

NOTES ON THE HIPPOBOSCIDAE (Diptera), 1<sup>1</sup>

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The nomenclature and systematics of the Hippoboscidae have made much progress in this century, chiefly by work of P. Speiser (1899a-1915), G. F. Ferris (1923-1930c) and J. C. Bequaert (1926a-1957). Bequaert, during his approximately 30 years of active study, published monographs of the subfamilies Hippoboscinae (1931, 1939b, 1941a) and Melophaginae (1942a) and New World forms of all subfamilies (1954, 1955, 1957). He also gave a comprehensive digest of the literature on the structure, physiology, natural history, distribution and evolution (1953, 1954), appended with an extensive bibliography. However, there remains much to be done with this family. Four of the six subfamilies, particularly the Old World Ornithomyiinae (which embodies about two-thirds of the species of the whole family), need to be thoroughly reviewed. There exists no world list of genera and species since 1817 (Speiser's 1908c list was incomplete and gave no synonyms), a large proportion of type specimens of earlier authors have not yet been critically re-examined, and the status of many old names has to be ascertained. While chances of discovering new forms are slim, there is much need of reducing the published names and of putting the interpretation of known forms on a more sound basis.

The following nomenclatural and systematic notes are the result of a review of the literature and examination of available material. For brevity, the references are not cited in full, but they can be traced in the bibliography by Bequaert (1953, Ent. Amer. n. ser. 33: 362-421; 1957, *ibid.* 36: 563-73). Certain points here discussed are inconclusive and are published to call them to the attention of fellow workers.

## A. SOME NEGLECTED GENERIC AND SPECIFIC NAMES

The following 2 generic names were not included in Neave's Nomenclator Zoologicus, vols. 1-5 (1939-50):

*Myiocoryza* Rondani 1878: 464. Name proposed conditionally for his new species *Myiophthiria lygaeoides*, not clearly marked.

*Zoomyia* Bigot 1885: 227, 234. Published as a substitute for *Hippobosca* Linn. 1758.

The following 20 species- and variety-names were not included in the Zoological Record, vol. 1 (for 1864) to date:

*Hippobosca bubonis* Packard 1869: 417. Published as a footnote in a general textbook.

*Lipoptena capreoli* Rondani 1878: 152.

1. Partial results of the project "South Pacific insects of public health importance", supported at Bishop Museum by the National Institutes of Health, Bethesda, Md., U.S.A.

*Melophagus rupicaprinus* Rondani 1879: 12.

*Lipoptena alcis* Schnabl 1881: 390. Name listed in the Zool. Rec. vol. 19 (for 1882) but not indicated as n. sp.

*Ornithomyia geniculata* Bigot 1892: 49. Published in an odd journal.

*Hippobosca aegyptiaca* var. *bengalensis* Ormerod 1895: 82. Name proposed tentatively, not clearly marked.

*Ornithomyia pyrrocephala* Speiser 1904a: 344. Based on Rondani's manuscript name.

*Stenopteryx hirundinis* var. *nigriventris* Strobl 1906: 415.

*Melophagus ovinus* var. *fera* Speiser 1908c: 444. Published in a paper on distribution and phylogeny, not clearly marked.

*Stilbometopa columbarum* Lutz *et al.* 1915: 178. Name proposed tentatively, not clearly marked.

*Austrolfersia ferrisi* Bequaert 1953: 284. Published in a paper on distribution. The genus was also overlooked by the Zool. Rec. to date.

*Brachypteromyia nakamurai*, *Lynchia nipponica*, *Ornithoica annalis* (sic), *O. diomedae*, *O. distincta*, *O. kibatiki*, *O. momiyamai*, *O. nipponensis*, *Ornithomyia tropica* Kishida 1932: 244-248. Published in Japanese, without indication as n. spp.

#### B. THE ORTHOGRAPHY VS TYPOGRAPHY OF CERTAIN NAMES

The generic names *Ornithomya* Latr. (1802: 466) and *Myophthiria* Rondani (1875: 464) were emended, by adding the letter "i" after "y", by their respective authors soon after first published. Both the original and emended forms were used by later workers. Since *mya* is merely the Attic form of *myia* (a fly), the emendations seem unnecessary and confusing (*cf.* Intern. Comm. Zool. Nomen. (1957) Opinion 442 on the genus *Stratiomys* Geoff. 1762).

The name *Lipoptena* Nitzsch (1818: 310) is apparently derived from *leipo* (to abandon, to cast away) and *ptenos* (winged). Later emendations *Lipoptera* by Macquart (1843: 437) and *Leptotaena* by E. Blanchard (1840: 631) are unnecessary in orthography. The emended name *Crataerhina* or *Crataerrhina* by Speiser (1900: 555) for *Crataerina* von Olfers (1816: 101) is also unnecessary (see Austen 1926: 351, Falcoz 1929: 52).

