

A Preliminary Revision of the Genus *Myophthiria* Rondani (Diptera: Hippoboscidae)

by

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With 15 figures

ABSTRACT

The genus *Myophthiria* Rondani is hereby divided into 2 subgenera, *Myophthiria* s. str. (Old World, 11 spp.) and *Brachypteromyia* Williston (New World, 2 spp.). In addition to a synoptic key, descriptions and re-descriptions, the host relationships, distribution pattern and evolutionary trends of various taxa of the genus are briefly discussed. New species described are *M. (M.) fijiarum* (Fiji), *javanica* (Java), *malayana* (Malaya), *neocaledonica* (New Caledonia), *neoheburum* (New Hebrides), *queenslandae* (Queensland), *wilsoni* (New Guinea) and *zeylanica* (Ceylon = Sri Lanka). *B. nakamurai* Kishida is suppressed as a new synonym of *M. capsoides* Rondani which is, in turn, resurrected as a valid species.

INTRODUCTION

Hippoboscids or louse-flies of the genus *Myophthiria* Rondani are brachypterous (as defined by HACKMAN 1964), superficially spider-like, specifically parasitic on swifts and swiftlets, and widespread in the world except the Palaearctic and Afrotropical Regions. Largely because of the considerable difficulty in collecting, these flies are generally very rare in museum collections — to my knowledge, less than 3 dozen specimens in all have ever been recorded in literature — and their natural history is scarcely known. In taxonomy, 7 nominal species (5 valid) have been described, and while the New World forms have been admirably monographed by BEQUAERT (1954), the Old World ones have not been revised since RONDANI (1878). This paper is, as admitted, preliminary in nature and is intended to serve as the groundwork for a more comprehensive revision in future, and to raise the interest of collectors and field ecologists. The material used in this study is largely in the collections of the B. P. Bishop Museum, Honolulu, British Museum (Natural History), London and Muséum d'Histoire naturelle de Genève (Switzerland). Eight species are described as new. More are expected to be added when the world fauna of the genus can be adequately and thoroughly explored.

Descriptions of the various species in this paper are, unless otherwise stated, on bases of holotypes and allotypes, and are largely relative measurements of various parts of the body. For easier comparisons between species and between parts of the body, all relative measurements of eyes, genae and inner orbits are given at the scale 50 micrometric units = 1 mm, and those of remaining parts of the body, at the scale 22 units = 1 mm. The length/width ratio is indicated by an "x" symbol between 2 numerals; all lengths are taken along a hypothetical median longitudinal line; all widths are taken at the widest part but a supplementary measurement (given in a parenthesis) is made for the mediovertex and postvertex at the midlength, and for the thorax at the level of prothoracic spiracles. For instance, when the thorax is described as 27 x (37) 48, the median length is 27 micrometric units; the width at the level of prothoracic spiracles, 37 units; and the greatest width, 48 units. Other exceptions are:

Head — length taken from occipital margin to level of apices of frontal processes.

Palpus — length taken from apex to level of basalmost seta.

Antenna — length taken from base of 1st segment to apex of antennal appendage.

Frons — length taken from ptilinal suture to level of apices of frontal processes.

Frontal process — interdistance taken at midlength, not including membranous parts.

Interantennal area — width taken at level of antennal bases.

Eye — length taken from foremost to hindmost facet, not including non-facetted areas at both ends.

Mediovertex — width taken at level of midpoint of ptilinal suture.

Thorax — length taken from anterior end of median notal suture to posterior scutellar margin in dorsal aspect of the insect.

Genus *Myophthiria* Rondani, 1875

Myophthiria Rndn., 1875: 464, type-species: *Myophthiria reduvioides* Rndn., monotypic.

Variants of spelling: *Myiophthiria*, *Myiophtheria*.

Myiocoryza Rndn., 1878: 155, conditionally proposed as n. gen., type-species: *Myiophthiria lygaeoides* Rndn., monotypic.

Hosts. Swifts and swiftlets (Apodidae) of the genera *Collocalia* G. R. Gray, 1840 (Chaeturinae) of the Old World, and *Aeronautes* Hartert, 1802 (Apodinae) of the New World. These birds are gregarious, generally non-migratory and build durable nests in extensive, compact colonies at high, sheltered, hardly accessible places. They are among the fastest flying birds in the world. On the contrary, *Myophthiria* flies are flightless and spend much of their lives in nests of host birds, and the population density is never high, hence they are usually very difficult to collect. Wings in these flies are no longer of any use for reaching a new individual host with such behavior, and the wing atrophy most probably only decreases the risk of the fly in being blown off the exceedingly fast-flying host (BEQUAERT 1953).

Besides specific hosts mentioned above, swifts of the chaeturine genera *Hirundapus* Hodgson, 1837 (lumped into *Chaetura* Stephens, 1826 by some authors) and *Cypseloides* Streubel, 1848 (= *Nephoecetes* Baird, 1858) possibly may serve as secondary hosts. One species of pigeons (Columbidae), 3 species of swallows and martins (Hirundinidae)

and even one species of sheath-tailed bats (Emballonuridae) have once each been recorded as hosts. Certainly these are to be considered either accidental associations or unreliable records.

A total of 16 genera were listed by PETERS (1940) for Apodidae of the entire world. They are Chaeturinae: *Collocalia*, *Hirundapus*, *Streptoprocne*, *Aerornis*, *Chaetura*, *Zoonavena*, *Mearnsia*, *Cypseloides*, *Nephoecetes*; Apodinae: *Apus*, *Aeronautes*, *Panyptila*, *Tachornis*, *Micropanyptila*, *Reinarda*, *Cypsiurus*. It is yet to be clarified whether any of the genera other than *Collocalia* etc. may serve as primary or secondary hosts of *Myophtiria* flies.

Distribution. Oriental, Australian, Nearctic and Neotropical Regions. The range of the genus *Myophtiria* evidently coincides with, or falls well within, that of the genera *Collocalia* and *Aeronautes*. Up to now *Myophtiria* flies are known only from Ceylon (= Sri Lanka), Malaya, Java, Borneo, Philippines, Lombok, Amboina, New Guinea, Queensland, New Hebrides, New Caledonia, Fiji, U.S.A. (Rocky Mountains area) and Venezuela. The altitudinal range of these flies is not clear but certainly depends on that of their host birds. All the 11 Old World species except *M. zeylanica* and *malayana* either prefer or are confined to hills and lowlands below 600 m level while the 2 New World species are both confined to mountains and highlands.

Systematics. The phylogenetic-taxonomic position of the genus *Myophtiria* within the family Hippoboscidae has been examined by SPEISER (1908), BEQUAERT (1943, 1954) and MAA (1962, 1969). In the classificatory scheme of SPEISER, both *Myophtiria* and *Brachypteromyia* were accepted as valid genera and were placed between *Crataerina* and *Ornithomya* in the subfamily Ornithomyinae while in the scheme of BEQUAERT and MAA, *Myophtiria* (with *Brachypteromyia* as a subgenus or synonym) was placed at the top of the *Ornithomya*-group of genera (viz., *Ornithophila*, *Ornithomya*, *Crataerina*, *Myophtiria*) of Ornithomyinae. Most probably *Crataerina* and *Myophtiria* have had derived from a common ancestor. Their host birds (both Apodidae and Hirundinidae in *Crataerina*) are alike in general appearance and behavior whereas their adaptive features, as shown by structural details, are similar or parallel to each other: the much lengthened head; the much reduced eyes; the absence of ocelli (present in the subgenus *Stenepteryx* of *Crataerina*); the short, much flattened, stoutly built and anteriorly deeply notched thorax; the prominent humeral calli; the short, posteriorly truncate/subtruncate scutellum; the reduced wings; the poorly definable alulae; the long legs; the powerful, deeply cleft tarsal claws; the vestigial praegonites (= "gonocoxites"), etc. Chief differences of *Myophtiria* from *Crataerina* are that the head is always distinctly longer than wide (sometimes about as long as wide in *Crataerina*), the eyes are about 2/7 as long as the head (sometimes about 1/2 as long in *Crataerina*); the frontal processes are longer; the lunula has a median pit; the median notal and transverse mesonotal sutures are either entirely or partly obsolete (always partly so in *Crataerina*); the calypteres are absent; the wings are roundish and pad-like (ribbon-like or with an elongate apex in *Crataerina*) and have more reduced venation, with vein R_{2+3} usually undefinable, veins M_{1+2} , M_{3+4} and Cu_{1+A} generally coalescent together into a thickened $MCuA$ stem, M_{1+2} and M_{3+4} occasionally represented each by a short stub; the legs vary in stoutness (always stout in *Crataerina*); the 7th tergite in ♀ is often represented by a pair of sclerites; the supra-anal plate in ♀ is usually present (never so in *Crataerina*). In certain respects, the genus *Myophtiria* shows resemblance to some less closely related genera. For instance, the relative lengths of the mesonotum and humeral calli resemble that of *Ornithoctona* while the presence of the 7th tergite and supra-anal plate in ♀ resembles that of *Ornithoica*.

Evolutionary trends within the genus from generalized to specialized forms appear to be generally in following directions: the shortening of the vertex versus the frons, the reduction of eyes, the merging of genae into anterior parts of inner orbits, the diverging of frontal processes, the partial fusion of the lunula with the interantennal area and antennal bases, the lengthening of the thorax, the diverging of humeral calli, the obscuring of the scutoscutellar suture, the modification of the anterior mesobasisternal margin, the crowding of veins toward the costal margin of the wing, the shortening of the radial cell and legs, the reduction in the number and size of abdominal tergal plates, and the acumination of postgonites (= "parameres"). The 2 subgenera and 13 species of the genus in the following pages are arranged in accordance to the relative degree of their speciation.

There is very little to be added to BEQUAERT'S (1954) redefinition of the genus but a few of the characters he enumerated fit the New World forms but not the Old World ones, and should be modified as follows: mediovertex either longitudinally wrinkled or not, 1 or more pairs of vertical bristles, prothoracic spiracles varying in size, disc of scutellum with or without short ordinary setae.

