caves, 1959, H. E. McClure; 1 ♀, Selangor, Gombak, 1969, A. Marshall; 1 ♀, Selangor, Subang, 1962, McClure. 2 ♂ 2 ♀, Perak, Gunong Kandu, 1965, A. J. Beck & N. Ueshima.

Ex *Eonycteris s. glandifera:* NEGROS: 1 ♂ 2 ♀ in 3 lots, Sibulan, Agan-an, 1964, D. S. Rabor; 2 ♂ 1 ♀ in 3 lots, Sibulan, San Antonio, Malindog, 1964, Rabor. 15 ♂ 13 ♀ in 15 lots, Valencia, Camp Lookout, 1964, Rabor. — LEYTE: 1 ♂ 2 ♀, Mahaplag, Pagang-Pagang, Paril, 1964, Rabor; 4 ♂ 5 ♀ in 8 lots, Mahaplag, Sta Cruz, 1964, Rabor.

Ex *Eonycteris major:* BORNEO: 1 ♀, Sarawak, Kuching, Kampong Pangkalankuap, 1964, B. L. Lim.

Ex *Eonycteris robusta:* LUZON: 2 ♂ 1 ♀ in 3 lots, Batangas, Calatagan, 1964-65, Migr. Anim. Path. Surv. 2 ♂ 2 ♀ in 2 lots, Nueva Vizcaya, Dalton Pass, 1965 & 1967, M. A. P. S.

Ex *Dobsonia viridis chapmani:* NEGROS: 3 ♂ 5 ♀ in 2 lots, Sibulan, San Antonio, Malindog, 1964, Rabor.

Ex *Cynopterus brachyotis:* MALAYA: 1 ♀, Selangor, Subang, 1962, H. E. McClure. — NEGROS: 1 ♀, Valencia, Camp Lookout, 1965, Rabor. — LEYTE: 1 ♂ 1 ♀, Mahaplag, Sta Cruz, 1964, Rabor.

Ex *Ptenochirus jagori:* NEGROS: 1 ♂, Sibulan, Kandagay, 1963, Rabor. 2 ♀ in 2 lots, Valencia, Camp Lookout, 1964-65, Rabor. — MINDANAO: 1 ♂, Agusan, Mt Hilong-Hilong, Hanggos, 1963, Rabor.

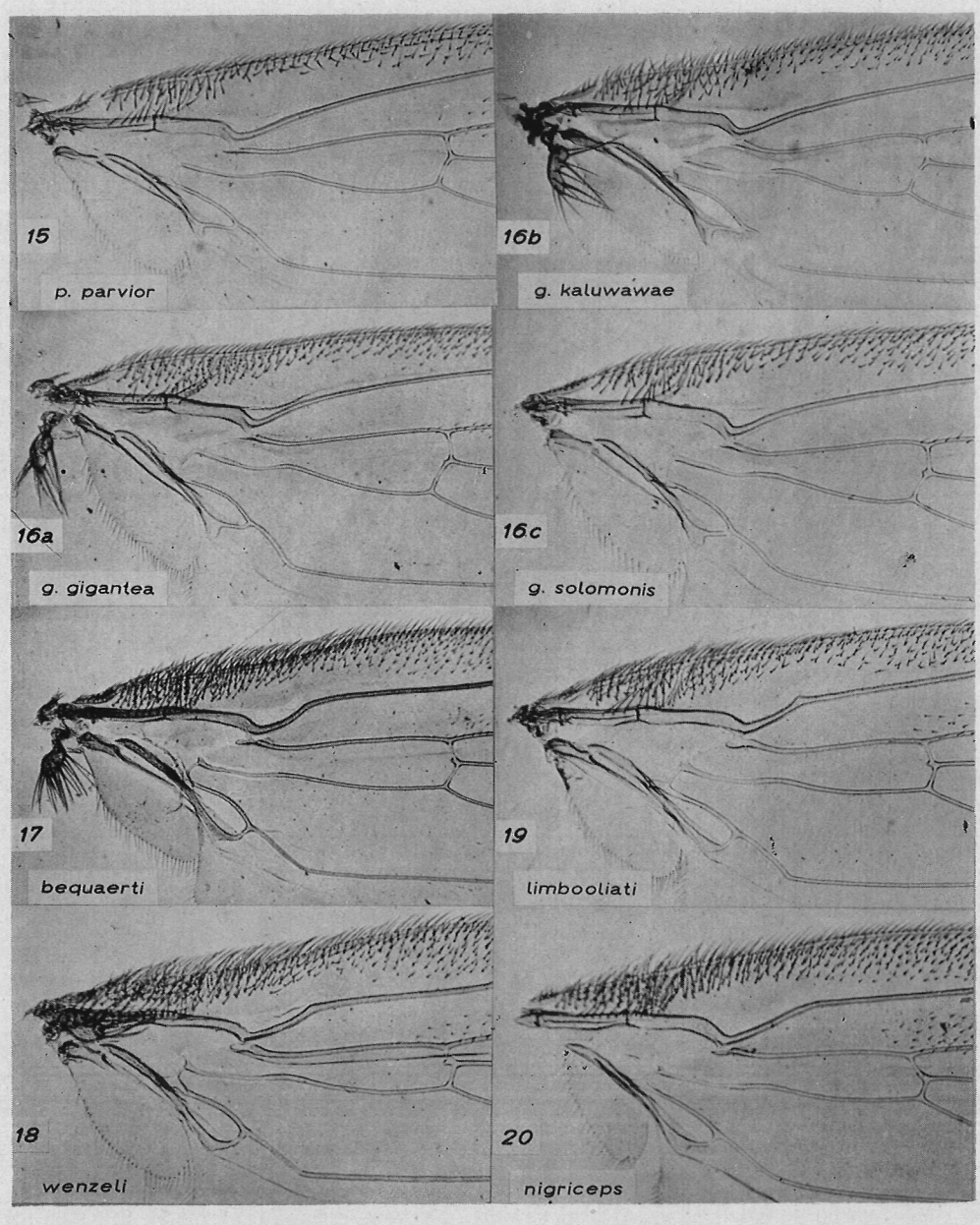

Fig. 15-20. *Megastrebla*, wings, basal parts.

Ex *Macroglossus lagochilus:* MALAYA: 1 ♂, Pahang, Mt Brinchang, 1961. 1 ♂, Selangor, Gombak, 1963, McClure. 1 ♂, Kedah, Alor Star, 1966, N. Ueshima. — NEGROS: 1 ♂, Valencia, Camp Lookout, 1964, Rabor.

Ex *Hipposideros* sp.: MALAYA: 1 ♂ 1 ♀ in 2 lots, Selangor, 1954.

Ex "bats": BURMA: 1 ♂ 1 ♀ (MSNG), Tenasserim, Moulmein, 1887, L. Fea. — THAILAND: 1 ♀, Chiengmai, Banbokaeo, 1962, SEATO Med. Res. Lab.; 1 ♂, 1 ♀ Chiengmai, Doi Phahompok, 1965, B. King. — MALAYA: 1 ♀, Ulu Kelantan, Fort Betis. 1961. 1 ♀, Selangor, Fraser's Hill, 1967, A. Marshall. 3 ♂ 2 ♀ in 3 lots, Selangor, 1964. — BORNEO. 1 ♀, Sarawak, Kuching, Kampong Pangkalankuap, 1964, B. L. Lim. — SUMATRA: 1 ♂ (MSNG), Balighe, 1891, E. Modigliani. 1 ♀ (MSNG), Lian si Peghe, 1891, Modigliani. — MINDANAO: 1 ♂ 2 ♀ in 3 lots, Davao, Mt Mayo, Limot Mati, 1965, Rabor; 1 ♀, Davao del Sur, Kibawalan, Malalag, 1963, Rabor. 6 ♂ 8 ♀ in 3 lots, Surigao, Lake Mainit, 1959, L. Quate, C. Yoshimoto & O. Phang. — LUZON: 1 ♀, Rizal Prov., Montalban, 1920, E. H. Taylor.

Hosts. Almost certainly *Rousettus* (177 records) is the primary and *Eonycteris* (48 rec.) is the secondary host. The occasional occurrence on *Macroglossus* (4 rec.), *Ptenochirus* (4 rec.), *Cynopterus* (4 rec.), *Dobsonia* (2 rec.), *Hipposideros* (3 rec.) and *Miniopterus* (2 rec.) is practically negligible.

Distribution. India, Burma (Tenasserim), Thailand, Malaya, Borneo, Sumatra, Java, Philippines (Luzon, Negros, Cebu, Leyte, Mindanao, Balabac, Palawan), Sumba.

Affinities. *M. parvior* is very closely related to *gigantea.* In addition to those features mentioned in couplet 2 of the key, the chief distinguishing characters of the former species are: Body smaller, less robust, less setose; mesepisternum very extensively bare, 1st abscissa of vein R_{4+5} shorter, dorsolateral bristles on abdominal connexivum quite poorly developed. The original description is brief. Only the chaetotaxy of the scutum and of ♀ sternite 10, the relative profile width of the femora and the shape of ♀ sternite 7 have been described.