On the other hand, the names *Alcephagus* Gimmerthal (1845: 152), *Ornithoica* Rondani (1878: 159), *Stenopteryx* Leach (1817a: 16; 1817b: 162) and the like are clearly and understandably incorrect in orthography. However, under provisions of the London Code (Intern. Code Zool. Nomen. adopted by the XV Intern. Congr. Zool. at London July 1958), articles 19, 32 and 33, they fall into the category "incorrect transliteration" or "improper latinization" and therefore must stand as in their original spellings. Their emendation *Alcophagus* Scudder (1882: 12), *Ornithoeca* Kirby (IN Zool. Rec. 15 [for 1878]: 245. 1879) and *Stenopteryx* Meigen (1830: 233), although being more correct in orthography and having status in nomenclature, have to be considered as "unjustified."

T. Say, in the early 19th century, described 1 hippoboscid and 11 other American insects under the specific name "*confluenta*" (see Sherborn's Index Animalum for 1801-1850), assumed to be a latinized form of the word "confluent," but apparently not classic Latin. This is another case of improper latinization.

The names *aegyptiaca* Macquart (1843: 431) and *pauciseta* Edwards (1919: 55), having "page priority" over *aegyptiaca* (and *oegyptiaca*) and *pauciseta* respectively in their ori-

ginal descriptions, are apparently inadvertent typographic errors. The most serious and confusing mis-spellings in hippoboscid names are *Anthoica* Coquillett (1899: 335, for *Ornithoica* Rndn. 1878, not *Anthoica* Rndn. 1861 which does not belong to Hippoboscidae) and *Ceronia* E. Blanchard (1840: 631, for *Feronia* Lch., not *Ceronia* Gray 1853 in Mollusca). The list of other mis-spellings is very long, for instance, *Leptoptena*, *Leptotaenia*, *Leptotena*, *Lioptera*, *Lipolepha*, *Lipoptema*, *Lipotena*, *Lipotenus*, *Lipopterna*, *Lipotepna*, *Lipotina*, *Liptotena* and *Lypoptena* were all for *Lipoptena*.

The names *Pseudolfersia* Coquillett (1899: 336), *Ortholfersia* Speiser (1902b: 152) and *Austrolfersia* Bequaert (1953: 284) are evidently derived partly from the name of a person, J. M. F. von Olfers. Not only is the formation of such compound words an objectionable practice (London Code, App. D, 13, 15) but also these names are somewhat misleading. The last 2 genera have no true affinities with *Olfersia*. *Austrolfersia* (see under Sect. G below) is more northerly in distribution than its closest relative *Ortholfersia* and is probably not restricted to Australia (*auster*, south or *australis*, southern, Australian, forms a part of the compound *Austrolfersia*).

#### C. THE DATING OF CERTAIN PUBLICATIONS

The Soc. Imp. Nat. Moscou, Bull. vol. 32, part 2 containing the original description of *Hippobosca oculata* Motschulsky (on p. 504), was published 22 Feb. 1860 (not in 1859 as generally cited). This was clearly indicated on the inner side of the title page of this particular part, although on the outer side of the same, it was given as 1859. Vol. 20, part 3 of the same journal containing the original description of *Anapera sibiriana* Gimmerthal (on p. 208) was published in 1847, not 1874 as listed in Bequaert's (1953: 384) bibliography.

The Encycl. Ent. ser. B, tome 5, fasc. 1 and 2 which contained Falcoz's paper on Diptera Pupipara in the Paris Museum and descriptions of 2 new species, was published on 15 Nov. 1929, as is clearly indicated at the foot of pp. 1, 17, 19, 27, etc. and at end of each article (only fasc. 4 of the tome, as indicated, was published on 15 Feb. 1930). They were listed by the Zool. Rec. and in Bequaert's (1953: 379; 1954: 167; etc.) papers as published in 1930.

#### D. THE TYPE SPECIES OF CERTAIN GENERA

The genus *Chelidomyia* Rondani (1879: 10, 15) was proposed for *Hippobosca hirundinis* Linn., *Chelidomyia cypseli* Rndn., *Oxypterum pallidum* Leach (sic) and *Chelidomyia melbae* Rndn. Its type species *H. hirundinis* Linn. was clearly designated on p. 10 by the author in his key to genera of the family. The name is hence an absolute synonym of *Stenepteryx* Leach 1817 which has priority and has the same type species. Bequaert's (1954: 163) later designation (apparently by oversight) of *Ornithomyia pallida* Latr. as the type species is invalid and his placing of *Chelidomyia* as a synonym of *Crataerina* Olf. 1816 (haplotype: *O. lonchoptera* Olf., Syn. of *pallida* Latr.) is untenable.