KEY TO SUBGENERA AND SPECIES

- 1. Palpus subequal in length to antenna; scutellum with 4-10 bristles in a single transverse series, and with a number of short ordinary setae; 1, occasionally 2, pairs of vertical bristles; humeral callus and anterior surface of femora sparsely covered with setae and bristles. Old World. Subgenus *Myophtiria* s. str. 2
- Palpus only about 1/2 as long as antenna; scutellum with more than 30 bristles in several transverse series, no short ordinary setae; 2-7, generally 3 or 4, pairs of vertical bristles; humeral callus and anterior surface of femora densely covered with setae and bristles. New World. Subgenus *Brachypteromyia* 12
- 2 (1). Eye exceedingly small, practically entirely invisible in dorsal (frontal) view of head; scutoscutellar suture poorly defined, virtually straight; veins R₁ and R₄₊₅ about 3 x as wide as their interspace. New Caledonia 11. *neocaledonica*
- Eye not so small, at least upper 1/2 clearly visible in dorsal view of head; scutoscutellar suture well defined, distinctly arcuate, or even subangulate at middle; veins R₁ and R₄₊₅ distinctly narrower than their interspace 3
- 3 (2). Lunula almost as long as vertex, postvertex much shorter than mediovertex; ♀ tergites 3, 4 and 7 undefinable, tergite 5 vestigial or undefinable, tergite 6 normal, interrupted medially. Philippines 10. *capsoides*
- Lunula, postvertex and ♀ tergites not in above combination 4
- 4 (3). Vertex as long as lunula and interantennal area together; mediovertex weakly widened anteriorly, slightly shorter than postvertex; femur 3 distinctly shorter than head and thorax together; palpus slightly shorter than antenna 5
- Vertex much longer than lunula and interantennal area together; mediovertex distinctly widened anteriorly, markedly longer than postvertex; femur 3 generally about as long as head and thorax together; palpus as long as or slightly longer than antenna 6

- 5 (4). Prothoracic spiracle small, about 1/2 as long as wide, and 2 x as wide as its distance to dorsolateral margin of humeral callus; eye narrower than nearby inner orbit (9:12); gena (together with anterior parts of inner orbit) narrowly rounded anteriorly, Fiji 9. *fijiarum*
- Prothoracic spiracle relatively large, about 2/3 as long as wide, and 3 x as wide as its distance to dorsolateral margin of humeral callus; eye as wide as nearby inner orbit; gena (together with anterior parts of inner orbit) broadly rounded anteriorly. Java 8. *javanica*
- 6 (4). Eye unusually large and prominent for the subgenus, about 1.6 x as long as wide, and 1.5 to 2 x as wide as nearby inner orbit; anterior margin of mesobasisternum sharply (shallowly or deeply) incised, not lobately produced, at middle 7
- Eye not so large, about 2 x as long as wide, and subequal in width to nearby inner orbit; anterior margin of mesobasisternum lobately produced, not sharply incised, at middle 8
- 7 (6). Eye 2 x as wide as nearby inner orbit, and 1.5 x as long as gena; anterior margin of mesobasisternum deeply incised medially, thus forming a pair of acute-apexed submedian lobes. New Guinea 7. *wilsoni*
- Eye 1.5 x as wide as nearby inner orbit, scarcely longer than gena; anterior margin of mesobasisternum shallowly incised medially, no acute-apexed submedian lobes. New Hebrides 6. *neohebudarum*
- 8 (6). Vein R_{2+3} clearly undefinable; anterior margin of mesobasisternum broadly rounded and produced medially, not or scarcely sinuate submedially; setae and bristles on dorsal connexivum almost as coarse as those on thoracic dorsum 9
- Vein R_{2+3} present, though weaker than R_1 and R_{4+5} ; anterior margin of mesobasisternum narrowly rounded and produced medially, distinctly sinuate submedially; setae and bristles on dorsal connexivum markedly finer than those on thoracic dorsum 11
- 9 (8). Interantennal area distinctly wider than its distance to inner orbit; lateral (outer) margins of humeral calli parallel to each other. Malaya . . 3. *malayana*
- Interantennal area about as wide as its distance to inner orbit; lateral margins of humeral calli slightly converging anteriorly to each other . . 10
- 10 (9). Interantennal area about 1/3 as long as wide; anterior margin of lunula weakly convex at middle; prothoracic spiracle scarcely wider than its distance to dorsolateral margin of humeral callus. Borneo . . . 4. *reduvioides*
- Interantennal area about 2/3 as long as wide; anterior margin of lunula abruptly, lobately produced at middle; prothoracic spiracle about 2 x as wide as its distance to dorsolateral margin of humeral callus. Queensland. 5. *queenslandae*
- 11 (8). Interantennal area as wide as its distance to inner orbit; ♂ tergites 4 and 5 both evenly short (i.e. transversely narrow) and sinuate posteromedially; postgonite (= paramere) evenly narrow and blunt-apexed in lateral view. Ceylon 1. *zeylanica*
- Interantennal area distinctly wider than its distance to inner orbit; ♂ tergites 4 and 5 both triangular; postgonite acuminate in lateral view. Amboina; New Guinea 2. *lygaeoides*

- 12 (1). Humeral callus triangular, narrowed anteriorly to a blunt point; interantennal area markedly wider than its distance to inner orbit; body smaller, length of head and thorax together 3.5 mm or less. USA (Rocky Mountains area) 12. *fimbriata*
- Humeral callus lobate, broadly rounded anteriorly; interantennal area slightly narrower than its distance to inner orbit; body larger, length of head and thorax together 5.5 mm or more. Venezuela 13. *neotropica*

Subgenus **Myophthiria** Rondani, *s. str.*

Hosts. *Collocalia* swiftlets; possibly *Hirundapus* swifts too. The genus *Collocalia* ranges from the Reunion, Mauritius and Seychelle Is. in the W Indian Ocean, eastward to the Marquesas and Society Is. in the central Pacific Ocean, and spreads northward to Assam, Burma, SW China (Yunnan, Szechwan, Hopeh), Tonkin and Micronesia (Caroline Is., Mariana Is.), and southward to New Caledonia and N tips of Australia. The taxonomy of the genus is exceedingly difficult and complicated because the inter-specific differences are very slight, the intraspecific variations often considerable and while different populations of same species may occur in different isolated caves, one same cave may house 2 or more species. The genus contains about 15 valid species which were assigned to 5 groups by MEDWAY (1966): (a) nest mossy, of plant fibers (mostly mosses) agglutinated with hardened saliva or so-called nest-cement, 10 spp., including *esculenta* L., *marginata* Salvadori, *troglydytes* Gray which jointly form the *esculenta*-complex of the genus; (b) nest mossy, of plant fibers, no saliva, 2 spp.; (c) nest mossy, of plant fibers and a little moist saliva, 1 sp.; (d) nest black, of saliva, feathers and a little plant fibers, 1 sp.; (e) nest white, purely of saliva, 1 sp. The *esculenta*-complex was believed by MEDWAY (*loc. cit.*) on the ground of morphological and ecological evidences, to be closest to the ancestral stock of *Collocalia*. It is also believed by UESHIMA (1968) to be primary hosts of bugs of the genus *Paracimex* Kiritsenko, 1913 (Hemiptera: Cimicidae). It may be added that 2 of the known *Paracimex* spp. are morphologically different from the remaining ones and are specifically parasitic on spine-tailed swifts of the genus *Hirundapus*, of which the nests are similar in all details to those of *Collocalia* group (a) except that they contain no saliva and are on rocky cliffs instead of in caves. The 10 other *Paracimex* species (plus several unnamed sibling species) are primary parasites of the *esculenta*-complex of *Collocalia*. Ranges of this genus of bugs and of this complex of swiftlets closely coincide with each other. There are several published records of accidental associations of *Paracimex* with *Collocalia* (*C. brevirostris*, *fuciphaga*, *lowi*, *spodiopygia*, *salangana*) which do not belong to the *esculenta*-complex. But these happened only when such *Collocalia* and members of the *esculenta*-complex were sympatric in same caves and, in these cases, the population density and parasitism rate on such *Collocalia* were always strikingly lower than on members of the *esculenta*-complex. By referring to what we know about *Paracimex* bugs, one may be tempted to surmise: (1) the nature of nests and the environment of nest sites of host birds probably have less influence on *Myophthiria* than on *Paracimex*; (2) *Myophthiria* probably are less host specific than *Paracimex* and, possibly due to the competition of the latter (which are dominant in population), they may be confined to *Collocalia* other than members of the *esculenta*-complex or, as suggested by available records (cf. Host-parasite list), they may breed on *Collocalia* belonging to, or not belonging to, that species-complex; (3) *Hirundapus* swifts probably do not serve as hosts of *Myophthiria* because of the competition with *Paracimex* on these birds; (4) there appear to be certain trends of the co-evolution

of these 2 groups of bloodsucking parasites. For instance, both groups have, in contradiction to their distribution patterns in general, 2 distinct species each in New Guinea; and the most specialized species (*M. neocaledonica* sp. n., *P. caledoniae* Ferris & Usinger) of both groups are found side by side in New Caledonia.

Distribution. Oriental and Australian Regions. Of the 11 species at present known, 5 are found W, and 6 found E of the Weber's Line; 8 are inside and 3 outside of the range of the *esculenta*-complex of *Collocalia*. In certain respects, the distribution patterns of *Myopthiria* s. str. and *Paracimex* are closely similar: a few species are found on the continent or subcontinent, most ones are insular in distribution; the insular isolation appears very significant, each major island or island-group has its own endemic species; the 2 species found on New Guinea each occupies a certain area within that huge island. Almost certainly there is an endemic *Myopthiria* species each on Sumatra, Celebes, Bismarck Archipelago, Solomon Is. etc. and possibly on the Reunion, Seychelle, Society Is. and other peripheral areas within the range of the genus *Collocalia*. The dispersal routes of the various *Myopthiria* species seem to have been in an eastward direction from the original distribution center. The most generalized and specialized species of the subgenus occur on Ceylon and New Caledonia, respectively.

Systematics. The name *Myiocoryza* was originally proposed as an independent genus, on condition. Since then it was never accepted by later authors and was even not listed in Neave's Nomenclator Zoologicus. It was sunk as a synonym of *Myopthiria* by BEQUAERT (1954). This appears to be fully justifiable because as shown by the key, the type-species of both nominal genera, *lygaeoides* and *reduvioides*, are scarcely separable.

The first and only synopsis of *Myopthiria* s. str. was by RONDANI (1878) who separated the 3 then-known species solely on bases of the relative length of palpi versus antennae and whether vein R is 2- or 3-branched. After that, the 4th nominal species was described under the name *Brachypteromyia nakamurai* by KISHIDA (1932) while the misidentified *M. «lygaeoides»* was recorded from Ceylon and *M. «reduvioides»*, from Lombok, Philippines, Queensland, New Hebrides and Fiji. A redefinition of the subgenus was provided by BEQUAERT (1954) who synonymized *capsoides* with *reduvioides* and left *nakamurai* unsettled. In this paper, *capsoides* is resurrected, *nakamurai* is synonymized and 8 new species are added.

Myopthiria s. str. is apparently more generalized than *Brachypteromyia* and differs from the latter subgenus in the following points: head widest behind level of eyes; palpus about as long as antenna; frontal processes longer, with length exceeding interdistance; interantennal area as wide as or slightly wider than its distance to inner orbit; median notal and transverse mesonotal sutures both always partly developed; prothoracic spiracle smaller; wing about 1.5 to 2 × as long as wide, veins R₁ and R₄₊₅ always distinct from each other; legs more slender, femur 3 about 4.5 to 6 × as long as wide; tergite 6 always present, either simple or divided medially; tergite 7 and supra-anal plate in ♀ usually present; body and legs, particularly inner orbits, humeral areas, anepisterna (posterior parts), scutellum and femora, less hirsute, with 1, occasionally 2, pairs of vertical bristles.

The 11 species of the subgenus enumerated below may be segregated into 2 groups, with the 1st one further divided into 4 subgroups: (1a) *zeylanica*, *lygaeoides*, *malayana*, *reduvioides*, *queenslandae*; (1b) *neohebudarum*, *wilsoni*; (1c) *javanica*, *fijiarum*; (1d) *capsoides*; (2) *neocaledonica*. Diagnoses of these groups and subgroups are given in the key. Subgroup (1a) probably represents the most generalized forms, from which the outshoots (1b), (1c) and (1d) have derived.