Description. Body rather robust, 3.5-4.4 mm long (in alcohol). Postvertex ovoid, less often elliptical, distinctly longer than wide, with 4-14 setae (av. 8.3). Labial theca less setose than in *gigantea,* with only 7 ± pairs of setae on surface. Upper area of mesepisternum bare, only posterior margin lined with 2, rarely 3, curved setal rows (occasionally discal area with 1-4 scattered setae). Meso- and metasterna rather densely setose, former rather deeply emarginate anteriorly at middle. Wing 3.5-3.8 mm long; apex of vein R_{2+3} more distant to R_1 apex than to R_{4+5} apex; 1st abscissa of R_{4+5} only 2/3 as long as rm; apex of 1st basal cell 3× as wide as narrowest part of same cell. Legs long; femora 1 and 2 in profile 3.4× as long as wide; femur 3 ca 1.6 mm long, 1.35× as long as femur 1 or 2, in profile 4.8× as long as wide; tibia 3, 1.14× as long as tibia 1. Abdomen in ♂ with 1 quite incomplete column of 2-5 moderately long bristles flanking dorsomedial bare area of connexivum. Lateral plate of tergite 6 with 10 ± setae of varied length. Sternite 1 very small. Aedeagus (incl. aedeagal apodeme) longer (50:43) than paramere and parameral apodeme together; parameres as in fig. 41. Abdomen in ♀ with similar dorsolateral bristle columns and sternites 1 and 2 as in ♂; lateral plate of tergite 7 triangular, 2× as long as wide, with 6-9 setae; sternite 7 triangular, distinctly longer than wide, with 9-26 setae (av. 16.1) of much varied length, posterolateral setae very long; sternite 8 distinctly wider than 7; sternite 10 as long as wide, with over 20 small setae in 3-4 irregular rows on surface and with 2 long setae on posterior margin. Other characters similar to those of *gigantea* as redescribed.

Megastrebla (Megastrebla) parvior papuae Maa, n. subsp. Fig. 21b, 30, 42.

MATERIAL EXAMINED. 11 ♂, 8 ♀ in 6 lots. Holotype ♀ (BISHOP 9449) selected from the Nabire series, in Bishop Mus.

Ex *Rousettus amplexicaudatus brachyotis:* NW NEW GUINEA: 10 ♂, 8 ♀ incl. holotype ♀, in 5 lots, S. Geelvink Bay, Nabire, ix. 1962, N. Wilson & L. Richards.

Ex *Dobsonia moluccensis magna:* NW NEW GUINEA: 1 ♂, Hollandia, x. 1962, R.T. Simon Thomas.

HOSTS. Almost certainly, *Rousettus amplexicaudatus brachyotis* (5 records) is the only normal host. The single record from *Dobsonia* is most probably a result of the misidentification of the host bat.

DISTRIBUTION. New Guinea, lowland; at present known only from the coastal area of the Geelvink Bay and Humboldt Bay.

AFFINITIES. This is a very weakly characterized race and differs from the nominate subspecies, so far as it could be found, in the characters given in the key and illustrated in the drawings.

Megastrebla (Megastrebla) gigantea gigantea (Speiser), n. comb.
Fig. 1, 4, 6, 11, 16a, 22, 26, 31, 35, 39, 43, 48, 53, 57.

Nycteribosca gigantea Speis. 1900b: 47, 60 (pt.), 64, fig. 1, ♂, type (Berlin Mus.) ex *Cephalotes peronii* [recte: *Dobsonia praedatrix*], New Britain: Ralum. — Jobl. 1934a: 70, 72 fig. 2, ♂ (key, des., Sumba [as Gumba] rec.); 1951: 227, 230 (pt.)(key, Sumba rec.) — Param. 1951: 757 (pt.) (key). — Maa 1962: 432 (pt.) (des., New Guinea rec.)
Brachytarsina gigantea, Maa 1965b: 383 (list).

PREVIOUS RECORDS. Ex *Dobsonia praedatrix*, New Britain (Speis. 1900b); ex *D. moluccensis magna*, New Guinea (Maa 1962); ex *D. peronii sumbana*, Sumba (Jobl. 1934a, 1951).

MATERIAL EXAMINED. 40 ♂ 33 ♀ in 20 lots, not including the type.

Ex *Dobsonia moluccensis magna:* NEW GUINEA: 1 ♂ 1 ♀ in 2 lots, Vogelkop Penin., Kebar Valley, 550 m, i. 1962, L. & S. Quate. 2 ♂ 1 ♀ in 2 lots, Cyclops Mt, nr Kota Nica, 420 m, viii. & xii.1961, R. T. Simon Thomas & L. Quate. 2 ♂ 1 ♀, Lae, viii. 1957, G. P. Holland. 1 ♂, Kratke Mts, Arau, x.1959, H. M. Van Deusen. 1 ♂ 3 ♂ in 3 lots, Huon Penin., Finschhafen, 1962, P. Shanahan & H. Clissold. 2 ♂ 1 ♀, Morobe distr., Kalalo, viii. 1966, R. Mitchell. 19 ♂ 18 ♀ in 4 lots, Central distr., Sogeri, Javarere Caves, viii.1966, Mitchell, iv.1968, T. C. Maa & T. Fenner, x-xi.1968, N. Wilson & M. Nadchatram. 13 ♂ 8 ♀ in 7 lots, Brown R., Laloki, Tubusereia & Vanapa, all nr Port Moresby, 1967-68, W. H. Ewers.

HOSTS. *Dobsonia moluccensis magna*, 20 records; *D. praedatrix*, 1 rec.; *D. peronii sumbana*, 1 rec. Certainly the former 2 bats are the normal hosts.

DISTRIBUTION. New Guinea, New Britain; probably occurring also in Mysol, Waigeu and New Ireland, but not in Australia (see above). The record from Sumba was based on a single ♂ and may possibly represent a 4th subspecies of *gigantea*. As a result of misidentifications, this species has been wrongly recorded from the Comoro Is. (Speis.

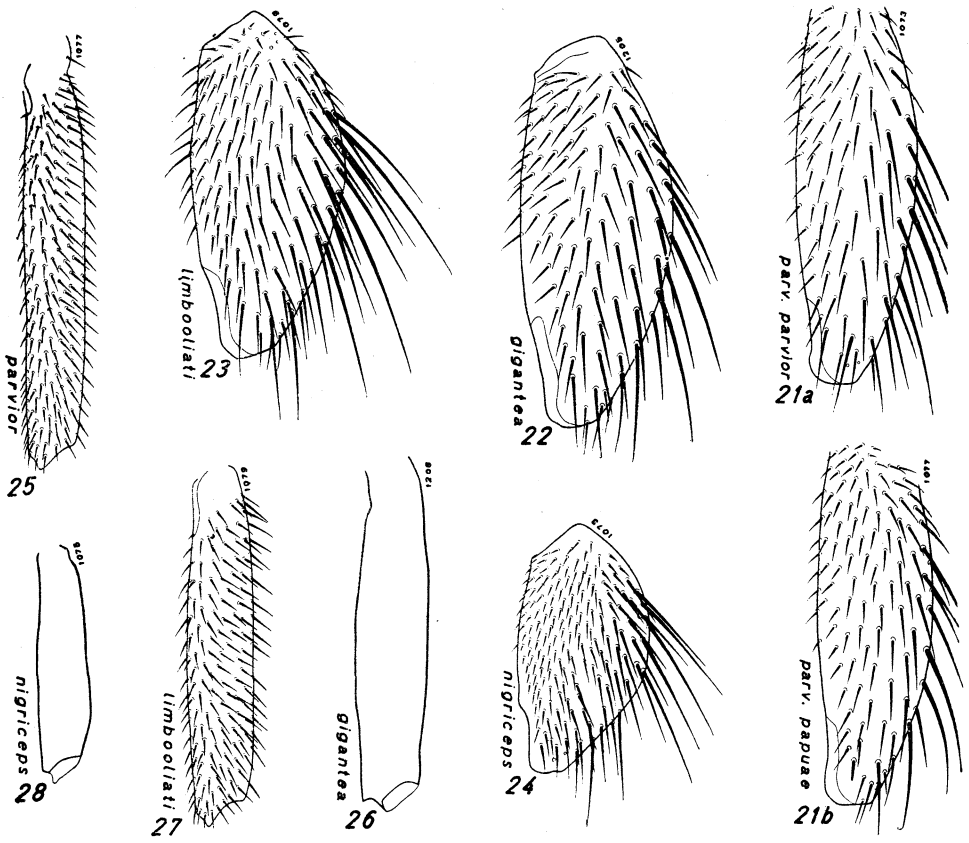

Fig. 21-28. *Megastrebla*, left mid femora (21-24) and tibiae (25-28), anterior surface. (Setae omitted in fig. 26 and 28).

1908b, incorrectly cited by Jobl. 1939b as from E. Africa), Philippines (Ferr. 1924a, Jobl. 1951), Malaya (Pendlebury 1929), Java (Jobl. 1951) and India (Bal & Ahmad 1949a, Hireg. & Bal 1956). For the true identity of the species involved, see synonymy under *M. bequaerti*, *wenzeli* and *parvior*. The earlier records by Maa (1965b) from the D'Entrecasteaux Archip. and Solomon Is. pertain to the subspp. *kaluwawae* and *solomonis* respectively (q. v.)

Affinities. *Gigantea* is the earliest described species of the genus. Its original description is equally applicable to any of its congeners except *nigriceps*. Consequently there has long been much confusion regarding its identity, hosts and distribution (see above). The species is, in fact, confined to the eastern Oriental Region and the only true close relative is *parvior* (q. v.) with which it coexists in New Guinea. From *parvior*, it may readily be distinguished by checking the characters given in couplet 2 of the key, and from the remaining species which belong to a different subgenus, by checking couplet 1 in the same key.