The type species of the genus *Austrolfersia* Beq. (1953: 284) is *A. ferrisi* Beq. 1953 which is definitely designated by the author and is the only species of the genus. Probably by oversight too, Paramonov (1954: 285) wrongly listed *Hippobosca tasmanica* Weschë 1903 as the type species. It belongs to the genus *Ortholfersia* Speiser (1902b: 152).

The genus *Feronia* Leach (1817a: 11; 1818: 557) was proposed for *F. spinifera* Leach, *F. americana* Leach and *F. macleayi* Leach. A little later, the author (1817b: 162) applied it only to his first species, which has since been designated as the type species by Coquillett (1910: 545). Being presumably preoccupied, the genus was renamed *Olfersia* by Wiedemann (1830: 605) who included Leach's 3 species, therefore *Feronia* Leach and *Olfersia* Wdm. should have the same type species. Speiser (1899: 202) correctly designated *Feronia spinifera* as the type of *Olfersia*. Rondani's (1879: 11) designation of *Olfersia ardeae* Macq. 1835 as the type is invalid, as the latter species was not originally included either by Leach or Wiedemann.

#### E. MITE INFESTATION OF OLFERSIA

Bequaert (1957: 424) remarked: "Considering the many specimens that I have examined, species of *Olfersia* appear to be, on the whole, less attacked by mites than most other genera of bird-flies." This is probably true for *O. aenescens* C. G. Thoms., but not *O. spinifera* (Leach), and the sharp difference in their infestation percentage may be related to host specificity of the two species.

Among 95 specimens (22 ♂♂, 73 ♀♀) of *aenescens* examined, only 3 were found to have been infested by 6 mites altogether (1 each on lateral surface of thorax, thoracic venter, hind femur and abdominal dorsum; 2 on abdominal venter). The infestation percentage is about 3.2. Bequaert (1957: 441) recorded two cases for this species.

The infestation percentage in *spinifera* is about 26.9. To the 8 cases of infestation recorded by Bequaert (1953: 159; 1957: 433), 49 new cases, out of 182 specimens examined (26 ♂♂, 156 ♀♀) may be added. One single fly may harbor as many as 13 mites, although there is usually one mite per fly. The location of the mites found on the host may be analyzed as follows: 4 on head (1 on occiput, 3 on mouthparts); 12 on thorax (5 on dorsum, 6 on lateral surface, 1 on venter); 22 on wing (14 on upper surface, 8 on lower surface; in both cases most mites are attached near wing base); 45 on legs (5 on fore femur, 2 on fore tarsus, 11 on mid femur, 4 each on mid tibia and tarsus, 8 on hind femur, 4 on hind tibia, 7 on hind tarsus); and 12 on abdomen (6 on dorsum, 3 on venter, 2 on lateral surface, 1 on terminalia). Most of the mites have egg-masses, and only a few larvae are noticed.

#### F. SYNONYMY OF SOME JAPANESE SPECIES

In addition to the common and widely distributed species, *Hippobosca equina* Linn., *H. variegata* Megerle (= *maculata* Leach) and *Melophagus ovinus* (Linn.), S. Matsumura (1905) and K. Kishida (1932) described 10 new hippoboscids from Japan. These species, with the exception of *Ornithomyia aobatonis* Matsum., were not indicated as new. The publications containing their descriptions have long been out of print, the descriptions (in Japanese only) and figures are crude, and the type specimens have not been available to recent workers. Consequently the identification of these species is difficult and their names, since publication, have largely not been used or mentioned. A review of the descriptions and figures involved has shown that these names are all synonymous with earlier ones. There appears to be very little chance to revive any of them even when the types are critically re-examined. The synonyms are:

*Ornithoica exilis* (Walker) 1861, = *Ornithoica momiyamai* Kishida 1932, *O. distincta* Kishida 1932. **New Synonymy.**

*Ornithomya avicularia* (Linnaeus) 1758, = *Ornithoica nipponensis* Kishida 1932, *O. kibitaki* Kishida 1932, *O. diomedae* Kishida 1932. **New Synonymy.** (Also = *Ornithomyia aobatonis* Matsumura 1905, see Bequaert 1954: 115).

*Crataerina (Stenepteryx) hirundinis* (Linnaeus) 1758, = *Lynchia nipponica* Kishida 1932 (see Bequaert 1953: 277).

*Myophthiria reduvioides* Rondani 1875, = *Brachypteromyia nakamurai* Kishida 1932. **New Synonymy.**

*Ornithoictona plicata* (von Olfers) 1816, = *Ornithoica annalis* Kishida 1932. **New Synonymy.** (Also = *Ornithoica tropica* Kishida 1932, see Bequaert 1941b: 269).