Difficulties confronting the taxonomy of *Myophtiria* s. str. are the lacking of sufficient materials from representative areas, the lacking of precise host data (due to the chaotic situation of the taxonomy of *Collocalia*), and the very slight interspecific differences. In strong contrast to those of *Brachypteromyia* (cf. discussions under *M. fimbriata*, below), members of the subgenus *Myophtiria* s. str. are so remarkably uniform in structure (and even in body size) that many diagnostic characters highly useful for *Brachypteromyia* are here of very little or no significance. Consequently the identity of the various species must be relied chiefly on combinations of "quantitative" characters or relative measurements. The following points are common to all species and are therefore not repeated in the descriptions: the long, nearly parallel-sided, apically broadly rounded antennal appendages; the single (rarely double) pair of vertical bristles; the multiseriate, moderately numerous orbital bristles; the posteriorly obsolete median notal suture; the medially broadly interrupted transverse mesonotal suture; the triangular, sparsely bristled, anteriorly blunt humeral calli; the moderately long, posteriorly arcuate scutellum; the inconspicuous pleurotergal protuberance; the elliptically outlined wings. For the usefulness of the wing venation and abdominal tergites as specific characters, see discussions under *M. (M.) wilsoni*.

1. *Myophtiria (Myophtiria) zeylanica* sp. nov. (Fig. 9)

Myophtiria sp.: AUSTEN 1926: 360 (Ceylon: Pundaluoya, ex *Collocalia u. unicolor*).
Myiophthiria lygaeoides: BEQ. 1953 (pt.): 268, 314, 316, fig. 12A (on p. 42) (Ceylon, ex *Collocalia brevisrostris unicolor*).

Material studied. 5 ♂♂ 1 ♀. CEYLON (Sri Lanka): Holotype ♂, Hunasgiriya, ex nest of *Collocalia fuciphaga*, 27.X.1966, N. Ueshima. Allotype ♀, det. O. Theodor as *M. reduvioides*, Rawanaella Cave, Ella, ex *C. brevisrostris unicolor*, 16.I.1970, P. Strinati & V. Aellen. Paratypes, 1 ♂, det. Theodor as *M. (?) reduvioides*, Gintota, ex *Collocalia* sp., G. Bouvier; 2 ♂♂, det. H. Oldroyd as *M. lygaeoides*, Namunukula, Uva Hills, Hindagalla Cave, 5000 ft. [1520 m], ex *C. brevisrostris unicolor*, 4.VII.1954, W.W.A. Phillips; 1 ♂, det. J. Bequaert as *M. lygaeoides*, Pundaluoya, ex nest of swiftlet, I.1898, E. E. Green. Holotype in Bishop Mus., allotype and 1 paratype in Genève Mus., 3 paratypes in Brit. Mus. (Nat. Hist.)

Hosts. *Collocalia brevisrostris unicolor* (Jerdon), *C. fuciphaga* (Thunberg).

Distribution. Ceylon.

Affinities. *M. zeylanica* is very closely related to *lygaeoides* of Amboina and New Guinea. For similarities and dissimilarities of these 2, see discussions under the latter species. The criterion for the recognition of this n. sp. is the blunt-apexed postgonites (in profile) which are unique within the subgenus. In BEQUAERT'S (1953) figure of a wing of the n. sp. (under the name *lygaeoides*), there are 2 setae at the base of vein R_{4+5} and a continuous series of long bristles covering the entire length of vein C. In fact, in *zeylanica* and all other members of *Myophtiria* s. str. there are no such setae on vein R_{4+5} , and the basal ones of the long bristles on vein C are replaced by much shorter ones and many short ordinary setae (cf. Fig. 15). In the type-series, vein M_{1+2} is undefinable, and M_{3+4} is also undefinable except in one of the paratypes where it is represented, in both wings, by a rather long stub.

Description. Head $1.42 \times$ as long as wide (37×26); frons equal in length to vertex (19:18). Palpus subequal in length to antenna (15:13), in profile tapering apicad.

Antennal appendage with moderately dense bristles. Frontal processes parallel to each other, with length equal to interdistance (7:7); interantennal area as wide as its distance to inner orbit ($5\frac{1}{2}:5\frac{1}{2}$); lunula 9×17 , with median pit situated at center, median section of anterior margin not distinctly convex. Vertex longer than lunula plus interantennal area (18:12); mediovertex $11 \times (7) 10$, distinctly widened anteriorly; postvertex $8 \times (5) 9$, triangular, with straight lateral margins and subacute anterior end. Gena about as long as width of eye (9:10), rounded anteroventrally. Eye elliptical, 16×9 , slightly narrower than nearby inner orbit (9:11), with both anterior and posterior ends narrowly rounded. *Thorax* 0.6 as long as wide, $27 \times (36) 45$. Humeral calli with their outer margins parallel to each other. Prothoracic spiracle relatively small, scarcely wider than its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with convex anterior margin. Anepisternum (in dorsal view of thorax) not narrowed caudad. Mesobasisternum with anterior margin narrowly rounded and produced medially, distinctly sinuate submedially. Wing 33×17 ; vein R_{2+3} well defined but distinctly weaker than neighboring veins; R_1 and R_{4+5} about $2/5$ as wide as their interspace, not markedly narrower than MCuA stem; radial cell long, longer than MCuA stem (19:15). Femur 3 about $6 \times$ as long as wide, subequal in length to head and thorax together (61:64). ♀ *Abdomen*: Tergites 3 and 4 undefinable; tergite 5 about 3×11 ; tergite 6 divided into 2 halves, each about $1/4$ as long as wide, with 2 bristles and 3 rows of setae; tergite 7 also in 2 halves, each slightly wider than long; relative widths of tergites 5, 6 (side-piece) and 7 (side-piece), 11:16:3. Supra-anal plate represented by a small triangular patch of some 10 setulae. Dorsal connexivum laterally with more numerous short ordinary setae than long bristles. ♂ *Abdomen*: Tergite 3 rather small, irregularly shaped, less sclerotized than other tergites and widely interrupted medially; tergites 4 and 5 arcuate, band-like, about $1/6$ and $1/4$ as long as wide, respectively; relative widths of tergites 3 (side-piece), 4, 5 and 6 (side-piece), 8:27:29:11. Dorsal connexivum with finer setae-bristles than in *malayana* and *reduvioides*, laterally with fewer long bristles than short ordinary setae. Postgonite acuminate in dorsal view, almost parallel-sided and apically blunt in lateral view. *Length*: Head plus thorax 2.8 mm, wing 1.5 mm.

2. *Myophtiria* (*Myophtiria*) *lygaeoides* Rondani, 1878 (Fig. 3)

Myophtiria lygaeoides Rndn., 1878: 155 (unsexed, Amboina, no host record, lectotype ♂ in Genova Mus., lectoparatype ♀ in Firenze Mus.) — BEQ. 1953 (pt.): 268, 314, 316 (host relationships). — MAA 1963: 43, 172 (notes on type).

(?) *Myophtiria reduvioides*: BEQ. 1941 (pt.): 288 (Lombok, no host record).

Material studied. 1 ♂ 1 ♀. NEW GUINEA: 1 ♀, Japen Island, Dawai R., ex *Collocalia* sp. (*whiteheadi*?), 1.XI.1962, N. Wilson (BBM-NG 22110); 1 ♂, Morobe distr., Bulolo R., 800 m, ex swiftlet nest, 21.VIII.1963, H. Clissold (BBM-NG 28986).

Host. *Collocalia* sp. (*C. whiteheadi papuensis* Rand ?)

Distribution. Amboina; New Guinea (Japen Island, Bulolo R.); ?Lombok.

Affinities. *M. lygaeoides* is, as mentioned above, a close relative of *zeylanica* of Ceylon with which it shares the following characters in common: mediovertex slightly, but not markedly, longer than postvertex; anterior margin of mesobasisternum produced medially and sinuate submedially; vein R_{2+3} present, though weak and often inconspicuous; dorsal connexivum with fine setae-bristles. Chief differences between these 2 species are that *lygaeoides* is larger (as judging from head-width and wing-length) and has

proportionately shorter head, longer frons, wider interantennal area, more inwardly placed prothoracic spiracles, shorter hind femora, and acute-apexed postgonites in profile. In the 2 New Guinean specimens examined, vein M_{1+2} is represented by a short stub while M_{3+4} , by a long stub which is (except in the right wing of the ♀) appended by a short crossvein extending to the MCuA stem and enclosing a very small extra cell. These 2 specimens are, with some hesitation, referred to *lygaeoides* largely for geographic reasons. A direct comparison with the type may reveal some differences. The following description is based on the New Guinean material.

Description. *Head* $1.25 \times$ as long as wide (40×32); frons longer than vertex ($23:18$). Palpus subequal in length to antenna ($16:15$), in profile tapering apicad. Antennal appendage with moderately dense bristles. Frontal processes scarcely diverging anteriorly to each other, with length subequal to interdistance ($9:8$); interantennal area markedly wider than its distance to inner orbit ($10:5$); lunula 12×22 , with median pit situated near center, median section of anterior margin slightly convex. Vertex longer than lunula and interantennal area together ($18:14$); mediovertex $10 \times (7) 11$, weakly widened anteriorly; postvertex $8 \times (6) 8$, trapezoidal, with concave lateral margins and rounded anterior end. Gena slightly longer than width of eye ($12:10$), angulate anteroventrally, separated from inner orbit by a distinct fovea. Eye elliptical, 17×10 , about as wide as nearby inner orbit ($10:11$), with both anterior and posterior ends narrowly rounded. *Thorax* 0.59 as long as wide, $28 \times (38) 48$. Humeral calli with their outer margins scarcely diverging anteriorly to each other. Prothoracic spiracle relatively small, about $1.5 \times$ as wide as its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with convex anterior margin. Anepisternum (in dorsal view of thorax) slightly narrowed caudad. Mesobasisternum with anterior margin narrowly rounded and produced medially, distinctly sinuate submedially. Wing 42×23 ; vein R_{2+3} present but much weaker than neighboring veins, R_1 and R_{4+5} about $2/5$ as wide as their interspace and $2/3$ as wide as MCuA stem; radial cell long, longer than MCuA stem ($20:16$). Femur 3 about $6 \times$ as long as wide, slightly shorter than head and thorax together ($62:68$). ♀ *Abdomen*: Tergites 3 and 4 both undefinable; tergite 5 small, roundish; tergite 6 about $2/9$ as long as wide, not interrupted but narrowly continuous at middle; relative widths of tergites 5, 6 and 7 (side-piece), $6:26:6$. Dorsal connexivum laterally with fewer long bristles than short ordinary setae. Supra-anal plate bare, poorly definable. ♂ *Abdomen*: Tergite 3 undefinable, tergites 4 and 5 both triangular, tergite 5 about $1/4$ as long as wide; relative widths of tergites 4, 5 and 6 (side-piece), $22:34:13$. Dorsal connexivum with finer setae-bristles than in *malayana* and *reduvioides*, laterally with about 5, 8 and 2 long bristles near spiracles 3, 4 and 5, respectively, no bristles near spiracle 6. Postgonite acuminate in both dorsal and lateral views. *Length*: Head and thorax together ♀ 3.1 mm, ♂ 3.2 mm; wing $1.9-2$ mm.