DESCRIPTION. Body robust, 4.2-4.6 mm long (in alcohol). Postvertex triangular, sometimes broadly ovoid, as long as or hardly longer than wide, with 5-19 (av. 9.5) setae. Labial theca rather uniformly beset with numerous small setae on surface. Prescutum and scutum largely bare; former with 5-9 long erect setae on anterolateral corner (humeral area) and similar number of shorter setas on lateral marginal area; scutum with an irregular series of setae along lateral margin and shortly before posterior margin, most of these setae rather short. Upper area of mesepisternum bare at anterior 1/3, with sparse, moderately long setae on posterior 2/3, most of these setae distinctly shorter than longest prescutal setae and as robust as mesepimeral setae. Meso- and metasterna sparsely setose, former shallowly emarginate anteriorly at middle. Wing 3.9-4.3 mm long; vein R_1 with bend near base, almost straight at apical section; apex of R_{2+3} more distant to that of R_1 than to that of R_{4+5}; 1st abscissa of R_{4+5} perpendicular to R_{2+3}, as long as or scarcely shorter than rm; 1st and 2nd abscissae of M_{1+2} subequal in length (42: 40), former distinctly curved before midlength; M_{3+4} very gently bent near base; 1st basal cell long, strongly narrowed at basal 1/3, widened at apex where it is ca 3.9 × as wide as narrowest part of cell; anal cell comparatively narrow, anterior apical angle clearly acute, posterior apex with long broad appendix. Legs moderately long, with rather sparse setae on dorsal femoral surfaces; femora 1 and 2 in profile similar to each other in size and shape, 2.7 × as long as wide; femur 3 ca 1.6 mm long, 1.21 × as long as femur 1 or 2, in profile 3 × as long as wide; tibia 3 ca 1.21 × as long as tibia 1. Abdomen in ♂ with 1 column of ʌɹɔʌ long bristles, interspaced by moderately long ones and 1 column of much shorter bristles flanking each side of dorsomedial bare area of connexivum. Lateral plate of tergite 6 triangular, with 12 ± setae of varied length. Sternite 1 relatively small; sternite 2 with compartively few setas on surface and with practically straight posterior margin; sternite 7 large, triangular, bare. Digitiform process in anterior view nearly straight, 1.5 × as long as wide, a little narrowed apicad; pregenital plate undefinable; aedeagus, incl. aedeagal apodeme, much longer (69: 45) than paramere and parameral apodeme together; parameres as in fig. 43. Abdomen in ♀ with 1 column of very long and 3-4 columns of successively shorter bristles flanking each side of dorsomedial bare area of connexivum; lateral plate of tergite 7 small, triangular, hardly longer than wide, with 12-16 setae, no spines. Sternites 1 and 2 as in ♂; ventral connexivum uniformly covered with small setas; sternite 7 more or less roundish, as long as wide, with 9-21 setae (av. 14.2), anterior setae much shorter than posterior ones; sternite 8 slightly narrower than 7, horseshoe-shaped, with anterior arms in close contact to sternite 7; sternite 9 transverse, lunate; sternite 10 nearly 2 × as long as wide, with 8 ± small setae in 3-4 rows on surface and 2 long setae on posterior margin; proctiger usually with 4 dorsal and 3 lateral long setae.

Megastrebla (Megastrebla) gigantea kaluwawae Maa, n. subsp. Fig. 16b.

Nycteribosca gigantea (pt.), Maa 1962: 432 (Fergusson I. rec.)

PREVIOUS RECORD. Ex "flying fox", Fergusson I. (Maa 1962).

MATERIAL EXAMINED. Holotype ♀ (BISHOP 9450), ex "flying fox", Fergusson I.: Mapamoiwa, vi.1959, W. Peters.

HOST. Undetermined, probably *Dobsonia moluccensis pannietensis*, which is endemic to Trobriand Is., D'Entrecasteaux Archip., Louisiade Archip. and other islands SE of New Guinea.

DISTRIBUTION. At present known only from Fergusson I. (= Kaluwawa), most probably general over islands SE of New Guinea.

AFFINITIES. This is a very weakly differentiated race of *gigantea* and its recognition is chiefly because of geographical reasons. The differences from the nominate subspecies are given in the key and are not repeated here.

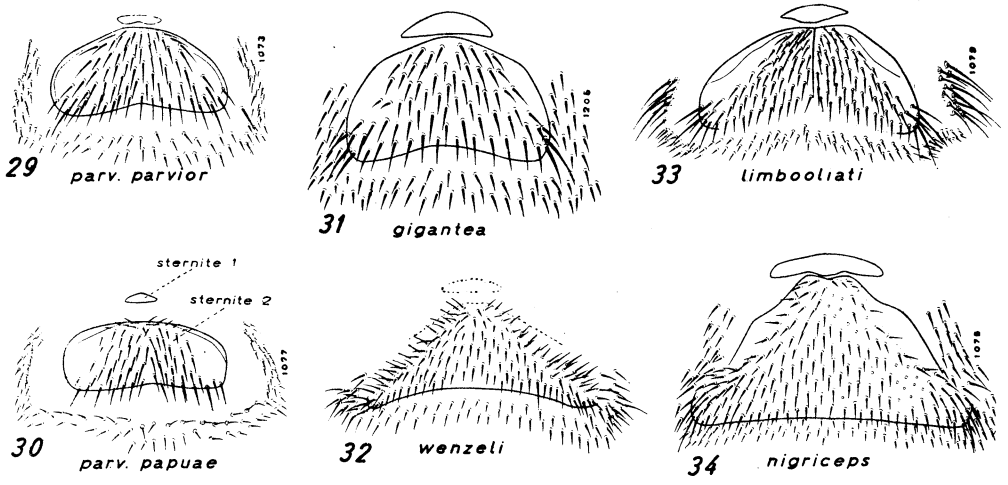

Fig. 29-34. *Megastrebla*, abdomens, basal parts, ventral. (Fig. 32 drawn from the allotype of *M. wenzeli*).

Megastrebla (Megastrebla) gigantea solomonis Maa, n. subsp. Fig. 16c.

Nycteribosca gigantea (pt.), Jobl. 1951: 227, 230 (key, Solomon Is. rec.) — Maa 1962: 432 (Solomon Is. rec.)

Previous Records. Ex "large pteropodid", "British Solomon Is." (Jobl. 1951); ex *Dobsonia* sp. [*D. inermis*], Buka I. (Maa 1962).

Material Examined. 34 ♂ 27 ♀ in 20 lots. Holotype ♀ (Bishop 9451) selected from the Buka series, in Bishop Mus.

Ex *Dobsonia inermis:* BUKA: 12 ♂ 6 ♀ incl. holotype ♀, Sia Cave, 10 m, xii. 1959, T. C. Maa. — BOUGAINVILLE I.: 1 ♀, base of Mt Balbi, Wakunai, Arau, 600 m, iv. 1968, A. B. Mirza; 1 ♂ 2 ♀, same data but Wakunai, Togarau. 1 ♂ 1 ♀ in 2 lots, Kieta, Arawa, xi. 1967, W. H. Ewers. — CHOISEUL: 3 ♂ 2 ♀, Malangona, 10 m, iii.1964, P. Temple; 4 ♂ 2 ♀ in 2 lots, Nambusasa, iii.1964, Temple. — MALAITA: 8 ♂ 7 ♀ in 6 lots, Dala, 20 m, vii.1964, P. Shanahan. — FLORIDA I.: 1 ♂ 2 ♀, Haleta, 10 m, x.1964, Shanahan. — FAURO: 2 ♂ 2 ♀, Toumoa, 10 m, iv.1964, Shanahan. — KOLOMBANGARA: 1 ♀, ii. 1964, Temple. — GUADALCANAL: 1 ♂, Vatakola, 20 m, vi.1964, Temple.

Ex *Rousettus amplexicaudatus hedigeri:* CHOISEUL: 1 ♀, Malangona, iii.1964, P. Temple.

Hosts. Obviously *Dobsonia inermis* (19 records) is the normal host. The single record from *Rousettus* is most probably a result of straggling or contamination.

Distribution. Solomon Is., at present known from Buka, Bougainville I., Choiseul, Malaita, Florida I., Fauro, Kolombangara and Guadalcanal, from sea level up to 600 m.

AFFINITIES. This is a rather distinct race of *gigantea* and can readily be distinguished from the other 2 races by its smaller body-size. Other characters of *solomonis* are given in the key.

Aoroura Maa, n. subgen.

TYPE. *Nycteribosca nigriceps* Jobling, 1934.

This subgenus is unique among the Nycteriboscinae in having a hanging ♀ sternite 7 and is thus named *Aoroura* (Greek, *aioretos*, *aoros*, hanging; *oura*, a tail). The members of this subgenus are parasitic on *Rousettus* and *Penthetor*. In many respects, *Aoroura* forms a link between *Megastrebla* s. str. and the genus *Brachytarsina* as here redefined. The included species may easily be segregated into 3 groups typified by *bequaerti*, *limbooliati* and *nigriceps*, respectively. The 1st group is chiefly characterized by the dense long strong setae on the body and by the presence of 1 or 2 pairs of micropustular patches on the ventral connexivum of the ♀; the 2nd group, by the very large ♂ pregenital plate and ♀ sternite 7; and the 3rd group, by the short femur 2 and the dense small setae on the prescutum. The 1st group is confined to the Ethiopian Region, whereas the 2nd and 3rd groups are only found in the Oriental Region.

DESCRIPTION. Labella very short; labial theca with only few pairs of small setae on surface and few moderately short setae on anterior margin. Prescutum with more than 10 setae on humeral area; upper part of mespisternum evenly setose. Vein R_1 with strong (seldom weak) bend near base; 1st basal cell a little widened apicad; anal cell with short, slender or indistinct appendix. Abdomen of ♂ with at least 1 complete column of very long bristles on either side of dorsomedial bare area of connexivum; sternite 7 either absent (merged into pregenital plate ?) of very small and setose; surstylus very long, ca 3× as long as digitiform process; pregenital plate linear or T-shaped. Abdomen of ♀ with long proctiger (longer than wide in dorsal view); sternite 7 strongly swollen, protruding and hanging under general curvature of abdomen in profile; sternite 8 small, transverse, fused with sternite 7; sternite 9 elongate, strongly sclerotized and pigmented anteriorly, not clearly separated posteriorly from sternite 10.