Kishida did not give type localities of his species except *tropica* and *annalis* and it is difficult to understand why he wrongly described the tarsal claws of his *nipponensis*, *kibitaki*, *diomedae* and *annalis* as having no "accessory claws" and lumped these species into the genus *Ornithoica*. (He also described his *Lynchia nipponica* as having no accessory claws. If so, the species could not be assigned to *Lynchia*). His descriptive terms are rather confusing, for instance, the so-called vertex most probably refers to the occipital margin, prothorax to prescutum, mesonotum and even mesothorax to mesoscutum, metanotum to scutellum, lateral margins of prothorax to mesopleura, and accessory claws to pre-apical teeth of claws. Meanwhile, the anal cell apparently referred to 3bc in *tropica*, but probably to the "axillary" cell (a) in *momiyamai*. Presumably Kishida's descriptions were based upon few dried specimens, as he rarely mentioned the variation in number of bristles, and on several occasions he emphasized the existence of the basal abdominal tergite (which touches the laterotergites at the sides), without realizing that this tergite is found in all Hippoboscidae but is concealed in shrunken specimens. The following are translations of Kishida's descriptions together with some comments on the species.

*Ornithoica momiyamai* (Momiya's louse-fly) Kishida, 1932: 245, fig. 474, ♀.

"Body of larger ♀♀ 2 mm long. Head only 1/2 as long as wide; face long, narrow, laterally slightly curved inward, with 4 pairs of bristles along margins of eyes; ocelli lying near 'vertex', their interspaces 1.5× diameter. 'Metanotum' with 2 pairs of bristles; humeral area and middle of lateral margins with many short spines; posterolateral corners of 'metathorax' with conspicuous branched hairs. Abdominal dorsum with 4 transverse sclerotized plates; 1st and 2nd plates with short spines on outer margin. Wing large, nearly reaching apex of fully stretched hind leg; costal vein only forming anterior margin of costal cell [i. e., costa not extending beyond apex of costal cell], hence next cell (which lies postero-exteriorly to costal cell) opened antero-exteriorly; 3rd anteromarginal cell [1r] linear; 4th anteromarginal cell [2r] postero-exteriorly (sic) more or less high, triangular, linear; toward posterior margin [behind this cell] there being 3 longitudinal veins forming 3 posterior cells; submarginal cell [3r] large; 1st basal cell [1bc] long, narrow; 2nd basal, 3rd basal, and anal [a, not 3bc] cells normal. Claws of legs huge, strongly curved, no accessory claws. Brownish yellow; face, thoracic dorsum and abdominal tergal plates brown. Parasitic on 'hachizokkoko' [*Turdus naumanni* Temm., Muscipidae] and 'mozu' [shrike, *Lanius b. bucephalus* Temm. & Schl., Laniidae] in late autumn. Discovered by Mr. T. Momiya."

The scutellum was described as having branched hairs; this is incorrect. Bequaert's (1953: 277) listing of the common African species *Ornithoica turdi* (Latr.) from Japan on *Lanius* is presumably on the strength of Kishida's record for *momiyamai*. The occurrence of *turdi* in Japan seems rather improbable.

*Ornithoica distincta* (kingfisher louse-fly) Kishida, 1932: 245, fig. 475, ♀.

"Small-sized, even largest individuals only about 3 mm long. Head length slightly more than 1/2 width; face long, narrow, more than 3× as long as wide, its outer margins almost parallel and straight, very suddenly divergent at posterior ends, very narrowly raised along inner and posterior margins of eyes, with 4 pairs of long spines; ocelli lying on anterior 1/2 of an oval prominence; their interspaces and diameter subequal. Thoracic dorsum lacking humeral calli; lateral margins with about 20 pairs of short strong spines; 'metanotum' distinctly diamond-shaped, with 6 pairs of long spines, the 2 inner pairs longer. Abdominal dorsum discally with 4 transverse sclerotized plates, anterior ones short and wide, the more posterior ones more lengthened and narrowed; anterolateral margins with many denticles and spiniform hairs; posterior margin with many long hairs and few denticles. Wing large; costal vein interrupted near base of costal cell and at apex of 2nd anteromarginal cell; 4th anteromarginal cell [2r] antero-exteriorly linear. Legs long; claws strongly curved, no accessory claws. Head and legs pale yellowish brown; thoracic dorsum and abdominal tergal plates dull brown; ground color of abdominal dorsum quite pale pinkish. Parasitic on 'shobin-roi' [kingfishers, *Halcyon coromanda major* Temm. & Schl. and others, Alcedinidae]. Rare species."

Almost certainly *momiyamai* and *distincta* represent the male and female, respectively, of *Ornithoica exilis* (Wk.) which has priority and which is common in the Pacific area and known from kingfishers and many unrelated kinds of birds. In the original drawings, both *momiyamai* and *distincta* were labelled as females. Differences of the 2 "species" in size, relative curvature of lateral facial margins, general color pattern, relative size of abdominal tergal plates and, in *distincta*, the presence of "denticles" on abdomen are apparently sexual characters of the same species. In the figure for *momiyamai*, the setulose area of the wing was clearly indicated, and in this respect, it is evidently a typical *exilis*. The same area was not drawn for *distincta*, but this does not rule out the existence of the area. None of the *Ornithoica* species is known to have entirely bare wings.