3. *Myophthiria* (*Myophthiria*) *malayana* sp. nov. (Fig. 4)

Material studied. 1 ♂ 1 ♀. MALAYA: Holotype ♀, allotype ♂, Selangor, Fraser's Hill, 1400 m, ex *Collocalia esculenta*, 21.XI.1966, N. Ueshima. Type-series in Bishop Mus.

Host. *Collocalia esculenta cyanoptila* Oberholser which is known from Malaya, Sumatra, Borneo and adjacent islets, and is possibly not a true host.

Distribution. Malaya (Selangor).

Affinities. *M. malayana* is a member of the *reduvioides* subgroup. It shows some similarities to the 2 preceding species but apparently stands closest to *reduvioides* of Borneo and differs from the latter species chiefly in having a wider interantennal area. The most interesting character of the n. sp. is perhaps the proportionately short radial cell if that proves to be constant. In the type-series, vein M_{1+2} is represented by a short stub (which is scarcely definable in the left wing of the allotype), and M_{3+4} is entirely undefinable.

Description. *Head* $1.31 \times$ as long as wide (38×29); frons longer than vertex ($22:18$). Palpus subequal in length to antenna ($16:15$), in profile tapering apicad. Antennal appendage with moderately dense bristles. Frontal processes parallel to each other, length equal to interdistance ($8:8$); interantennal area distinctly wider than its distance to inner orbit ($8:5$); lunula 10×18 , with median pit situated near center, median section of anterior margin not protruding out. Vertex longer than lunula plus interantennal area ($18:13$); mediovertex $10 \times (7) 11$, distinctly widened anteriorly; postvertex $8 \times (5) 8$, triangular, with concave lateral margins and subacute anterior end. Gena about as long as width of eye ($9:10$), subangulate anteroventrally. Eye elliptical, 18×10 , as wide as nearby inner orbit ($10:10$), with both anterior and posterior ends rounded. *Thorax* 0.53 as long as wide, $26 \times (37) 49$. Humeral calli with their outer margins parallel to each other. Prothoracic spiracle relatively small, about $1.5 \times$ as wide as its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with anterior margin subangulate medially. Anepisternum (in dorsal view of thorax) not narrowed caudad. Mesobasisternum with anterior margin broadly rounded and produced medially, almost straight laterally, no distinct submedian situation. Wing 37×22 ; vein R_{2+3} undefinable, R_1 and R_{4+5} about $2/3$ as wide as their interspace and as MCuA stem; radial cell moderately short, as long as MCuA stem ($16:16$). Femur 3 about $6 \times$ as long as wide, subequal in length to head and thorax together ($62:64$). ♀ *Abdomen*: Tergite 3 undefinable; tergite 4 vestigial, bearing only 2 setae; tergite 5 about $1/3$ as long as wide; tergite 6 divided into 2 halves, each about $5/9$ as long as wide; tergite 7 also in 2 halves, each slightly shorter than wide; relative widths of tergites 4, 5, 6 (side-piece) and 7 (side-piece), $1:12:11:6$. Supra-anal plate small, roundish. Dorsal connexivum laterally with nearly equal numbers of long bristles and short ordinary setae. ♂ *Abdomen*: Tergite 3 much smaller than tergite 4, weakly sclerotized, irregularly shaped, widely separated into 2 halves; tergites 4 and 5 both arcuate and band-like, tergite 5 about $1/5$ as long as wide; relative widths of tergite 3 (side-piece), 4, 5 and 6 (side-piece), $7:21:25:10$. Dorsal connexivum with coarser setae-bristles than in *zeylanica* and *lygaeoides*, with more numerous short ordinary setae than long bristles. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax ♀ 3 mm, ♂ 2.7 mm; wing 1.5-1.6 mm.

4. *Myophtiria (Myophtiria) reduvioides* Rondani, 1875 (Fig. 7, 15)

Myophtiria reduvioides Rndn., 1875: 464, fig. (unnumbered) (unsexed, Borneo: Sarawak, no host record, lectotype ♂ in Genova Mus., lectoparatype ♂ in Firenze Mus.) — MEDWAY 1962a: 62, as *reduvioides* (Sarawak, ex *Collocalia maxima*). — MAA 1963: 61, 172 (notes on type).

Myiophthiria reduvioides: RNDN. 1878 (pt.): 154 (key, redescription). — SPEIS. 1904: 349 (notes on type). — BEQ. 1953 (pt.): 263, 268, 314, 316 (host relationships).

Material studied. BORNEO: 1 ♂ (BMNH), det. H. Oldroyd, Sarawak, Baram, Lobang Tukung, ex *Collocalia* sp., 12.V.1957.

Host. *Collocalia lowi lowi* (Sharpe) which is called *C. maxima maxima* (Hume) by some authors and is known to occur in Tenasserim, Malaya, Sumatra, Borneo and Palawan.

Distribution. Borneo (Sarawak).

Affinities. The name *M. reduvioides* has, in the past, been misapplied to several species reported from Lombok, Philippines, Queensland, New Hebrides and Fiji because these species all have a 2-branched radial vein, and because RONDANI'S (1875, 1878) descriptions of *reduvioides* deal only with the color pattern, venation, shape and relative length of the proboscis and palpi. As hereby understood, *reduvioides* stands slightly closer to *queenslandae* than to *malayana* but in certain respects, approaches *zeylanica* and *lygaeoides*. Characters common to *reduvioides* and *queenslandae* are the proportionately short frons, the narrow interantennal area, the long mediovertex (when compared with the postvertex), etc. Chief differences of these 2 species are given in the key, couplet 10. Both species are known only from the ♂. The discovery of the ♀ and an examination of the mesobasisternum and abdomen of *queenslandae* may reveal further differences. The redescription given below is based on the Baram specimen, in which the MCuA stem of both wings is appended with 2 closed cells (Fig. 15). Probably these cells are formed by stubs of veins M_{1+2} and M_{3+4} and their presence cannot be considered a constant character.

Description. *Head* $1.4 \times$ as long as wide (35×25); frons subequal in length to vertex (19:17). Palpus longer than antenna (16:13), in profile tapering apicad. Antennal appendage with moderately dense bristles. Frontal processes scarcely converging anteriorly to each other, with length exceeding interdistance (7:5); interantennal area about $1/3$ as long as wide, and as wide as its distance to inner orbit ($6:5\frac{1}{2}$); lunula 7×17 , with median pit situated at center, median section of anterior margin slightly produced. Vertex much longer than lunula plus interantennal area (19:11); mediovertex $11 \times (7) 10$, distinctly widened anteriorly; postvertex $6 \times (4) 7$, trapezoidal, with slightly concave lateral margins and broadly rounded anterior end. Gena about as long as width of eye (8:9), subangulate anteroventrally. Eye lanceolate, 18×9 , about as wide as nearby inner orbit (9:8), with acute posterior end and subacute anterior end. *Thorax* 0.59 as long as wide, $26 \times (34) 44$. Humeral calli with their outer margins slightly converging anteriorly to each other. Prothoracic spiracle relatively small, scarcely wider than its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with convex anterior margin. Anepisternum (in dorsal view of thorax) not narrowed caudad. Mesobasisternum with anterior margin broadly rounded and produced medially, almost straight laterally, no distinct submedian situation. Wing 38×22 ; vein R_{2+3} undefinable, R_1 and R_{4+5} about $2/3$ as wide as their interspace and as MCuA stem; radial cell long, longer than MCuA stem (21:16). Femur 3 about $6 \times$ as long as wide, and as long as head and thorax together (60:59). ♂ *Abdomen*: Tergite 3 similar in size and shape to tergite 4, both band-like; tergite 5 arcuate, also band-like, about $1/4$ as long as wide; relative widths of tergites 3, 4, 5 and 6 (side-piece), 15:16:23:10. Dorsal connexivum with coarser setae-bridles than in *zeylanica* and *lygaeoides*, laterally with fewer long bristles than short ordinary setae. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax 2.6 mm, wing 1.7 mm. ♀ unknown.

5. *Myophthiria* (*Myophthiria*) *queenslandae* sp. nov.

Myophthiria sp.: AUSTEN 1926: 360 (Queensland: Rockingham Bay, no host record).
Myophthiria reduvioides: BEQ. 1941 (pt.): 288 (Queensland: Rockingham Bay, no host record).

Material studied. QUEENSLAND: Holotype ♂, Rockingham Bay, H.M.S. Rattlesnake, J. Macgillivray (BMNH 50.95), det. J. Bequaert as *M. reduvioides*. Holotype glued on paper card, with right leg 2 and left legs 2-3 largely missing, in Brit. Mus. (Nat. Hist.) Obviously this is the same specimen mentioned by AUSTEN (1926) and BEQUAERT (1941).

Host. Unrecorded; probably either *Collocalia spodiopygia terraereginae* (Ramsay) or *C. vanikorensis yorki* Mathews. These 2 species are the only *Collocalia* so far known from Queensland. The occurrence of the unique type on a warship is very interesting.

Distribution. Queensland.

Affinities. As mentioned above, *M. queenslandae* is closely allied to *reduvioides* of Borneo. In addition to those given in the key, couplet 10, the following characters fit the n. sp. but not *reduvioides*: vertex only 1/4 longer than lunula plus interantennal area, eye ovoid and broader anteriorly than posteriorly, etc. The unique type is so dry, shrivelled and damaged that the relative measurements of the palpi and abdominal tergites and details of the mesobasisternum and abdominal chaetotaxy must be left out until fresh material can be available.

Description. *Head* 1.31 × as long as wide (34 × 26); frons subequal in length to vertex (18:16). Palpus in profile tapering apicad. Antennal appendage with moderately dense bristles. Frontal processes parallel to each other, with length exceeding interdistance (7:5½); interantennal area about 2/3 as long as wide, scarcely wider than its distance to inner orbit (6½:5½); lunula 8 × 17, with median pit situated at center, median section of anterior margin lobately produced. Vertex longer than lunula plus interantennal area (16:12); mediovortex 11 × (8) 12, weakly widened anteriorly; postvertex 5 × (4½) 7, trapezoidal, with straight lateral margins and truncate anterior end. Gena as long as width of eye (10:10), angulate anteroventrally. Eye ovoid, 18 × 10, scarcely wider than nearby inner orbit (10:8), posterior end narrowly rounded, narrower than anterior end. *Thorax* 0.58 as long as wide, 25 × (34) 43. Humeral calli with their outer margins slightly converging anteriorly to each other. Prothoracic spiracle relatively small, about 2 × as wide as its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with convex anterior margin. Anepisternum (in dorsal view of thorax) not narrowed caudad. Wing 37 × 19; vein R₂₊₃ undefinable, R₁ and R₄₊₅ about 2/3 as wide as their interspace and not markedly narrower than MCuA stem, M₁₊₂ undefinable, M₃₊₄ represented by a short stub; radial cell slightly longer than MCuA stem (16:13). Femur 3 about 6 × as long as wide, equal in length to head and thorax together (58:59). ♂ *Abdomen*: Tergite 3 about as short as tergite 4; tergite 5 large. Dorsal connexivum laterally with fewer long bristles than short ordinary setae. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax 2.8 mm, wing 1.7 mm. ♀ unknown.