Megastrebla (Aoroura) bequaerti (Jobling), n. comb. Fig. 17, 40, 44, 59.

Nycteribosca bequaerti Jobl. 1936a: 374, fig. 4, ♀ ♂, type ♂ (Mus. Comp Zool. Harvard) ex *Rousettus aegyptiacus leachii*, Tanzania: Uluguru Mts, Bagilo; 1939b: 150, 152 (key, syn.); 1954a: 91, 98, fig. 1A (key, Kenya rec.) — Param. 1951: 757 (key).

Brachytarsina bequaerti, Theod. 1968b: 316, 321, fig 14, 15, ♀ (key, des., Kenya rec., affinities).

PREVIOUS RECORDS. Ex *Rousettus aegyptiacus leachii*, Tanzania (Jobl. 1936a); ex *R. lanosus kempi*, Kenya (Jobl. 1954a, Theod. 1968b).

MATERIAL EXAMINED. 6 ♂ 15 ♀ in 9 lots.

Ex *Rousettus aegyptiacus leachii:* TANZANIA: 1 ♀ paratype (BM), Uluguru Mts, Bagilo.

Ex *Rousettus lanosus kempi:* KENYA: 1 ♂ 1 ♀ (BM), Mt Menengai, Rift Valley crater, 2700 m, vi. 1948, H. Hoogstraal. 5 ♂ 13 ♀ in 7 lots (USNM), Nakuru distr., 3 km N of Nakuru, 2000 m, vii. 1968, B. J. Hayward.

HOSTS. Most probably *Rousettus lanosus* (Uganda, Kenya, Tanzania, Ethiopia) is the normal host, and the occurrence on *R. aegyptiacus leachii* (Cape Prov., NW to

Kenya) is accidental. There is only a single published record each from these 2 *Rousettus* bats. In Zumpt's (1966. Arthrop. Paras. Vertebr. Afr. S. of Sahara **3**: 99-107) checklist of the African Streblidae, the subspecific name *leachii* was dropped and *R. lanosus kempi* was not mentioned. *R. aegyptiacus* was thus listed as the only host in both Tanzania and Kenya. As shown above, there is no record from *R. aegyptiacus* in Kenya.

DISTRIBUTION. Kenya, Tanzania; probably to be found in Uganda and Ethiopia and with a similar range to *R. lanosus*. Jobling (1939b) stated, "I am sure that the specimen, which was collected in East Africa and identified by Speiser (1908) as *Nycteribosca gigantea*, belongs to this species [*bequaerti*]". In fact, the very specimen is from the Comoro Is. and belongs to *wenzeli* instead (see Hurka 1964b). Even as late as Speiser's checklist of Diptera from German E Africa (1924. *Beitr. Tierk. Widmungsschr. f. Prof. M. Braun:* 90-156), the only streblid included is *N. kollari*. This indicates that Speiser almost certainly never examined any *Megastrebla* from E Africa.

AFFINITIES. This species is very closely related to *wenzeli* (q. v.). The longer, denser and stronger setae-bristles on the body and the basally wider 1st basal cell of the wings suggest that *bequaerti* is more remote from the Oriental species of the genus than is *wenzeli*. The unique character of *bequaerti* is the presence of the 4 (rather than 2 as in *wenzeli*) compact micropustular patches on the ♀ abdominal venter. The nature of these patches is unknown; perhaps they represent the 5th and 7th laterotergites. The following redescription is based on 3 undissected, whole-mounted specimens on slides from which it is impossible to accurately measure the legs and ♂ genitalia, to examine the ♀ sternites 8 and 9 on a horizontal plane, and to illustrate the lateral view of the ♀ sternite 7 and ♂ left paramere.

DESCRIPTION. Body rather robust, 3.7-4.6 mm long (on slides), with longer, denser and stronger setae-bristles than in other *Megastrebla* species. Postvertex broadly pyriform [Jobling 1954a described it as cordiform], as long as or a little longer than wide, angulately or acutely produced anteriorly, with 22-25 setae. Prescutum with 20 ± long erect setae on anterolateral corner; scutum with 2-3 series of setae along lateral margins and shortly before posterior margin. Setae on upper area of mesepisternum almost as long as those on anterior part of prescutum Wing 4.9-5.0 mm long [Jobling 1936a said 4.6 mm]; vein R_1 straight at apical section, with subangulate bend near base; 1st abscissa of M_{1+2} scarcely longer (50: 46) than 2nd abscissa and almost straight before midlength; M_{3+4} also with subangulate bend near base; 1st basal cell at apex 2× as wide as at narrowest part; anal cell comparatively wide, with anterior margin perpendicular or slightly oblique to apical margin, Abdomen in ♂ with 2-3 dorsolateral columns of very long bristles on connexivum. Pregenital plate longitudinal, linear; right paramere as in fig. 44. Abdomen in ♀ with 3-4 dorsolateral columns of very long bristles on connexivum; ventral connexivum with 2 pairs of micropustular patches, one at about midlength on sides, another situated anterolateral to sternite 7; lateral setae between anterior and posterior patches curved, strong, spinelike and each originating from a large pustule. Lateral plate of tergite 7 large, elliptical, with 10 ± long bristles and some short spines. Sternites 1 and 2 as in ♂; sternite 7 in ventral view obcordiform, nearly as long as wide, anterior margin deeply and angulately incised at middle, upper lateral margin lined with 5-7 short setae, and lower lateral margin with similar number of much longer and stronger spinelike setae; sternite 9, as seen at its natural position, tuberculate and lying on a vertical plane. Other characters similar to those of *wenzeli*, as redescribed.

Megastrebla (Aoroura) wenzeli (Jobling), n. comb. Fig. 7, 18, 32, 36, 45, 49, 60.

Nycteribosca gigantea (misidentification), Speis. 1908b: 198 (Comoro Is. rec.)

Nyctsribosca wenzeli Jobl. 1952: 132, fig. 3, ♀ ♂, type ♀ (U.S. Nat. Mus.) ex *Rousettus madagascariensis*, Madagascar: Dauphin distr., Fort Mananteina; 1954a: 92, 98, fig. 1B (key). — Hurka 1964b: 73 (Comoro Is. rec., syn.)

Brachytarsina wenzeli, Theod. 1968b: 321 (status).

PREVIOUS RECORDS. Ex *Rousettus madagascariensis*, Madagascar (Jobl. 1952); ex *Rousettus* sp., Comoro Is. (Speis. 1908b, Hurka 1964b).

MATERIAL EXAMINED. 3 ♂ 1 ♀ (plus 1 ex. lacking abdomen) in 2 lots.

Ex *Rousettus madagascariensis:* MADAGASCAR: Allotype ♂ (labelled on slide by Jobling as paratype) (FMNH), Dauphin distr., Fort Mananteina. 2 ♂ 1 ♀ (plus 1 ex. of unknown sex) (BVP), Perinet, 8 km S of town, iv. 1967, R. L. Peterson.

HOSTS. Most probably both *Rousettus madagascariensis* (Madagascar, 2 records) and *Rousettus* sp. (Comoro Is., 1 rec.) are normal hosts. The latter bat is undescribed.

DISTRIBUTION. Comoro Is., Madagascar.

AFFINITIES. In the original description, Jobling (1952) noted that *wenzeli* differs from *bequaerti* in (1) all setae on head and thorax distinctly shorter, (b) postvertex "elliptical", not pyriform or rhomboid, (c) vein M_{3+4} having a much sharper bend near base, (d) ♀ proctiger slightly narrower, and (e) ♀ sternite 7 "semispherical", not cordiform.

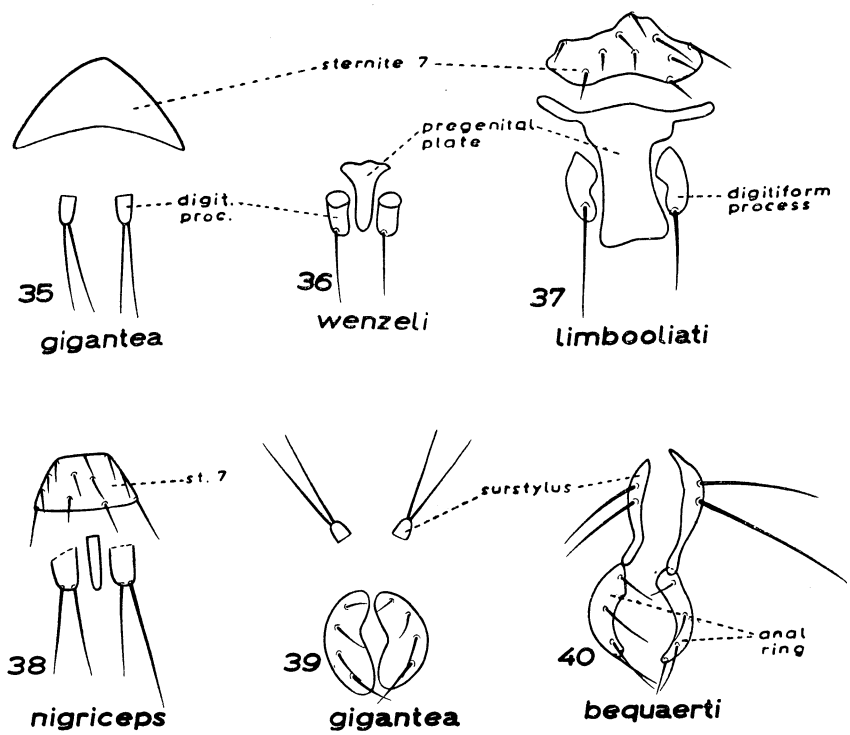

Fig. 35-40. *Megastrebla*, certain details of ♂ terminalia. (Note the absence of the pregenital plate in fig. 35, and the absence of the sternite 7 in fig. 36).