*Ornithoica nipponensis* (crow louse-fly) Kishida, 1932: 246, fig. 476, ♂.

"Medium-sized, body sometimes more than 5 mm long. Head 2/5 as long as wide; face very extensive, about as long as wide, its outer margins almost parallel, very suddenly divergent caudad, raised along margins of eyes, with 1-2 long spines at anterior 1/2 of inner margin; ocelli lying on anterior 2/5 of a triangular prominence near 'vertex'; interspace of posterior ocelli nearly 3× diameter. Humeral calli short, small, triangular, pointed, with more than 10 long and short spines; posterior part of lateral margins with 7-8 long and short spines and 1 curved-forward long spine; 'mesonotum' with 2 pairs of long spines; 'metanotum' short, wide, with 3 pairs of long spines on posterior margin. Abdominal dorsum densely covered with fine hairs, along all margins with long hairs, near midway on lateral margins with 6 pairs of short sharp spines; no transverse sclerotized plates. Legs long; claws long, strongly curved, no accessory claws. Head and thorax brownish; ocellar prominence and ⋈ mark on 'mesonotum' greyish brown; abdominal dorsum greyish yellow. Parasitic on 'hashibuto-garasu' [crow, *Corvus japonensis* Bonaparte, Corvidae] in summer and autumn. Rare species."

The original description was very probably drawn from a dried specimen or specimens (the "species" was said to be rare), hence the abdominal tergal plates are not easily recognized. The excessively wide face and wide ocellar interspace were certainly an exaggeration. The so-called ocellar diameter evidently referred to the transverse axis of the posterior ocellus which is only about 1/2 as long as longitudinal axis of the same.

This "species" is apparently a synonym of *Ornithomya avicularia* (Linn.) which is para-

sitic on *Corvus* and other birds in Europe and Australia.

*Ornithoica kibitaki* (kibitaki louse-fly) Kishida, 1932: 246, fig. 477, ♀.

"Medium-sized, body about 5 mm long. Length of head nearly 1/2 width; face wide, its outer margins slightly curved inward, no hairs, raised along margins of eyes; ocelli lying on anterior 1/2 of triangular prominence near 'vertex'; interspace of posterior ocelli more than 2× diameter. Humeral calli rudimentary, with 4 long hairs; posterior 1/2 of lateral margins with 4-7 long hairs; 'mesonotum' with 3 pairs of long spines, posterior margin of 'metathorax' with 4 pairs of long spines (outer ones shorter). Abdominal dorsum with 5 sclerotized plates, the 1st long, large; 4th and 5th short, wide, arranged as the word / \; at each side between 3rd and 4th, with 1 callous spot; near posterior margin, and at posterior part of abdominal venter with countless denticles. Wing large; costal vein interrupted at antero-exterior corner of costal cell. Legs not robust; claws strongly curved, no accessory claws. Pale brownish yellow; thoracic dorsum, face and 4th and 5th abdominal tergal plates slightly darker. Parasitic on 'kibitaki' [flycatcher, *Zanthopygia n. narcissina* Temm., Muscicapidae] in late autumn."

The abdominal plates in this and next "species" were said to be 5 and 4 in number respectively, but in the figures, they are 4 in both cases. Actually the terminal 2 belong to the same segment and represent lateral parts of a medially interrupted plate.

*Ornithoica diomedea* (albatross louse-fly) Kishida, 1932: 247, fig. 479, ♀.

"Medium-sized, body about 5 mm long. Head 1/2 as long as wide; face extensive, slightly longer than wide, its lateral margin slightly divergent posteriorly, very narrowly raised along margins of eyes, no hairs; ocelli lying on anterior 1/2 of a triangular prominence; interspace of posterior ocelli 2× diameter. Humeral calli small, with 14-15 long and short spines; posterior 1/2 of lateral margin with 10 long and short spines and few long hairs; 'mesonotum' with 2 pairs of long spines; posterior margin of 'metathorax' with 4 pairs of long spines, the 2 outer pairs slightly shorter. Abdominal dorsum with countless fine hairs and 4 transverse sclerotized plates, the 3rd and 4th long, large, arranged as the word / \; anterolateral to 2nd plate at each side with a callous spot; posterior margin with long hairs; posterior part of abdominal venter with denticles. Wing large; costal vein not interrupted. Legs long, large; claws curved, no accessory claws. Head, thorax and legs brown; but posterior margin of head, and anterior and posterior margins of 'pronotum' blackish brown; ground color of abdomen pale greyish brown, its dorsal plates greyish brown. Parasitic on 'ahodoi' [albatross, *Diomedea albatrus* Pallas, Diomedidae]."