6. *Myophtiria* (*Myophtiria*) *neohebudarum* sp. nov. (Fig. 6, 13)

Myophtiria reduvioides: FERR. 1927: 218, fig. 9, ♂♀ (descr., New Hebrides: Espiritu Santo, Hog Harbour, ex *Collocalia francica vanikorensis*).

Material studied. 1 ♂ 1 ♀. NEW HEBRIDES: Holotype ♀, Espiritu Santo, Hog Harbour, ex *Collocalia vanikorensis*, 28.VIII.1971, A.G. Marshall (# 101.01). Allotype ♂, same data but Louyenbra Cave nr Hog Harbour (# 102.01). Type-series in Bishop Mus.

Host. *Collocalia vanikorensis vanikorensis* (Quoy & Gaimard) which is found on the Solomon, Santa Cruz and New Hebrides Is.

Distribution. New Hebrides (Espiritu Santo).

Affinities. Obviously *M. neohebudarum* is a very close relative of *wilsoni* of E New Guinea. These 2 species jointly form the (1b) subgroup of the subgenus (see above) which can immediately be distinguished from other subgroups by the unusually large eyes and anteriorly sharply incised mesobasisternum. Chief differences between these 2 species are that in *neohebudarum* the mediovertex (versus postvertex) longer, the anteromedian incision of the mesobasisternum much shallower, and the radial cell narrower. The specific epithet *neohebudarum* is derived from Hebudae (or Ebudae), an ancient name for the Hebrides.

Description. *Head* $1.29 \times$ as long as wide (36×28); frons equal in length to vertex (19:18). Palpus slightly longer than antenna (16:14), in profile tapering apicad. Antennal appendage with moderately dense bristles. Frontal processes scarcely diverging anteriorly to each other, with length subequal to interdistance (8:7); interantennal area as wide as its distance to inner orbit; lunula 8×17 , with median pit situated near anterior margin, median section of anterior margin slightly convex. Vertex distinctly longer than lunula plus anterantennal area (18:12); mediovertex $11\frac{1}{2} \times (7) 10$, weakly widened anteriorly; postvertex $6\frac{1}{2} \times (5) 7$, trapezoidal, with slightly concave lateral margins and broadly rounded anterior end. Gena slightly shorter than width of eye (10:12), subangulate anteroventrally. Eye unusually large and prominent, about $1.6 \times$ as long as wide (19×12) and $1/2$ longer than nearby inner orbit (12:8), with anterior and posterior ends both rounded. *Thorax* 0.57 as long as wide, $27 \times (37) 47$. Humeral calli with their outer margins parallel to each other. Prothoracic spiracle relatively small, slightly narrower than its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with convex anterior margin. Anepisternum (in dorsal view of thorax) not narrowed caudad. Mesobasisternum with almost entirely straight anterior margin which is shallowly, sharply incised medially and moderately sinuate submedially. Wing 34×20 ; vein R_{2+3} undefinable, R_1 and R_{4+5} scarcely narrower than their interspace, not distinctly narrower than M_{CuA} stem, M_{1+2} undefinable, M_{3+4} represented by a short stub; radial cell longer than M_{CuA} stem (18:13). Femur 3 about $6 \times$ as long as wide, subequal in length to head and thorax together (61:63). ♀ *Abdomen*: Tergite 3 undefinable, tergites 4 and 5 small, tergite 6 narrowly interrupted at middle, side-piece of tergite 7 roundish and larger than tergite 4; relative widths of tergites 4, 5, 6 (side-piece) and 7 (side-piece), 3:11:14:4. Dorsal connexivum with about 7, 10 and 3 long bristles on each side near spiracles 3, 4 and 5, respectively, no bristles near spiracles 6 and 7. Supra-anal plate large, rectangular, transverse. ♂ *Abdomen*: Tergite 3 irregular in shape, slightly lengthened medially; tergites 4 and 5 band-like, latter slightly longer than former, slightly shortened laterally, and about $1/5$ as long as wide; relative widths of tergites 3, 4, 5 and 6 (side-piece), 11:19:29:13. Dorsal connexivum with about 7 and 10 long bristles on each side near spiracles 3 and 4, respectively, no bristles near spiracles 5-7. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax 2.9 mm, wing 1.6 mm.

7. *Myophthiria* (*Myophthiria*) *wilsoni* sp. nov. (Fig. 8, 14)

Material studied. 17 ♂♂ 20 ♀♀. NEW GUINEA: Holotype ♀, allotype ♂, Central distr., Javarere Caves, 250 m, nr Port Moresby, ex *Collocalia* sp., 3.XI.1968, N. Wilson (BBM-NG 60274). Paratypes, 2 ♂♂, same data as holotype but 31.X.1968

(BBM-NG 60238); 12 ♂♂ 17 ♀♀, same data as holotype; 2 ♂♂ 2 ♀♀, Morobe distr., Finschhafen subdistr., Gatop, 600 m, X.1960, B. McMillan. Holotype, allotype and most paratypes in Bishop Mus.; 1 pair of paratypes each in Brit. Mus. (Nat. Hist.), Genève Mus., U.S. Nat. Mus. and B. McMillan colln.

Host. *Collocalia* sp.; probably either *C. hirundinacea hirundinacea* Stresemann or *C. vanikorensis granti* Mayr which (plus *C. esculenta esculenta* L.) are the only swiftlets found on lowlands and hills in New Guinea.

Distribution. New Guinea (Central and Morobe districts), lowlands, up to 600 m.

Affinities. *M. wilsoni* is, as mentioned above, a distinct species closely related to *neohebudarum* of the New Hebrides. For similarities and dissimilarities of these 2 species, see discussions under *neohebudarum*. It would be interesting to find out whether the *Myophtiria* s. str. (when discovered) of the Bismarck Archipelago and Solomon Is. stand intermediate between *wilsoni* and *neohebudarum*, or closer to either.

The wing venation and abdominal tergites of the type-series (16 ♂♂ 19 ♀♀) of this n. sp. were examined to see their intraspecific variation and to evaluate their usefulness as specific characters. Both branches of vein M were found to be almost always undefinable, M_{3+4} was represented by a very short stub in 8 of the 70 wings examined (11.4%) — these 8 wings were of 4 ♂♂ 2 ♀♀; otherwise no other variations or abnormalities were noted. The 3rd tergite in ♂ was generally well defined (undefinable in 2 ♂♂) but irregularly shaped and weakly sclerotized; the same tergite in ♀ was more variable: undefinable in 6 ♀♀, vestigial (with only 1-4 setae) in 7 ♀♀, and moderately small but irregularly shaped and weakly sclerotized in 5 ♀♀. The 4th and 5th tergites in both sexes were always band-like, never triangular. The 6th tergite was narrowly continuous at middle in 4 ♂♂ 5 ♀♀, and was normal, obliquely elliptical and interrupted at middle in the remaining 12 ♂♂ 14 ♀♀ (74.3%). The 7th tergite in all except 2 ♀♀ (including the holotype) was vestigial and was represented by a pair of patches of 2-18 tiny, irregularly shaped, sclerotized bits which were more or less larger than ordinary basal papillae of setae and each bearing 1, occasionally 2, setae. The side-pieces of the 7th tergite in 2 exceptional ♀♀ were roundish, not quite symmetrical in size and shape, and were surrounded by several above-described, tiny sclerotized bits (similar bits were often also found around the vestigial 3rd tergite). Ranges (and averages, in parentheses) of widths, in micrometric units, of the 4th, 5th and 6th (side-piece) tergites in ♂ were 8-23 (17.7), 25-34 (30.1) and 10-13 (12.4), respectively; those in ♀ were 3-6 (4.8), 11-16 (13.4) and 12-15 (13.8), respectively. The above results suggest that at least in this species, the wing venation is not so variable as one would presume; the width or size of the 3rd tergite in both sexes, and that of the 4th and 5th tergites in ♂ are extremely variable; the relative widths of the remaining tergites are somewhat useful as a specific character; the general outline of the 4th and 5th tergites in ♂, whether band-like or triangular, is constant; the most variable tergites are those represented or accompanied by the above-described tiny sclerotized bits.

This species is named after Dr N. Wilson, now of the University of Northern Iowa, who collected the type-series of this remarkable louse-fly.

Description. *Head* $1.3 \times$ as long as wide (35×27); frons about as long as vertex ($19:17$). Palpus subequal in length to antenna ($16:15$), in profile tapering apical. Antennal appendage with moderately dense bristles. Frontal processes parallel to each other, with length slightly exceeding interdistance ($9:7$); interantennal area slightly wider than its distance to inner orbit ($7:5\frac{1}{2}$); lunula 8×18 , with median pit situated

near anterior margin, of which the median section is slightly convex. Vertex distinctly longer than lunula plus interantennal area (17:11); mediovertex $9 \times (9)12$, weakly widened anteriorly; postvertex $8 \times (6)7$, trapezoidal, with slightly concave lateral margins and broadly rounded anterior end. Gena distinctly shorter than width of eye (9:13), angulate anteroventrally. Eye unusually large and prominent, about $1.6 \times$ as long as wide (20×13), and $2 \times$ as wide as nearby inner orbit (13:6), with subacute anterior end and rounded posterior end. *Thorax* 0.56 as long as wide, $27 \times (37)48$. Humeral calli with their outer margins slightly converging anteriorly to each other. Prothoracic spiracle relatively small, about $1.5 \times$ as wide as its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with evenly convex anterior margin. Anepisternum (in dorsal view of thorax) not narrowed caudad. Mesobasisternum with anterior margin deeply, sharply incised medially (thus forming a pair of acute-apexed lobes) but scarcely sinuate submedially. Wing 38×21 ; vein R_{2+3} undefinable, R_1 and R_{4+5} about $1/2$ as wide as their interspace, not markedly narrower than MCuA stem; radial cell longer than MCuA stem (19:14). Femur 3 about $6 \times$ as long as wide, subequal in length to head and thorax together (64:62). ♀ *Abdomen*: Tergite 3 undefinable; tergites 4-6 normal in shape; tergite 7 almost always vestigial and represented by 2 patches of tiny sclerotized bits each bearing 1, occasionally 2, setae; relative widths of tergites 4, 5 and 6 (side-piece), 4.8:13.4:13.8 (average of 19 ♀♀). Dorsal connexivum laterally with more numerous long bristles than short ordinary setae. Supra-anal plate roundish, moderately large. ♂ *Abdomen*: Tergite 3 much smaller than tergite 4, often vestigial or even undefinable; tergites 4 and 5 both band-like and arcuate, latter tergite about $1/5$ as long as wide; relative widths of tergites 4, 5 and 6 (side-piece), 17.7:30.1:12.4 (average of 16 ♂♂). Dorsal connexivum with about 5 and 10 long bristles on each side near spiracles 3 and 4, respectively, no bristles near spiracles 5-7. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax 2.7-3 mm, wing 1.8-2 mm.

8. *Myophthiria* (*Myophthiria*) *javanica* sp. nov. (Fig. 2, 11)

Material studied. 3 ♂♂. JAVA: Holotype ♂, Ciampea (Tjiampea), 250 m, 27.III.1961. Paratypes, 1 ♂, same data as holotype; 1 ♂, det. F. van Emden as *M. reduvioides*, Tamuna Cave, 14.III.1934, H.W.S. Holotype in Bishop Mus., paratypes 1 each in Brit. Mus. (Nat. Hist.) and Mus. Zool. Bogoriense.