Theodor (1968b), obviously basing his conclusion on Jobling's description, remarked that some of the differences [which he did not specify] between these 2 species might be insignificant and that a comparison of their types would be necessary to determine their true status. A direct comparison of paratypes and fresh specimens by me revealed that *wenzeli* is certainly distinct from *bequaerti*. Their chief differences are enumerated in the key and the details are given in the redescription of *bequaerti*. Contrary to Jobling's statement, the holotype ♀ of *wenzeli* is in the U. S. Nat. Mus.; only the allotype ♂ is in the Field Mus. Nat. Hist. No material from the Comoro Is. is available and whether it shows any geographical variation is still to be ascertained.

DESCRIPTION. Body rather robust, 3.7-4.1 mm long (in alcohol). Postvertex ovoid, distinctly longer than wide, with 9-12 setae. (Jobling described the postvertex as "elliptical" but in all specimens examined, it is widest behind midlength.) Prescutum largely bare, anterolateral corner with 14 ± long erect setae, lateral margin lined with single series of shorter setae and lateral sections of posterior margin with single series of fine short setae; scutum with 2 series of setae along lateral margins and shortly before posterior margin, most of these setae rather short. Upper area of mesepisternum uniformly beset with setae which are distinctly shorter than longest setae of prescutum and about as robust as those on mesepimeron. Meso- and metasterna rather densely setose, former deeply emarginate anteriorly at middle. Wing 3.8-4.1 mm long [4.1-4.5 mm according to Jobling 1952]; vein R_1 with angulate bend near base, almost straight at spical section; R_{2+3} apically rather gently curved, hence its apex distinctly farther (25: 20) from that of R_1 than from that of R_{4+5}; 1st abscissa of R_{4+5} nearly perpendicular to R_{2+3} and as long as rm; 1st abscissa of M_{1+2} longer (40: 35) than 2nd abscissa and gently curved before midlength; M_{3+4} angulate near base; 1st basal cell long, a little widened at apex where it is 2.5× as wide as narrowest part of cell; anal cell comparatively narrow, anterior margin perpendicular to apical margin, appendix of posterior apex slender, poorly defined. Legs moderately long, with dense setae on dorsal femoral surfaces; femora 1 and 2 in profile similar to one another in size and shape, 2.8× as long as wide; femur 3 ca 1.3 mm long, 1.27× as long as femur 1 or 2, in profile 4.2× as long as wide; tibia 3, 1.25× as long as tibia 1. Abdomen in ♂ with 2 columns of very long bristles flanking each side of dorsomedial bare area of connexivum. Lateral plate of tergite 6 elliptical, 2× as long as wide, with 6 ± setae Sternite 1 relatively large; sternite 2 with rather numerous setae on surface; sternite 7 undefinable. Digitiform process in anterior view straight, 2× as long as wide, slightly narrowed apicad; pregenital plate T-shaped; aedeagus, incl. its apodeme, longer (40: 33) than paramere and parameral apodeme together; parameres as in fig. 45. Abdomen in ♀ with 2 columns of slightly shorter bristles flanking dorsomedial bare area of connexivum. Sternites 1 and 2 as in ♂. Ventral connexivum largely covered with small uniform setae which are intermixed with 3 incomplete transverse series each of 4-6 very long, fine pale setae, these setal series probably marking posterior margins of sternites 3-5; sternite 7 flanked by pair of roundish patches of 50 ± dense dark micropustules each bearing a pale microseta; lateral connexival setae near those micropustular patches curved, strong, spinelike and each originating from a large basal pustule. Lateral plate of tergite 7 very small, elliptical, 2× as long as wide, bearing 6 ± long bristles and similar number of short spines. Sternite 7 in ventral view somewhat obcordiform, slightly shorter than wide, anterior margin weakly convex, posterior margin very weakly concave at middle, in lateral view ca 1.5× as long as wide (Jobling 1952 described this sternite as "semispherical"), ventral surface with numerous short setae, posterolateral surfaces with much longer ones, lower lateral margin (morphologicolly, the dorsolateral margin) with 4-6 very robust spinelike long setae; sternite 8 transverse, partly fused with sternite 7; sternite 9 narrow, elongate, strongly sclerotized and pigmented; sternite 10, 1.5× as long as wide, with 6-7 rows of small setae and 1 pair of long setae; proctiger with 4 dorsal and 3-4 lateral long setae, lateral ones in 2 rows.

Megastrebla (Aoroura) limbooliati Maa, n. sp.

Fig. 8, 12, 14, 19, 23, 27, 33, 37, 46, 52, 56.

MATERIAL EXAMINED. 2 ♂ 2 ♀ in 3 lots. Holotype ♀ (BISHOP 9452) from Borneo, in Bishop Mus.

Ex *Eonycteris major:* BORNEO: Holotype ♀, Sarawak, Kuching, 7th mi. Serian Rd., iv. 1964, Lim Boo Liat.

Ex *Cynopterus* sp.: "CEYLON: 1 ♀, Labugama Reservoir, xi.1966, N. Ueshima".

Ex *Hipposideros* sp: MALAYA: 1 ♂ 1 ♀, Selangor, ii.1954, R. Traub (#B 22888).

HOSTS. Host relationship still uncertain. None of the above listed bats is likely to be the normal host: *Eo. major* is very rare and is unknown to Malaya; *Cynopterus* usually does not roost in caves; *Hipposideros*, though generally cave-dwelling, belongs to the suborder Microchiroptera and is known to include the specific hosts of several true *Brachytarsina* species.

DISTRIBUTION. Borneo, Malaya. The single specimen from *Cynopterus* labelled as from Ceylon might actually be from Malaya, as it was received from Dr N. Ueshima who collected, on my request, a series of batflies from both Ceylon and Malaya in 1966.

AFFINITIES. *M. limbooliati* is rather isolated and stands between *bequaerti* and *wenzeli* of the Ethiopian Region and *nigriceps* of the Oriental Region. With those 2 Ethiopian species, *M. limbooliati* shares the following characters: mesonotum extensively bare, veins R_1 and M_{3+4} basally angulate, and femora 1 and 2 similar to each other in size and profile shape. With that Oriental species, *limbooliati* has the following characters

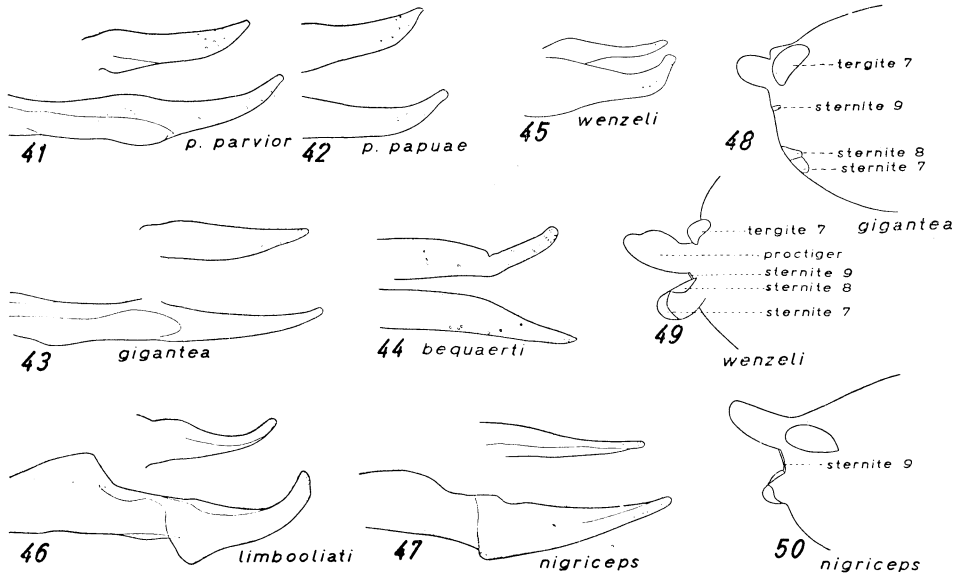

Fig. 41-50. *Megastrebla.* 41-47, ♂ parameres (fig. 44 and 45 drawn from a slightly slanting plane); 48-50, ♀ abdominal apices, lateral (drawn from engorged specimens in alcohol; setae and details of proctigers omitted).

in common: lst abscissa of vein R_{4+5} oblique, appendix of anal cell broad, ♂ sternite 7 present, micropustular patches of ♀ abdomen absent, ♀ sternite 10 long. Unique characters of this new species are the large, conspicuous ♂ pregenital plate, strongly curved ♂ digitiform processes and large, quadrate ♀ sternite 7. This species is named in honor of Mr Lim Boo Liat of Malaya who has collected many interesting batflies and other ectoparasites during the last 15 years.