Both in descriptions and figures, this and the preceding "species" are evidently identical. The slight differences all fall within the normal range of intraspecific variation. The face was described as hairless for both species, and the humeral bristles in *kibitaki* were composed of 4 long hairs, and in *diomedae*, 14-15 long and short spines. Very probably the specimens were imperfect in chaetotaxy, and the author did not check the setigerous papillae. The legs in *kibitaki* were "not robust", and in *diomedae*, long and large, but in the figures, they are inseparable for the two species, except that in *diomedae*, the apical part of fore femur was drawn as if thicker than in *kibitaki*. Therefore I fail to appreciate the correctness of the descriptions and figures.

*Ornithomayia* (sic) *Aobatonis* Matsumura (green pigeon louse-fly), Kishida 1932: 244, fig. 472, ♂.

"Body 4.0-5.5 mm long. Head transversely elliptical; lateral margins of face almost parallel, slightly divergent posteriorly, with 3-4 pairs of long hairs on anterior part of lateral ridges; ocelli small, subequal in size, their interspace 3× diameter. Humeral calli blunt, strong, protruding, with

5 pairs of short and 4 pairs of long spines; 'mesothorax' with 2 pairs of long spines; 'metathorax' with 4 pairs of long spines (also numerous short hairs on posterior margin). 'Prothorax' and 'mesothorax' with a continuous longitudinal suture [medium notal suture], which dilates posteriorly. Wing large. Claws each with an accessory claws. Abdominal dorsum with many short hairs, posteriorly with a pair of sclerotized plates arranged as the word  $\diagup \diagdown$ . Face pale greyish brown; eye blackish brown; ocellar area brown; antenna largely brown, apex yellow, hairs black; rostral sheath [palp] yellow, its hairs black; thoracic dorsum dull yellow, longitudinal suture yellow; wing uniformly yellow, major veins blackish brown, minor veins yellow; abdomen pale greyish yellow, hairs black; legs yellowish; tarsi dull brown. Parasitic on 'aobato' [green pigeon, *Sphenocercus s. sieboldii* Temm., Columbidae]. Occurring in Hokkaido and Honshu."

This "species" was originally described in Japanese by S. Matsumura (1905: 119, pl. 28, fig. 12, ♀) and again in 1931 (6000 Illus. Ins. Jap.-Emp.: 390, fig. 241, ♀). Since Kishida's redescription is more detailed, it is translated here. At first, Bequaert (1941b: 269) interpreted it as a synonym of *Ornithoetona australasiae* (Fabr.), probably because the abdominal tergal plates were described and figured as absent. In a more recent paper, the same author (1954: 115) synonymized *aobatonis* with *Ornithom. avicularia* (Linn.). The descriptions and figures might have been drawn from dried specimens where these plates are usually not clearly visible. The cross vein *im* in the figures is much closer to *rm* than to *mcu* which indicates *aobatonis* is referable to *Ornithomya* rather than *Ornithoetona*.

In addition to *aobatonis*, Kishida's *nipponensis*, *kibitaki* and *diomedae* are apparently synonyms of *avicularia*. His assignment of these species to the genus *Ornithoica* and the descriptions of them as having no "accessory claws" are certainly wrong. Probably Kishida presumed that different kinds of host-birds harbor different species of Hippoboscidae and did not realize the fact that *avicularia* is not only widely distributed but exceedingly polyxenous. Meanwhile, his figure of *aobatonis*, labelled as male, appears to be a female instead.

There may be a slight possibility that one of the names, *nipponensis*, is referable to *Ornithom. fringillina* Curt. which is often found together with *avicularia* in the Palaearctic Region and spreads into the Nearctic. According to Bequaert (1954: 119), *fringillina* is smaller, wing only 4–5.5 mm long (6–7.5 mm in *avicularia*), and its scutellar bristles are only 2–6, usually 4 in number (6–10, usually 8 in *avicularia*). *Nipponensis* was described as having 3 pairs of such bristles, the other 3 names, each 4 pairs. But the dimensions of all the names, as shown in the descriptions and figures, are practically the same.

*Lynchia nipponica* (rock swallow louse-fly) Kishida 1932: 248, fig. 480, ♀.

"Body about 5 mm long. Head 1/2 as long as wide, normal in shape; face hardly divergent anteriorly, with about 10 pairs of long hairs along margins of eyes; ocelli touching hind margin [of head]. Thoracic dorsum narrowed anteriorly, widened at humeral areas and dilated posteriorly; humeral areas with numerous short spines; 'metanotum' short, narrow, semicircular, posterior margin truncate, its surface densely covered with fine hairs. Wing arising from widest part of mesothorax, long, narrow, lanceolate, with 6 longitudinal veins. Legs robust, short; claws long, large, curved, no accessory claws. Abdomen divided into anterior and posterior parts, anterior part short, wide, densely covered with short hairs; posterior part large, extensive, densely covered with short hairs, and postero-exteriorly and postero-interiorly with numerous large, strong spines; no sclerotized plates. Dorsum of head and of thorax, and legs yellowish brown; face with a long triangular, greyish brown marking; abdomen greyish yellow. Parasitic on 'iwa-tsubame' [rock swallow, *Delichon urbica dasyopus* Bonaparte, Hirundinidae]."