Host. Unrecorded; probably either *Collocalia fuciphaga* (Thunberg), or *C. salangana salangana* (Streubel), or *C. lowi lowi* (Sharpe) which, together with *C. esculenta linchi* Horsfield & Moore, have been recorded from the type-locality Ciampea by Medway (1962b).

Distribution. Java.

Affinities. *M. javanica* is exceedingly closely related to *fijiarum* of Fiji with which it shares the following characters: frontal processes subparallel to each other, median pit of lunula lying on anterior margin, interantennal area wider than its distance to inner orbit, vertex distinctly shorter than frons and about as long as lunula plus interantennal area, mediovertex about as long as postvertex and scarcely widened anteriorly, femur 3 distinctly shorter than head plus thorax. The distinction between these 2 species is so slight (cf. discussion under *fijiarum*) that it is difficult to explain why and how the ranges of them should be isolated and far apart. Cases similar to this are *M. zeylanica* (Ceylon) versus *lygaeoides* (Amboina, New Guinea), and *reduvioides* (Borneo) versus *queenslandae* (Queensland). Perhaps they are due to the convergence of the counterparts

in question, or to the disappearance of connecting links. Certainly this is a puzzling phenomenon.

Description. *Head* $1.41 \times$ as long as wide (38×27); frons much longer than vertex ($23:15$). Palpus in profile tapering apicad. Antennal appendage with moderately dense bristles. Frontal processes scarcely converging anteriorly to each other, with length much exceeding interdistance ($10:6\frac{1}{2}$); interantennal area distinctly wider than its distance to inner orbit ($8:5$); lunula large, $11\frac{1}{2} \times 19$, with median pit lying on anterior margin, median section of which not protruding out. Vertex as long as lunula plus interantennal area ($15:14$); mediovertex $6 \times (8) 10$, almost parallel-sided, scarcely widened anteriorly; postvertex $9 \times (8) 9$, trapezoidal, with strongly convex lateral margins and subacute anterior end. Gena scarcely longer than width of eye ($10:8$), confluent with neighboring inner orbit, with which together broadly rounded antero-ventrally. Eye lanceolate, 16×8 , as wide as nearby inner orbit ($8:8$), with both anterior and posterior ends narrowly rounded. *Thorax* 0.58 as long as wide, $26 \times (37) 45$. Humeral calli with their outer margins moderately diverging anteriorly to each other. Prothoracic spiracle relatively large, about $\frac{2}{3}$ as long as wide, and $3 \times$ as wide as its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with convex anterior margin. Anepisternum (in dorsal view of thorax) hardly narrowed caudad. Wing 39×26 ; vein R_{2+3} undefinable, R_1 and R_{4+5} about $\frac{1}{2}$ as wide as their interspace and as MCuA stem; radial cell longer than MCuA stem ($19:12$). Femur 3 about $6 \times$ as long as wide, markedly shorter than head and thorax together ($57:64$). ♂ *Abdomen*: Tergite 3 small, subtriangular; tergite 4 also subtriangular, about $\frac{1}{5}$ as long as wide, no bristles; tergite 5 band-like, gently arcuate, with 4 or 5 bristles on each side; tergite 6 divided into 2 halves, each about $\frac{1}{3}$ as long as wide, with 5 bristles and 3 rows of setae; relative widths of tergites 3, 4, 5 and 6 (side-piece), $11:27:33:10$. Dorsal connexivum laterally with much fewer long bristles than short ordinary setae. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax 2.9 mm, wing 1.8 mm. ♀ unknown.

9. *Myophtiria (Myophtiria) fijiarum* sp. nov. (Fig. 1, 10)

Myiophthiria reduvioides: RNDN. 1878 (pt.): 154 (Fiji: Viti Levu, ex *Collocalia vanikorensis* or *Emballonura fuliginosa* [*E. semicaudata*]). — BEZZI 1928: 285 (Fiji, no host record). — BAU 1929: 11 (ex *Collocalia vanikorensis*, no locality).

Myophtiria reduvioides: AUSTEN 1926: 560 (Fiji, ex *Collocalia francica assimilis*). — BEQ. 1941 (pt.): 288 (Fiji: Lau, Ongea, no host record).

Material studied. 3 ♂♂ 1 ♀. FIJI: Holotype ♀, allotype ♂, Viti Levu, Asinu Cave, 15 km N of Suva, ex *Collocalia spodiopygia assimilis*, 2.III.1963, C. M. Yoshimoto. Paratypes, 1 ♂, Viti Levu, Wailotua, Wailotua Cave, prob. ex *Collocalia* sp., 30.III.1977, P. Strinati & V. Aellen; 1 ♂, det. E. E. Austen 1926 as *M. reduvioides*, Viti Levu, cave nr Suva, ex martin, II.1884, C. M. Woodford. Holotype and allotype in Bishop Mus., paratypes 1 each in Brit. Mus. (Nat. Hist.) and Genève Mus.

Hosts. *Collocalia spodiopygia assimilis* Stresemann, *C. vanikorensis vanikorensis* (Quoy & Gaimard). RONDANI's (1878) record of *Emballonura* bat as a possible host was said to have been on the authority of von Röder's information. But in the catalogue of von Röder's Pupipara collection, BAU (1929) did not include such a host record. The ♂ labelled « ex martin » (see above) certainly is the one recorded by AUSTEN (1926).

It bears 2 labels, one in pencil (in Austen's handwriting), another in ink. Data on the 2 labels are identical except that the word *martin* on the pencilled label is enclosed by quotation marks. It is obvious that in AUSTEN's paper, the host was deliberately corrected from martin to *Collocalia*. Anyhow, true martin is unknown in the Fiji Is. and there is no reason to accept martin as a host of this Fijian fly.

Distribution. Fiji Is. (Viti Levu).

Affinities. *M. fjiarum* is a very close relative of *javanica* of Java which differs from the former species only in having the head longer, narrower in proportion, the gena and neighboring inner orbit broadly rounded anteriorly, the eye as wide as nearby inner orbit, the frontal processes closer to each other, the prothoracic spiracle slightly larger, and the MCuA stem thicker. In both wings of the holotype, there is a fairly large lanceolate cell enclosed by the MCuA stem and an arcuate loop which is formed jointly by stubs of veins M_{1+2} and M_{3+4} . And, in both wings of the paratype ex martin and the right wing of the allotype, this extra cell is much shortened and narrowed, and is enclosed by the MCuA stem and the stub of M_{3+4} , leaving the stub of M_{1+2} free-ended. In the left wing of the allotype, there is no extra cell, while stubs of both M_{1+2} and M_{3+4} are short and free-ended.

Description. *Head* $1.33 \times$ as long as wide (40×30); frons much longer than vertex ($24:16$). Palpus slightly shorter than antenna ($13:16$), in profile tapering apicad. Antennal appendage with moderately dense bristles. Frontal processes scarcely converging anteriorly to each other, with length slightly exceeding interdistance ($11:9$); interantennal area markedly wider than its distance to inner orbit ($9:6$); lunula 11×22 , with median pit lying on anterior margin, of which the median section does not protruding out. Vertex about as long as lunula plus interantennal area ($16:15$); mediovertex $7 \times (9) 11$, almost not widened anteriorly; postvertex $9 \times (8\frac{1}{2}) 9$, trapezoidal, with weakly convex lateral margins and broadly rounded anterior end. Gena nearly as long as width of eye ($10:9$), and, together with neighboring inner orbit, narrowly rounded anteriorly. Eye ovoid, 18×9 , narrower than nearby inner orbit ($9:12$), with subacute anterior end and narrowly rounded posterior end. *Thorax* 0.58 as long as wide, $28 \times (38) 48$. Humeral calli with their outer margins moderately diverging anteriorly to each other. Prothoracic spiracle relatively small, about $2 \times$ as wide as its distance to dorsolateral margin of humeral callus. Scutellum normal in shape, with convex anterior margin (subangulate at middle in the paratype ex "martin"). Anepisternum (in dorsal view of thorax) hardly narrowed caudad. Mesobasisternum with anterior margin distinctly lobate medially and distinctly sinuate submedially. Wing 38×25 ; vein R_{2+3} undefinable, R_1 and R_{4+5} scarcely narrower their interspace and about as wide as MCuA stem; radial cell longer than MCuA stem ($18:14$). Femur 3 about $6 \times$ as long as wide, markedly shorter than head and thorax together ($57:68$). ♀ *Abdomen*: Tergite 3 undefinable; tergite 4 vestigial, bearing 3 or 4 setae; tergite 5 small, roundish; tergite 6 narrowly interrupted medially; side-piece of tergite 7 roundish; relative widths of tergites 4, 5, 6 (side-piece) and 7 (side-piece), $3:8:12:4$. Dorsal connexivum laterally with nearly equal numbers of long bristles and short ordinary setae. Supra-anal plate small, roundish. ♂ *Abdomen*: Tergite 3 vestigial, irregular in shape; tergite 4 arcuate, band-like; tergite 5 triangular, about $2/7$ as long as wide; tergite 6 normal; relative widths of tergites 3, 4, 5 and 6 (side-piece), $8:15:23:9$. Dorsal connexivum with about 4, 7 and 1 long bristles on each side near spiracles 3, 4 and 5, respectively. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax 3.1 mm, wing 1.8 mm.

10. *Myophthiria (Myophthiria) capsoides* Rondani, 1878

Myiophthiria capsoides Rndn., 1878: 154 (unsexed, "Philippines", no host record, lectotype ♀ and 3 lectoparatypes in Firenze Mus., 1 lectoparatype in Berlin Mus.) — MAA 1963: 24, 172 (notes on type).

Myiophthiria reduvioides: BEZZI 1913: 311 ("Philippines", no host record, *capsoides* listed as syn.) — FERR. 1925: 337, fig. 5, ♀ (descr., Samar: Wright, Loquicolon, ex *Collocalia troglodytes*); 1930: 550, fig. 7, ♂♀ (descr., Luzon: Rizal Prov., Novaliches, ex *Geopelia striata*; Tablas: Badajos, no host record). — BEQ. 1954 (pt.): 173 (*capsoides* listed as syn.).

Myophthiria reduvioides: BEQ. 1941 (pt.): 288 (*capsoides* listed as syn.).

Brachypteromyia nakamurai Kishida, 1932: 248, fig. 481, ♀ (not indicated sp. n., ex "tsubame", no locality, type obviously lost). — BEQ. 1953: 268, 275 (type-locality & identity questioned). — MAA 1962: 591 (orig. descr. translated into English, type locality & identity suggested). **Syn. nov.**

Material studied. None was at hand during the course of the preparation of this paper. In 1962 I briefly examined the type-series in the Firenze Mus., 1 "cotype" ♀ in the Brit. Mus. (Nat. Hist.), 1 ♀ (det. Bezzi as *reduvioides*) in Milano Mus. and 1 ♀ (det. Ferris as *reduvioides*) in the Stanford Univ. And in 1964 I undertook a special search in Tokyo but failed to locate the type of *nakamurai*.