DESCRIPTION. Body robust, 4.0-4.1 mm long (in alcohol). Postvertex ovoid, sometimes unusually small, surface with 3-13 setae. Prescutum largely bare, anterolateral corner with 10-13 long setae, lateral marginal area with single series of slightly shorter setae, posterior margin lined with a medially interrupted series of similar setae; scutum with 2 irregular series of rather short setae, plus 1 pair of posteromedial and 3 pairs of posterolateral long setae, otherwise this sclerite bare. Upper area of mesepisternum evenly beset with moderately short setae which are distinctly shorter than longest prescutal setae and are as robust as mesepimeral setae. Meso- and metasterna rather densely setose; former deeply emarginate anteriorly at middle. Wing 3.9-4.2 mm long; vein R_1 distinctly angulate near base, straight at apical section; R_{2+3} gently curved to C, its apex more distant (27: 19) from that of R_1 than from that of R_{4+5}; 1st abscissa of R_{4+5} slightly oblique to R_{2+3} and nearly as long as rm; 1st and 2nd abscissae of M_{1+2} subequal in length (40: 37), former very gently curved before midlength; M_{3+4} also distinctly angulate near base; 1st basal cell long, weakly narrowed at basal 1/3, a little widened at apex where it is ca 1.7× as wide as narrowest part of cell; anal cell rather narrow, anterior apical angle 90 degrees, apical margin strongly curved, lower apex with short broad appendix. Legs moderately long, with rather sparse setae on dorsal femoral surfaces; femora 1 and 2 in profile similar in size and shape, 2.8× as long as wide; femur 3 ca 1.5 mm long, 1.27× as long as femur 1 or 2, 3.6× as long as wide in profile; tibia 3, 1.24× as long as tibia 1. Abdomen in ♂ with 3-4 columns of very long bristles flanking each side of dorsomedial bare area of connexivum. Lateral plate of tergite 6 elliptical, ca 2× as long as wide, with 10 ± long bristles. Sternite 1 comparatively large; sternite 2 with numerous setae, posterior margin distinctly concave; sternite 7 small, transverse, well sclerotized and pigmented, with 3 setal rows. Digitiform process in anterior view strongly curved, 3× as long as wide, a little narrowed apicad; pregenital plate unusually large, T-shaped; genitalia as in fig. 37, 46. Abdomen in ♀ dorsolaterally with 6 ± columns of long bristles on connexivum; sternites 1 and 2 as in ♂; ventral connexivum not uniformly setose, setae of 2 (at middle) or 5 (at lateral areas) hindmost rows distinctly longer and more robust than those of anterior rows. Lateral plate of tergite 7 very large, roundish, with 15 ± long bristles and few short spines. Sternite 7 quadrate, very large, anteriorly broader and convexly curved, surface beset with numerous short fine setae, lateral and poseterior margins with some long robust setae; sternite 8 transverse, fairly large, fused with sternite 7; sternite 9 elongate, anteriorly thickened; sternite 10 ca 2.5× as long as wide, with numerous irregularly arranged small setae and 1 pair of long setae; proctiger with 4 dorsal and 2-3 lateral long setae, its lateral margin in dorsal view slightly curved anteriorly and strongly so posteriorly.

Megastrebla (Aoroura) nigriceps (Jobling), n. comb.

Fig. 3, 9, 13, 20, 24, 28, 34, 38, 47, 50, 54, 58.

Nycteribosca nigriceps Jobl. 1934a: 70, 74, fig. 3, ♂, type (Brit. Mus.) ex "bat", Borneo: Bidi Caves; 1951: 227, fig. 6F (key). — Param. 1951: 757 (key). — Maa 1962: 433 (Malaya rec.)

Brachytarsina nigriceps, Maa 1965b: 383 (list).

PREVIOUS RECORDS. Ex *Penthetor lucasi* (mixed with *Megaderma spasma*), Malaya (Maa 1962); ex "bat", Borneo (Jobl. 1934a).

MATERIAL EXAMINED. 28 ♂ 34 ♀ in 18 lots, not including the type.

Ex *Penthetor lucasi:* MALAYA: 15 ♂ 18 ♀, Pahang, Gua che Manan, mixed with *Megaderma spasma*, xii.1958, J. R. Hendrickson, J. L. Gressitt & T. C. Maa; 1 ♂ 1 ♀ in 2 lots, Pahang, Cameron Highlands, Mt Brinchang. x.1959 & iii.1962. 3 ♂ 4 ♀ in 5 lots, Selangor, Fraser's Hill, 1966-69, A. G. Marshall & G. C. Yang. — BORNEO: 2 ♂ 5 ♀ in 4 lots, Sarawak, Kuching, v.1964, B. L. Lim.

Ex *Rousettus a. amplexicaudatus:* MALAYA: 1 ♂, Pahang, Mt Brinchang, iii.1962, H. E. McClure.

Ex *Megaerops ecaudata:* MALAYA: 3 ♂ 3 ♀, Pahang, Mt Brinchang, xii. 1961, McClure.

Ex *Chironax melanocephalus:* MALAYA: 2 ♂, Selangor, Subang, ii.1962, McClure.

Ex *Cynopterus brachyotis:* MALAYA: 1 ♀, Selangor, Ampang, 1968, A. G. Marshall; 1 ♀, Selangor, Subang, v.1962, McClure.

Ex *Macroglossus lagochilus:* MALAYA: 1 ♂, Pahang, Mt Brinchang, xii. 1961, McClure.

Ex "bats": MALAYA: 1 ♀, Pahang, Mt Brinchang, xii.1961, McClure.

Hosts. Obviously *Penthetor lucasi* (12 recoads) is the normal host. The recorded occurrence on *Cynopterus* (2 rec.) and on *Rousettus, Megaerops, Chironax, Macroglossus* and *Megaderma* (1 rec. each) apparently resulted from contamination and incorrect field determinations of these bats.

Distribution. Malaya, Borneo. Most probably the range corresponds to that of the specific host *Penthetor lucasi* which occurs also in the Rhio Arch.

Affinities. *M. nigriceps* is isolated and is the sole representative of a distinct species-group which is unique in having the prescutum uniformly setose and femur 1 greatly dissimilar to 2 in both the size and shape. In these respects, in the curvature of veins R_1 and M_{3+4}, and the chaetotaxy of the mesepisternum, *nigriceps* evidently approaches *Brachytarsina* and is, therefore, hereby placed at the top of the new genus. In superficial appearnace, this species is noticeably smaller and more slender, but its head and thorax, contrary to Jobling's (1934a) opinion, are not more darkened (Latin, *niger*, black, dark; *-ceps*, head) than in its congeners. The vein R_{4+5} was described by Jobling (loc. cit.) as diverging from M_{1+2} near the wing apex and the ♂ digitiform process described as globular. This is not quite accurate. The pair of submedial scutal setae was correctly described by the same author as long and thin, but was incorrectly stated by Paramonov (1951), apparently based on Jobling's drawing, to be "very strong and much stronger than others nearby".

Description: Body slender, 2.6-3.5 mm long (in alcohol). Postvertex distinctly longer than wide, with 8-23 setae (av. 13). Prescutum completely setose; setae on anterior 1/3 erect and moderately long, those on posterior 2/3 very small and more or less pale and subrecumbent; scutum with 3 ± series of small setae along lateral margins and shortly before posterior margin, with 1 pair of submedial and 3 pairs of posterolateral setae which are, as in other ***Megastrebla*** species, much longer than others nearby; anterior margin lined with an incomplete row of pale, very small setae. Upper area of mesepisternum evenly covered with rather sparse setae which are much shorter than longest prescutal setae and less robust than mesepimeral setae. Meso- and metasterna evenly, rather densely setose, former deeply emarginate anteriorly at middle. Wing 2.6-3.5 mm long; vein R_1 with weak bend near base; R_{2+3} apically rather gentely curved to C, its apex nearly equidistant to R_1 and R_{4+5}

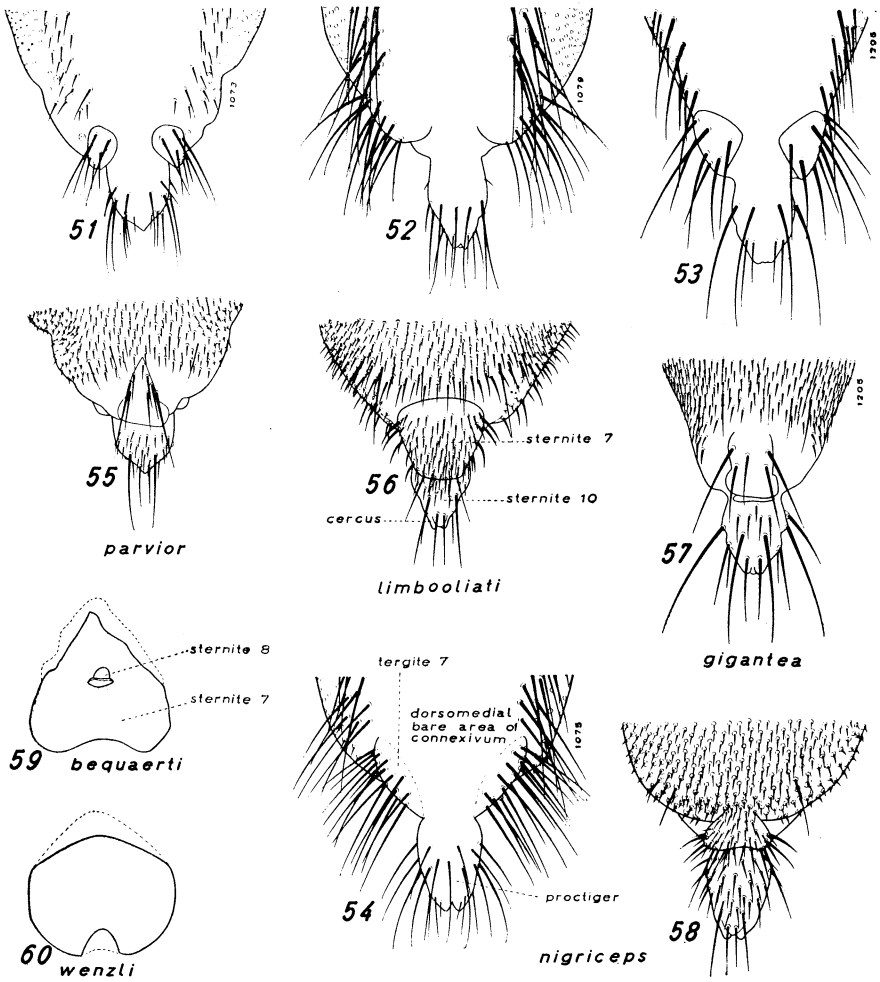

Fig. 51-60. *Megastrebla*, ♀. 51-58, abdominal apices, dorsal and ventral; 59-60, sternites 7, outline (fig. 59 showing the sternite 8 as seen in a cleared specimen).