I follow Bequaert (1953: 277) in suppressing this species as a synonym of *Crataerina* (*Stenopteryx*) *hirundinis* (Linn.), although the tarsi were again wrongly described as having no "accessory claws" (clearly visible in the figure). *C. hirundinis* has been recorded from *Delichon* in Europe too.

*Brachypteromyia nakamurai* (swallow louse-fly) Kishida 1932: 248, fig. 481, ♀.

"Body of larger ♀♀ about 6 mm long. Head nearly as long as wide, medially convex, gradually depressed at sides; lateral margins [inner orbits] not parallel, anteriorly narrow, posteriorly wide; anterior and posterior margins [of face] both strongly curved caudad; eye long, elliptical, length more than  $2 \times$  width, only middle part [of inner margin] convexly curved and embracing raised area in shape of a short wide triangle, thereby anterior 1/2 of face with 15-16 pairs of bristles; ocelli entirely absent; antenna, mouthparts and other parts all protruding forward and with bristles. Thoracic dorsum slightly shorter than wide; humeral callus blunt, heavy. Wing strongly degenerated, elliptical-oval, with bristles at basal 1/2 and apical 1/2 [probably error for a point of basal 1/4 to apical 1/4], 3 longitudinal veins and, between 2nd and 3rd ones, a cross vein. Haltere present, large, flattened. Legs robust; last tarsal segment long, large, about 1/2 as long [as whole tarsus]; claws also large, strongly curved, tridentate; accessory claws large, deeply separated. Abdominal dorsum basally with a large tergal plate [i.e., the basal plate which touches laterotergites at sides], apically with 2 small ones arranged as the word  $\diagup \diagdown$ . Head, thorax and appendages yellowish brown; bristles and abdominal tergal plates blackish brown; other parts greyish yellow. Parasitic on 'tsubame' [swallow, *Hirundo rustica gutturalis* Scop., Hirundinidae] all-through the year. Discovered by Mr. Yukio Nakamura."

This "species" is apparently synonymous with *Myophthiria reduvioides* Rndn. which is widely spread in the Pacific area and is known only from the swifts *Collocalia* spp. (Apodidae, Apodiformes). Its occurrence in Japan or Taiwan is most improbable since swifts are not found there. Presumably *nakamurai* was actually collected in Micronesia or the Philippines where several *Collocalia* species occur. The host record by Kishida is unreliable and swifts and swallows are generally confused in Japan.

*Ornithomyia tropica* (drongo louse-fly) Kishida 1932: 244, fig. 473, ♀.

"Large-sized, larger ♀♀ sometimes more than 10 mm long. Face wide, raised along eyes, anteriorly narrow, posteriorly broad, anterior 1/2 of lateral margins with 5 pairs of bristles, at side of mouthparts, with a cluster of 5 pairs of long robust bristles, at posterolateral end, also with long bristle [vertical bristle]; anterior ocellus conspicuously smaller than 2 others, transversely elliptical; posterior ocelli large, their interspace  $2 \times$  diameter and slightly more than interspace between anterior and posterior ocelli. Bristles on humeral areas 4 pairs, sublateral areas of 'mesonotum' 2 pairs, posterolateral mesonotal corners [postalar callus] numerous, 'metanotum' (near posterior margin) 4 pairs (its anterior margin with 9 and disc 3-4 bristles) and around 'prothoracic' spiracles numerous. Abdominal dorsum having no visible sclerotized plates, but with countless fine hairs and, on lateral and posterior margins, with many spine-like bristles. Wing large, reaching beyond apex of fully stretched hind leg, with 7 longitudinal veins; anal cell [3 bc] completely closed. Femora robust, hairs numerous; claws with 'accessory claws.' Head, thorax and abdominal venter pale brownish yellow; abdominal dorsum pale greyish white; anterior 1/2 of face, ocellar area, posterior margin [of head], **I** mark on thoracic dorsum, spiracles, inner surface of tibiae and terminal tarsal segments all dark brown. Parasitic on 'ouchiu' [drongo, *Dicrurus macrocercus harterti* Stuart-Baker, Dicruridae] and 'sanshokui-roi' [cuckoo shrikes, *Pericrocotus* spp., Campephagidae]. Known from Taiwan and the Philippines."

As pointed out by Bequaert (1941b: 269), this species is apparently the same as *Ornithoctona plicata* (Olf.).

*Ornithoica annalis* (mizogoi louse-fly) Kishida 1932: 247, fig. 479, ♀.