Hosts. *Collocalia troglodytes* Gray. The occurrence of this species on a pigeon, *Geopelia striata* (L.), as recorded by FERRIS (1930) certainly is accidental and needs no more comments. The record of "tsubame" as the type-host of "*Brachypteromyia nakamurai*" should be examined more closely. The Japanese term *tsubame*, in a strict sense, applies to Hirundinidae: *Hirundo rustica gutturalis* (Scopoli) which is the most common swallow in Japan. In a broad sense, the same term is a collective name for all swallows (Hirundinidae) and swifts (Apodidae) occurring in Japan, e.g., *iwa-tsubame* applies to *Delichon* or house martins; *shodo-tsubame*, to *Riparia* or sand martins; *ama-tsubame*, to *Apus* or swifts; *Ryukyu-tsubame*, to *Hirundo tahitica namiyei* Stejneger. It is now quite clear that *nakamurai* is nothing but a synonym of *Myophthiria capsoides* of the Philippines (see below). Therefore the so-called *tsubame* of KISHIDA (1932) must be an undetermined *Collocalia* species, and not what was interpreted by BEQUAERT (1941) as *Hirundo rustica gutturalis*.

Distribution. Philippines (Luzon, Tablas, Samar).

Synonymy. "*Brachypteromyia*" *nakamurai* was originally, briefly described in Japanese in an iconography of Japanese insects, without indicating its type-locality, its precise host, and its being a n. sp. These make the identity of the species obscure and perplexing. BEQUAERT (1953) first discussed it but failed to reach any conclusion. Then MAA (1962), while translating the description into English, suggested that *nakamurai* might be a synonym of *M. "reduvioides"*, and might be of Philippine origin. While the type-specimen(s) is no more in existence, there leaves the only clue with KISHIDA's (1932) description and drawing. A closer re-examination of them revealed that they closely fit FERRIS' (1925) of "*reduvioides*" (i.e. *capsoides*). This is particularly true in the number and relative size of the ♀ abdominal tergites which are comparable only with those of *neocaledonica*. But the eyes in KISHIDA's drawing are so large that *nakamurai* can never be mistaken for that New Caledonian fly. Incidentally, the type-specimen(s) of *nakamurai* was said to have been collected by a Yukio Nakamura. Upon my enquiry into the fact

whether Yukio Nakamura has ever collected avian ectoparasites in the Philippines or other Pacific islands, Dr Rukuro Kano of Tokyo very kindly replied (19.II.1976): "I was surprised that your guess came true. I asked Dr Tsukasa Nakamura (Associate Professor, Yamanashi Univ.) about his father Yukio Nakamura and was informed that the father (died in 1974 at the age of 84) was former Biologist, Birds and Mammals Division, Forestry Dept., Yamanashi Prefectural Government, has been in the Philippines in 1928 and 1930 collecting birds and mammals, and has brought back many ectoparasite specimens which were sent to Dr Kishida ..." From Kishida's paper and the information quoted above, it appears well justifiable to sink *nakamurai* as a synonym of *capsoides*, **Syn. nov.**

Affinities. Since first published in 1878, *M. capsoides* has never been accepted as a valid species by any of later authors. In fact it is isolated and very distinctive, and is the sole representative of the (1d) subgroup. It can immediately be distinguished from all other members of the subgenus by the very small postvertex, very long mediovertex and much reduced ♀ abdominal tergites. However, the strong emphasis of the unusually long palpi in the original description is an exaggeration. By omitting passages on color patterns, RONDANI's (1878) description may be quoted as follows. "Corpus... Proboscis basi crassa... in haustellum filiforme elongata. Palpi elongati, subincurvi et paulo compressi, antennis duplo circiter longiores. Alae... venis crassis... longitudinalibus sub costalem duabus, posteriore tota usque ad apicem simplicem. Pedes..." As shown in the key, couplet 3, the most important characters of *capsoides* are that the lunula is almost as long as vertex, the postvertex is much shorter than the mediovertex, the ♀ tergites 3, 4 and 7 are all undefinable while tergite 5 is vestigial or undefinable (tergite 6 is normal). The variation of the wing shape and venation has been illustrated by FERRIS (1930). Of the "cotype" ♀ in the Brit. Mus. (Nat. Hist.), the head is about 0.56 as wide as the thorax, the palpus about as long as the antenna, the eye about $2 \times$ as long as wide, the mediovertex $1.4 \times$ as long as the postvertex, the wing 1.5 mm long, with veins M_{1+2} and M_{3+4} each represented by a short stub. In FERRIS' (1925) drawing of a ♀ from Samar, the mediovertex is, perhaps due to technical discrepancy or individual variation, more than $3 \times$ as long as the postvertex.

11. *Myophthiria* (*Myophthiria*) *neocaledonica* sp. nov. (Fig. 5, 12)

Material studied. 4 ♂♂ 3 ♀♀. NEW CALEDONIA: Holotype ♀, Nouméa, 15 km N, deserted highway tunnel, ex *Collocalia* sp., 3.III.1968, J. L. Gressitt & T. C. Maa. Allotype ♂, Koumac, Koumac Caves, ex *C. spodiopygia leucopygia*, 4.IV.1977, P. Strinati & V. Aellen. Paratypes, 1 ♀, same data as holotype; 1 ♂ 1 ♀, same data as allotype; 1 ♂, also same data as allotype but no host record, 4.VIII.1978, S. & J. Peck; 1 ♂, Hienghène, Taphozous Cave, prob. ex *Collocalia* sp., 3.VII.1978, Peck. Holotype and 2 paratypes in Bishop Mus., allotype and 1 paratype in Genève Mus., 2 paratypes in Canadian National Collection, Ottawa.

Host. *Collocalia spodiopygia leucopygia* Wallace.

Distribution. New Caledonia.

Affinities. *M. neocaledonica* is an isolated species and is the sole representative of the (2) group. Characters unique within the subgenus are that the frontal processes are strongly diverging and entirely overlapped by the antennal appendages, the genae exceedingly long, the eyes unusually small and narrow, the femora very slender, and the scutoscutellar suture is nearly obsolete and virtually straight. Other less important

characters are the almost parallel-sided palpi in profile, the very dense bristles on the antennal appendages (and on the abdomen), the angulate genae, the much thickened wing veins, the \wedge -shaped 5th tergite in ♂ and so on. In the number of definable tergites in ♀, *neocaledonica* simulates *capsoides*; in the position of the median pit of the lunula and the relative length of hind femora, it simulates *fjiarum*, *javanica* and *neohebudarum*; and in the degeneration of the scutoscutellar suture and the thickening and crowding-together of R-branches and the reduction of tergites in both sexes, it approaches the subgenus *Brachypteromyia* of the New World. This remarkable n. sp. is so highly specialized that it must be placed at the top of *Myophtiria* s. str. and immediately next to *Brachypteromyia*. Because of the extraordinary thickness and relative position, the posterior branch of vein R in this species may perhaps be interpreted as R_s , instead of R_{4+5} as found in other members of *Myophtiria* s. str.

Description. *Head* $1.36 \times$ as long as wide (42×31); frons and vertex subequal in length (21:23). Palpus as long as antenna (17:17), in profile almost parallel-sided. Antennal appendage with very dense bristles. Frontal processes strongly diverging anteriorly to each other, entirely overlapped by antennal appendages, and with length much exceeding interdistance (9:6); interantennal area slightly narrower than its distance to inner orbit (6:7); lunula 10×20 , with median pit lying on anterior margin, of which the median section is lobate and slightly produced. Vertex distinctly longer than lunula plus interantennal area (23:15); mediovertex $12 \times (9) 14$, distinctly widened anteriorly; postvertex $11 \times (6\frac{1}{2}) 10$, trapezoidal, with straight lateral margins and blunt anterior end. Gena unusually long, $2.5 \times$ as long as width of eye (15:6), distinctly angulate anteroventrally. Eye lanceolate, exceedingly small and narrow, practically invisible in dorsal (frontal) view of head, $2.5 \times$ as long as wide, slightly wider anteriorly, length equal to that of gena (15:15), width only as much as $1/3$ that of nearby inner orbit (6:18), with rounded anterior end and acute posterior end. *Thorax* 0.67 as long as wide, $34 \times (39) 50$. Humeral calli with their outer margins distinctly diverging anteriorly to each other. Prothoracic spiracle relatively small, about $2 \times$ as wide as its distance to dorsolateral margin of humeral callus. Scutellum unusually short, scutoscutellar suture faintly indicated and virtually straight. Anepisternum (in dorsal view of thorax) scarcely narrowed caudad. Mesobasisternum with anterior margin angulately produced medially, very little slanting laterally, not sinuate submedially. Wing 31×16 , veins unusually thickened, R_{2+3} undefinable, R_1 and R_{4+5} about $3 \times$ as wide as their interspace, M_{1+2} and M_{3+4} represented by a fairly long and a short stub, respectively, MCuA stem about $2 \times$ as wide as R_1 ; radial cell exceedingly short, shorter than MCuA stem (10:14). Femur 3 very slender, only about $4.5 \times$ as long as wide, markedly shorter than head and thorax together (62:76). ♀ *Abdomen* with longer, denser bristles and setae than in other members of the subgenus; tergites 3-5 and 7 all undefinable, tergite 6 represented by a pair of transversely linear sclerites each bearing 4-7 setae in 1 or 2 transverse series. Dorsal connexivum laterally with more numerous long bristles than short ordinary setae. Supra-anal plate exceedingly small, roundish, bearing 2-4 setae. ♂ *Abdomen*: Tergites 3 and 4 both undefinable; tergite 5 ribbon-like, \wedge -shaped; tergite 6 also ribbon-like, widely divided into 2 halves, each only about $1/3$ as wide as tergite 5; tergites 5 and 6 each bearing 2 rows of short setae, no long bristles. Bristles on lateral areas of dorsal connexivum inconspicuous, slightly longer than and nearly as fine as neighboring ordinary setae. Postgonite acuminate in both dorsal and lateral views. *Length*: Head plus thorax 3.3 mm, wing 1.4 mm.

Subgenus **Brachypteromyia** Williston, 1896

Brachypteromyia Wlltn., 1896: 184, type-species: *Brachypteromyia femorata* Wlltn. [= *Anapera fimbriata* Waterh.], monotypic. Variants of spelling: *Brachyptomyia*, *Brachypteromia*, *Brachypteromya*.

Hosts. Swifts of the genus *Aeronautes* and possibly the genus *Cypseloides* too. The association of *Brachypteromyia*, as recorded, with swallows of the genus *Tachycineta* Cabanis, 1851 (Hirundinidae) is accidental and most probably is because the nesting sites of the involved swift and swallow happened to be close to each other.

Distribution. Nearctic Region (Rocky Mountains Subregion); Neotropical Region (Brazilian Subregion). At present known to occur only in the U.S.A. and Venezuela; expected to be found in other parts of the Neotropical Region where *Aeronautes* swifts occur.