apices; 1st abscissa of R_{4+5} distinctly oblique to R_{2+3} and as long as rm; 1st and 2nd abscissae of M_{1+2} subequal in length (32 : 29), former very gently curved before midlength; M_{3+4} almost straight near base; 1st basal cell long, a little narrowed at a point of basal 1/3, slightly widened at apex where it is ca 2× as wide as narrowest part of cell; anal cell narrow, anterior apical angle acute, posterior apex with short broad appendix. Legs short, with dense setae on dorsal femoral surfaces; femur 1 in profile quite dissimilar in size and shape to femur 2, former 2.5 and latter 1.7× as long as wide; femur 2 much shorter (22 : 27) than 1, its dorsal margin in profile strongly curved near midlength; femur 3 only 1.1 mm long, 1.22× as long as femur 1, in profile 3× as long as wide; tibia 3 only 1.11× as long as tibia 1. Abdomen in ♂ with 3 columns of very long bristles flanking each side of dorsomedial bare area of connexivum. Lateral plate of tergite 6 elliptical, 2.5× as long as wide, with 15 ± very long bristles. Sternite 1 comparatively large; sternite 2 with numerous setae on surface; sternite 7 small, trapezoidal, with 2-3 setal rows, well defined in strongly pigmented specimens.

Digitiform process in profile straight, 1.5× as long as wide, often slightly narrowed apicad [it is globular, as Jobling described, only when in vertical view]; pregenital plate linear, longitudinal; aedeagus, incl. aedeagal apodeme, longer (41 : 36) than paramere and parameral apodeme together; parameres as in fig. 47. Abdomen in ♀ similar to ♂ in number of dorsolateral bristle-columns, size of sternite 1 and chaetotaxy of sternite 2; ventral connexivum rather uniformly setose, lateral setae sparser and each originating from a much larger basal pustule. Lateral plate of tergite 7 fairly large, elliptical, 2× as long as wide, with 15 ± long bristles, no spines. Sternite 7 obcordiform, transverse, with 34-54 (av. 43) setae of much varied length and robustness, most of anterior setae much shorter and finer, posterior margin weakly concave; sternite 8 subquadrate, slightly wider than long, fused with sternite 7; sternite 9 elongate, ribbonlike; sternite 10 ca 2.5× as long as wide, with 6-7 rows of short setae and 1 pair of long setae; proctiger generally with 8 dorsal and 3 lateral long setae in 2 rows, its lateral margin in dorsal view gently curved at both ends.

Genus **Brachytarsina** Macquart, 1850

TYPE. *Brachytarsina flavipennis* Mcq., 1850.

SYNONYM. *Nycteribosca* Speiser, 1900 (type: *Raymondia kollari* Frfld., 1855 (= *Br. flavipennis* Mcq.)

REMARKS. This genus, as treated here, is parasitic normally on the Pteropodidae (*Notopteris*), Rhinopomatidae (*Rhinopoma*), Emballonuridae (*Emballonura, Taphozous*), Rhinolophidae (*Rhinolophus*), Hipposideridae (*Hipposideros*) and Vespertilionidae (*Miniopterus*). It is widespread in the Old World tropics and subtropics and includes about 25 described species. Most species occur in the Oriental Region and a few have successfully penetrated into the southern Palaearctic and northern Australian Regions. Under the name *Nycteribosca*, the genus, in its broad sense, has been defined by Jobling (1934a, 1951) and Theodor (1954b), and, under the name *Brachytarsina*, by Theodor (1968b). Following the segregation of certain previously included species into the new genus *Megastrebla*, a revised definition of *Brachytarsina* becomes a necessity. The genus is here divided into 2 subgenera.

The occurrence of a true *Brachytarsina* species, *rouxi* Falc., on the megachiropteran bats of the genus *Notopteris* in Melanesia may perhaps be explained by the following points: (a) Both *Br. rouxi* and *Notopteris* are anomalous in the structure and distributional pattern. The former is the sole representative of a well marked species-group in the genus *Brachytarsina* and the latter is in a very distinctive tribe (Notopterini) in the subfamily Macroglossinae. They are confined to the SE corner of the overall range of the family Pteropodidae and occur in a region clearly isolated from the range of the genus *Megastrebla*. Most probably the 2 taxa *Br. rouxi* and *Notopteris*, odd as they are, have evolved under more specialized and isolated environmental conditions than had *Megastrebla* and its specific hosts. (b) The light-colored head and reduced eyes in *Br. rouxi* are obviously an adaptation to conditions of the roosting sites of its specific host *Notopteris* which roosts usually in deep dark caves. By the same reasoning, the darkened head and large prominent eyes in *Megastrebla* are adaptive to the shallow, partially illuminated roosting sites of the specific hosts *Rousettus, Dobsonia, Penthetor* and *Eonycteris*. Similar cases involve 2 of the *Brachytarsina* species (*cucullata* Jobl. and *macrops* Jobl., both specifically on *Taphozous* bats), the hosts of which also roost in shallow, partially illuminated caves and rock-crevices.

DESCRIPTION. Medium-sized, wing 1.5-3.2 mm long. Head triangularly rounded posteriorly in dorsal and lateral views; cervix (fig. 2) narrow; eye small and not prominent, seldom moderately large and prominent or exceedingly small; latero- and postvertices of same color as other parts of body, seldom distinctly darker. Arista of antenna with branches at apical 1/2, very seldom from near base to apex. Palpus bare on dorsal surface; labella very short and hardly protruding, very seldom ca 1/3 as long as labial theca. Prescutum and scutum always rather uniformly beset with long dense setae; metanotum posterolaterally sometimes broadly rounded, generally produced into conical processes or calli. Prosternum (fig. 2) entirely concealed under mesosternum which is anteriorly produced at middle; metasternum extending anteriorly to level of anterior margins of coxal cavities 2. Wing-vein M_{1+2} with 1st abscissa usually much longer than 2nd abscissa; apical sections of R_{4+5} and M_{1+2} either parallel or divergent apicad to each other; M_{3+4} very weakly curved, never subangulate near base; Cu+1A at most indicated by a darkened line beyond apex of anal cell. Coxae 1 rather close to each other; dorsal tibial setae distinctly longer than tarsal setae. Abdomen always with well developed, complete bristle-columns flanking sides of dorsomedial bare area of connexivum; sternite 1 comparatively large; ventral connexivum in ♂ never with traces of segmentation; ♂ sternite 7, ♂ pregenital plate and ♀ sternite 8 undefinable, ♀ sternite 9 generally undefinable also, at most appearing as darkened thickened anterior margin of sternite 10.

Subgenus **Brachytarsina**, s. str.

For the definition of the subgenus, see discussions under *Psilacris*, n. subgen.

Brachytarsina (Brachytarsina) rouxi (Falcoz)

Nycteribosca rouxi Falc. 1921 : 237, ♀, type (Basle Mus.) ex *Notopteris macdonaldi neocaledonica*, New Caledonia: Hienghéné; 1923a: 85, fig. 4, ♀ as n. sp. again! — Jobl. 1934a: 70, 84, fig. 9, ♀ (key, redes.); 1951: 927, 233, fig. 3D (key, New Caledonia rec.)

Brachytarsina rouxi, Maa 1965b: 383 (list).

PREVIOUS RECORDS. Ex *Notopteris macdonaldi neocaledonica*, New Caledonia (Falc. 1921, 1923a; Jobl. 1951 [as *Notopteris* sp.]).

MATERIAL EXAMINED. 16 ♂ 13 ♀ in 4 lots.

Ex *Notopteris m. macdonaldi:* NEW HEBRIDES. 1 ♂ 1 ♀ (AM), Tanna, coll. J. M. Nicol; 1 ♀ (AM), Tanna, coll. W. L. Bell.

Ex *Notopteris m. neocaledonica:* NEW CALEDONIA: 12 ♂ 8 ♀ (SAM), Poya, Beiga Cave, i.1965, E. Hamilton-Smith; 3 ♂ 2 ♀ (SAM), Poya, Naaton Cave, xii.1965, Hamilton-Smith.

HOSTS. Obviously *Notopteris macdonaldi* (6 records) is the normal breeding host.

DISTRIBUTION. New Hebrides, New Caledonia.

AFFINITIES. *Br. rouxi* is isolated and may easily be distinguished from its congeners by the presence of a very darkly pigmented, pointed, medial process of the scutellum. Other more important characters of this species are: Body with moderately dense setae. Head not darker than other parts of body and in profile, strongly produced upward at level of postvertex. Thorax distinctly wider than long; scutellar setae not uniform in length, 2 pairs of them markedly longer; setae on upper part of metepisternum ca 3 × as long as those on lower part; metanotal calli well developed. Setae on ♀ ventral abdominal connexivum not uniform in length and robustness, those on posterior 1/4 more or less longer, curved, spinelike and much more robust while those of hindmost row as strong as on sternite 7; ♀ sternite 7 rather small, triangular,

transverse, with 2 rows of setae; ♀ sternite 10 much longer than wide, widest at posterior 1/3, with 3-4 rows of setae; ♀ proctiger widest before midlength, slightly narrowed anteriorly, cone-shaped posteriorly. Parameres almost symmetrical. Body ca 3 mm long, wing 2.9-3.2 mm long.

Jobling (1934a) described the thorax as very darkly pigmented, meso-pleuron (i. e. mesepisternum) and pteropleuron (i. e. mesepimeron) with setae of same length as those on scutum. These points are not quite accurate, only the scutellum is slightly darker than elsewhere, and the setae on the lower parts of the mesepisternum and mesepimeron are, as described above, much shorter than those on the upper parts where they are about as long as on the scutum.

Psilacris Maa, n. subgen.

TYPE. *Nycteribosca longiarista* Jobl., 1949.

This new subgenus is represented solely by the type-species (incl. its subsp. *longipes* Theod., 1968) and is known from *Hipposideros caffer* in the Cameroons and Ghana, and from *Miniopterus inflatus* in the Congo. The normal host is not certain yet. Jobling (1949a: 54) first pointed out that by the narrow palpus and the very long arista, *longiarista* is easily separable from all its congeners. Since then Theodor (1968: 326) suggested that a new subgenus may have to be created for this species because of the very marked differences [which he did not specify]. For comparison, characters of the subgenus *Brachytarsina* s. str. are given in parentheses in the following definition of *Psilacris*.

DESCRIPTION. Postvertex bare (setose), hence the name ***Psilacris*** [Greek, ***psilos***, bare, smooth; ***akris***, ***-ios***, hilltop, peak]. Eye exceedingly small, with central ring of its lens smaller than basal socket of a nearby seta (both eye and its central ring relatively larger). Arista of antenna very long, projecting beyond level of terminal setae of palpus, with branches from near base to apex (not so long, branches confined to apical 1/2). Palpus ca 3× as long as wide (slightly longer than wide); labial theca ca 2× as long as wide (at most slightly longer than wide, usually about as long as wide); labella 1/3 as long as theca (at most 1/4 as long). Lateral plate of ♂ tergite 7 markedly convex (hardly so), that of ♁ tergite 6 closer to (rather far from) medial line of abdomen; ♀ sternite 7 triangular, wider anteriorly, with small setae on surface and some short spines plus 1 pair of long setae on posterior margin (when triangular, then wider posteriorly and otherwise setose).

APPENDIX I. Host-Parasite List

In the following list doubtful or apparently unreliable records are each marked with brackets (for bats) or an asterisk (for flies), numerals in parentheses after the various species of flies denote numbers of available records in question, and the order of the arrangement of megachiropteran genera is after K. Andersen (1912. *Cat. Chiropt. Brit. Mus.*, **1**: xiv-xvi).

Megachiroptera: Pteropodidae	
[*Rousettus* (*Rousettus*) *aegyptiacus leachii* A. Smith]	**Megastrebla bequaerti* (1)
R. (*R.*) *leschenaulti* Desmarest, 1820	*M. p. parvior* (3)
R. (*R.*) *amp. amplexicaudatus* E. Geoffroy, 1810	*M. p. parvior* (170), **M. nigriceps* (1)
R. (*R.*) *amp. brachyotis* Dobson, 1877	*M. parvior papuae* (5)
[*R.* (*R.*) *amp. hedigeri* Pohle, 1953]	**M. gigantea solomonis* (1)
R. (*Stenonycteris*) *lanosus kempi* Thomas, 1909	*M. bequaerti* (8)
R. (*S.*) *madagascariensis* G. Grandidier, 1928	*M. wenzeli* (2)
R. (*S.*) sp. (Comoro Is.)	*M. wenzeli* (1)
Dobsonia moluccensis magna Thomas, 1905	*M. g. gigantea* (20), **M. parvior papuae* (1)
D. mol. pannietensis De Vis, 1905	*M. gigantea kaluwawae* (1)
D. peronii sumbana Andersen, 1905	*M. gigantea* (ssp. ?) (1)
[*D. viridis chapmani* Lawrence]	**M. p. parvior* (2)
D. praedatrix Andersen, 1909	*M. g. gigantea* (1)
D. inermis Andersen, 1909	*M. gigantea solomonis* (19)
[*Cynopterus brachyotis* S. Müller]	**M. p. parvior* (3), **M. limbooliati* (1), **M. nigriceps* (2)
[*Cynopterus* sp. (? Ceylon)]	**M. limbooliati* (1)
[*Cynopterus* sp. (Java)]	**M. p. parvior* (1)
[*Ptenochirus jagori* Peters]	**M. p. parvior* (4)
[*Megaerops ecaudata* Temminck]	**M. nigriceps* (1)
[*Chironax melanocephalus* Temminck]	**M. nigriceps* (1)
Penthetor lucasi Dobson, 1880	*M. nigriceps* (12)
Eonycteris spelaea Dobson, 1871	*M. p. parvior* (41)
Eo. robusta Miller, 1913	*M. p. parvior* (7)
Eo. major Andersen, 1910	*M. p. parvior* (1), *M. limbooliati* (1)
[*Macroglossus lagochilus* Matschie]	**M. p. parvior* (4), **M. nigriceps* (1)
Notopteris macdonaldi Gray, 1859	*Brachytarsina rouxi* (6)
Microchiroptera: Megadermatidae	
[*Megaderma spasma* Linnaeus (mixed with *Penthetor lucasi*)]	**M. nigriceps* (1)
Microchiroptera: Hipposideridae	
[*Hipposideros diadema griseus* Meyen]	**M. p. parvior* (1)
[*Hipposideros* sp. (Malaya)]	**M. p. parvior* (2), **M. limbooliati* (1)
Microchiroptera: Vespertilionidae	
[*Miniopterus schreibersii* Kuhl (mixed with *M. australis* Tomes)]	**M. p. parvior* (2)

APPENDIX II. Streblidae Incorrectly Recorded as from Megachiroptera

Brachytarsina (*Brachytarsina*) *africana* (Walker, 1849)

Chiefly parasitic on Rhinolophidae: *Rhinolophus*. Once recorded (Jobl. 1954a: 101) as from *Rousettus ae. aegyptiacus* E. Geoffroy in the Congo.

Br. (*Brachytarsina*) *alluaudi* (Falcoz, 1923)

Probabaly specific on either Hipposideridae: *Hipposideros* or Emballonuridae: *Taphozous*. Once recorded (Jobl. 1954a: 102) as from *Rousettus ae. aegyptiacus* E. Geoffr. in the Congo and (Theod. 1968b: 317) as from *Epomophorus* (?) *wahlbergi haldemani* Halowell in Kenya.

Br. (*Brachytarsina*) *amboinensis* Rondani, 1878

Specific on Vespertilionidae: *Miniopterus* and separable into several subspecies. Once recorded (Jobl. 1951: 233) as from *Rousettus amp. amplexicaudatus* E. Geoffroy or *Eonycteris spelaea glandifera* Lawrence in the Philippines: Mindanao.

Br. (*Brachytarsina*) *cucullata* (Jobling, 1934)

Probably specific on Emballonuridae: *Taphozous*. Originally described from Ceylon. Once recorded (Jobl. 1951: 230) as from *Cynopterus brachyotis luzoniensis* Peters in the Philippines: Mindanao. It is doubtful if the Philippine specimens have been correctly determined.

Br. (*Brachytarsina*) *diversa* (Frauenfeld, 1857)

Specific on Rhinopomatidae: *Rhinopoma*, and synonymous with *Br. alluaudi minor* Theod., 1968. Originally recorded (Frfld. 1857b: 478) as from *Rousettus ae. aegyptiacus* E. Geoffr. in Egypt.

Br. (*Brachytarsina*) *hoogstraali* (Jobling, 1951)

Normal host unknown. Originally recorded (Jobl. 1951: 232) as from *Cynopterus brachyotis luzoniensis* Peters in the Philippines: Mindanao.

Br. (*Brachytarsina*) *proxima* (Jobling, 1951)

Probably specific on Rhinolophidae: *Rhinolophus*. The holo- and allotypes were originally recorded (Jobl. 1951: 237) as from *Rousettus amp. amplexicaudatus* E. Geoffr. or *Eonycteris spelaea glandifera* Lawrence in the Philippines: Mindanao.

Br. (*Brachytarsina*) *werneri* (Jobling, 1951)

Probably specific on Hipposideridae: *Hipposideros*. One of the 11 paratypes was originally recorded (Jobl. 1951: 238) as from *Eonycteris robusta* Miller in the Philippines: Mindanao.

Raymondia pseudopagodarum Jobling, 1951

Chiefly parasitic on Rhinolophidae: *Rhinolophus*, less often on Hipposideridae: *Hipposideros*. Three of the 85 paratypes were originally recorded (Jobl. 1951: 241) as from *Rousettus amp. amplexicaudatus* E. Geoffr. or *Eonycteris spelaea glandifera* Lawrence in the Philippines: Mindanao.

Ascodipteron semirasum Maa, 1965

Specific on Hipposideridae: *Hipposideros*. One of the 2 paratypes was originally recorded (Maa 1965a: 318, Theod. 1968b: 370) as from *Epomophorus wahlbergi haldemani* Halowell in Kenya.

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