Systematics. *Brachypteromyia* apparently is more specialized than *Myophthiria* s. str. and differs from the latter subgenus in the following points: head widest at level of eyes; palpus markedly shorter than antenna; frontal process relatively short; inter-antennal area either slightly narrower or markedly wider than its distance to inner orbit; median notal and transverse mesonotal sutures either entirely obsolete or partly developed; prothoracic spiracle large or very large; wing-pad 1/5 to 1/2 longer than wide, vein R either branched or simple; legs more robust, femur 3 about 3.3-4.3 × as long as wide; abdominal dorsum at most with 1 pair of very small preapical sclerites (representing tergite 6); supra-anal plate in ♀ undefinable; body and legs densely hirsute, 2 to 7 pairs of vertical bristles. The 2 known species of *Brachypteromyia* are strongly differentiated and can readily be recognized from each other while the 11 species of *Myophthiria* s. str. are closely related to one another and are very difficult to distinguish. Most probably the contrast between these 2 subgenera reflects relative interspecific affinities of their respective host birds: the 2 species of *Aeronautes*, hosts of *Brachypteromyia*, are very distinctive, but the 15 ± species of *Collocalia*, hosts of *Myophthiria* s. str., are, as pointed out above, scarcely separable.

Brachypteromyia has long been regarded an independent genus. KISHIDA (1932) accepted it as the generic name for his *nakamurai* from the Philippines, FERRIS (1928) sank it as a synonym of *Myophthiria* while BEQUAERT (1954) degraded it as a subgenus. For convenience, I am following BEQUAERT's view.

12. **Myophthiria (Brachypteromyia) fimbriata** (Waterhouse, 1887)

Anapera fimbriata Waterh., 1887: 164, fig. (unnumbered) (unsexed, New Mexico: McKinley Co., Fort Wingate, ex *Cypselus melanoleucus* [= *Aeronautes s. saxatilis*], type ♀ in Brit. Mus. (Nat. Hist.)) — MAA 1963: 32 (notes on type).

Brachypteromyia fimbriata: AUSTEN 1926: 359 (notes on type).

Myiophthiria fimbriata: FERR. 1928: 140, fig. 1-2, ♂♀ (descr., Arizona: Tuba, ex *Aeronautes melanoleucus*).

Myiophthiria (Brachypteromyia) fimbriata: BEQ. 1954: 174, fig. 35 (A-F), ♂♀ (ref., records, bionomics, affinities, quotation of orig. descr.).

Brachypteromyia femorata Wlltn., 1896: 185, ♂ ("Wyoming", ex *Aeronautes s. saxatilis*, type apparently lost).

For more references, see BEQUAERT (1954).

Hosts. *Aeronautes saxatilis saxatilis* (Woodhouse), 5 verified records; *Cypseloides niger borealis* (Kennerly), 1 record; *Tachycineta thalassina lepida* Mearns, 1 record. These 3 species of birds were all listed as breeding hosts by BEQUAERT (1954). Most probably *Aeronautes* is the only true breeding host while *Tachycineta* (Hirundinidae) is an accidental one.

Distribution. Arizona, Colorado, Nebraska, New Mexico, Utah, Wyoming, all in the Rocky Mountains Subregion in the U.S.A.

Affinities. Apparently *M. fimbriata* is more generalized than *neotropica* and has closer affinities to members of *Myophthiria* s. str. than does the latter species. BEQUAERT (1954) provided a long list of characters for the separation of the 2 New World species. The list may be revised as follows (for comparison, corresponding characters of *neotropica* are given in parentheses).

Head about $1.5 \times (1.25 \times)$ as long as wide; palpus relatively longer; frontal processes relatively longer and slightly converging anteriorly (parallel) to each other; antennal appendage longer, narrower, about $2.5 \times (2 \times)$ as long as wide, blunt (broadly rounded) at apex; interantennal area distinctly wider than (about as wide as) its distance to inner orbit; lunula relatively larger; mediovertex slightly narrower than (about as wide as) inner orbit, more distinctly longer than postvertex; postvertex shorter, wider; gena much longer; inner orbit slightly wider; orbital bristles less numerous and spreading over a smaller area. *Thorax* longer in proportion; median notal and transverse mesonotal sutures both entirely obsolete (partly definable); humeral callus triangular, narrowed anteriorly to a blunt point (wide throughout, lobate, broadly rounded anteriorly); prothoracic spiracle relatively smaller; scutoscutellar suture distinctly arched (almost straight); scutellum longer, weakly convex (truncate) posteriorly; pleurotergal protuberance weaker, barely definable; wing about $1.5 \times$ as long as (scarcely longer than) wide, with slightly more complete venation, costa partly free from (entirely fused with) R-stem; legs less robust. ♂ *Abdomen* with (without) a pair of very small preapical sclerites which represent tergite 6. *Length* much smaller, head plus thorax at most 3.5 mm (at least 5.5 mm).

Of the 13 ♀♀ (California Acad. Sciences) from New Mexico: Navaho, the vertical bristles were counted and found to be ranging from 2 to 5 pairs, average 3.7 pairs.

13. *Myophthiria* (*Brachypteromyia*) *neotropica* (Bequaert, 1943)

Brachypteromyia neotropica Beq., 1943: 113, fig. 1, ♂ (Venezuela: Distr. Fed., Galipán, 2000 m, ex *Aeronautes m. montivagus*, type in Harvard Univ.).

Myiophthiria (*Brachypteromyia*) *neotropica*: BEQ. 1954: 178, fig. 35 (G), 36, ♂ (ref., records, revision of orig. descr.). — PARSONS & COLLINS 1975: 216 (records, descr. of ♀).

For more references, see BEQUAERT (1954).

Host. *Aeronautes montivagus montivagus* (D'Orbigny & Lafresnaye).

Distribution. Venezuela (Distrito Federal, Aragua State).

Affinities. *M. neotropica* obviously is the most highly specialized species of the entire genus. Its lobate, apically broadly rounded humeral calli, unusually large prothoracic spiracles, markedly short scutellum, subcircular wing-pads, strongly modified venation, very stout legs and entirely undefinable tergites are incomparable with those of any of the congeners. Only 2 ♂♂ 1 ♀ have ever been discovered. For the differences from *fimbriata*, see discussions under that species.



FIG. 1-9.

Myophtiria (*Myophtiria*) spp., heads, dorsal view, in same magnification: (1) *fjiarum* ♀; (2) *javanica* ♂, paratype; (3) *lygaeoides* ♀, Japen Island; (4) *malayana* ♀; (5) *neocaledonica* ♀, right antennal appendage detached; (6) *neohebudarum* ♀; (7) *reduvioides* ♂, Baram; (8) *wilsoni* ♀; (9) *zeylanica* ♂. Unless otherwise stated, all are taken from holotypes.

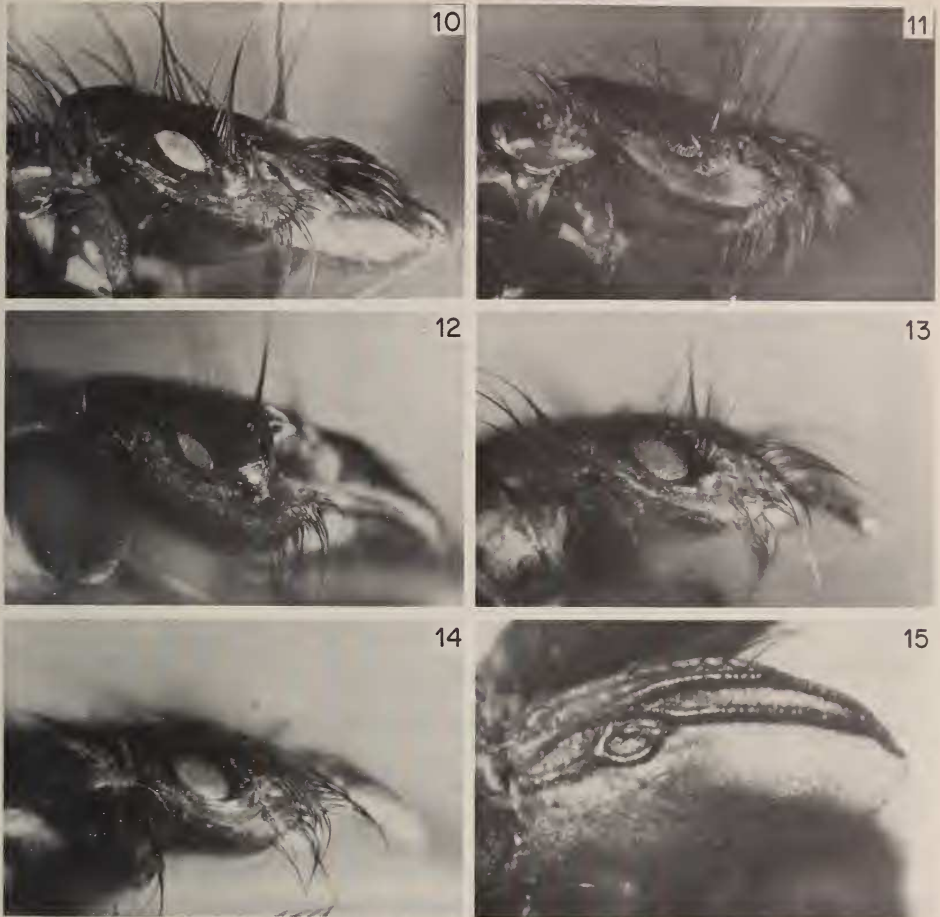


FIG. 10-14.

Myophthiria (Myophthiria) spp., head, lateral view, in same magnification: (10) *fijiarum* ♀, holotype; (11) *javanica* ♂, paratype; (12) *neocaledonica* ♀, holotype, right antennal appendage detached; (13) *neohebudarum* ♀, holotype; (14) *wilsoni* ♀, holotype. Fig. 15. *M. (M.) reduvioides* ♂, Baram, right wing, showing the extra cell near the base.

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HOST — PARASITE LIST *

<i>Collocalia</i> Gray	<i>Myophthiria</i> Rndn., s. str.
<i>brevirostris</i> (McClelland)	<i>zeylanica</i> sp. n.
<i>esculenta</i> (L.)	<i>malayana</i> sp. n.
<i>fuciphaga</i> (Thng.)	<i>zeylanica</i> sp. n.
<i>lowi</i> (Sharpe)	<i>reduvioides</i> Rndn.
<i>spodiopygia</i> (Peale)	<i>fijiarum</i> , <i>neocaledonica</i> spp. n.
<i>troglydites</i> Gray	<i>capsoides</i> Rndn.
<i>vanikorensis</i> (Quoy & Gaim.)	<i>fijiarum</i> , <i>neohebudarum</i> spp. n.
<i>whiteheadi</i> Ogilvie-Grant (?)	<i>lygaeoides</i> Rndn.
sp. (Java)	<i>javanica</i> sp. n.
sp. (New Guinea)	<i>wilsoni</i> sp. n.
sp. (Queensland)	<i>queenslandae</i> sp. n.
<i>Cypseloides</i> Streubel	<i>Brachypteromyia</i> Willtn.
<i>niger</i> (Gmelin)	<i>fimbriata</i> (Waterh.)
<i>Aeronautes</i> Hartert	<i>Brachypteromyia</i> Willtn.
<i>montivagus</i> (d'Orb. & Lafr.)	<i>neotropica</i> (Beq.)
<i>saxatilis</i> (Woodh.)	<i>fimbriata</i> (Waterh.)

* Recorded hosts other than Apodidae are omitted in the list. Cf. remarks under *M. fijiarum*, *capsoides* and *fimbriata*.

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