"Body large, ♀ about 9 mm long. Head 1/2 as long as wide. Face wide, its lateral margins straight, subparallel, slightly divergent posteriorly, raised along inner and posterior margins of eyes, widest at postero-interior corners; ocelli lying on a semicircular prominence; interspace of posterior ocelli more than  $2 \times$  diameter. Humeral calli and outer side of pre-alar areas [mesopleura] with sparse spine-like bristles; 'metathorax' diamond-shaped, its anterior 1/2 and posterior margin with many fine hairs. Abdominal dorsum with a transverse sclerotized plate [i.e., the basal tergite which touches laterotergites at sides], remaining area extensive, with 2 medially interrupted and 2 complete, depressed, finely-haired fasciae; lateral and posterior margins densely covered with long hairs. Wing long and large; costal vein complete, hence costal cell and its 3 following cells [apparently error for 3rd of its following cells] antero-exteriorly extending to same level. Legs, particularly femora, robust; apical 1/2 [of femora] with many long hairs; claws large, strongly curved, no accessory claws. Head and legs brown; ocellar prominence and ocular fold [inner orbits] black; 'mesonotum' and ]\_ mark of 'prothorax' greyish brown; abdomen pale greyish yellow. Parasitic on 'mizogoi' [*Gorsakius goisagi* Temm., Ardeidae] throughout the year. Widely distributed."

The subcosta and  $R_1$  of this "species" and *Ornithoica nipponensis*, *O. kikitaki* and *O. diomedea* were wrongly drawn as coalescent except at extreme apices. The chaetotaxy in *annalis* was as fully described as in *tropica*, the size is slightly smaller and legs appear to be more densely haired in the former species, otherwise the two are hardly distinguishable in the descriptions and figures.

#### G. RECORDS, AND REMARKS ON SPECIES

The following notes are based chiefly upon the Bishop Museum collection which contains the Pacific Entomological Survey and "Fauna Hawaiiensis" material and was partly studied years ago by Prof. J. C. Bequaert. (The Micronesian material will be dealt with in a separate article). Sources of other material are:

- 1) Rijksmuseum van Natuurlijke Historie, Leiden (LDN), through the courtesy of Dr. M. A. Liefstinck.
- 2) Naturhistorischen Museum, Basel (BSL), through the courtesy of Dr. F. Keiser.
- 3) Macleay Museum, The University, Sydney, N. S. W. (MLM), through the courtesy of Miss Elizabeth Hahn.
- 4) Australian Museum, Sydney, N. S. W. (AM), through the courtesy of Drs. J. W. Evans and C. N. Smithers.
- 5) School of Public Health and Tropical Medicine, The University, Sydney, N. S. W. (SHMS), through the courtesy of Dr. B. McMillan.
- 6) Queen Victoria Museum and Art Gallery, Launceston, Tasmania (LCT), through the courtesy of Dr. R. H. Green.
- 7) Hawaiian Sugar Planters' Association Experiment Station, Honolulu (HSPA), through the courtesy of Mr. F. Bianchi.
- 8) Hawaii State Department of Agriculture, Honolulu, through the courtesy of Miss Mabel Chong.
- 9) American Museum of Natural History, New York City (AMNH), through the courtesy of Drs. H. M. Van Deusen and J. G. Rozen, Jr.
- 10) Natural History Museum, Stanford University, Stanford, Calif. (STF), through the courtesy of Drs. P. Ehrlich and J. P. Wourms, Jr.
- 11) US Navy Medical Research Unit No. 2, Taipei, Taiwan (NAMRU), through the courtes-

sy of Dr. R. E. Kuntz.

With much pleasure I express my gratitude to the above mentioned fellow entomologists for their kindness and cooperation. I am also much indebted to Prof. Bequaert, formerly of Harvard University and Dr. J. L. Gressitt, Miss S. Nakata and Miss Amy Suehiro of this Museum for their encouragement and other courtesies.

The genera and species dealt with here are not arranged in phylogenetic order and the terminology is adapted from Bequaert (1953: 14-57, figs. 3-14). The venational notations (fig. 1) however are modified from Tillyard (1926: 378, fig. W73). The 1st to 7th longitudinal veins of authors are interpreted as  $R_1$ ,  $R_{2+3}$ ,  $R_{4+5}$ ,  $M_{1+2}$  (as  $M_1$  in Tillyard's figure),  $M_{3+4}$ ,  $Cu_1 + 1A$  and  $2A$  respectively. Tillyard did not name the crossveins and cells. For descriptive purposes, the anterior, anterior-basal and posterior-basal crossveins of Bequaert are here provisionally termed as *rm*, *im*, and *mcu* respectively; and his anterior, anterior-basal, posterior-basal, marginal, submarginal, 1st posterior, 2nd posterior, 3rd posterior and axillary cells, as 1bc, 2bc, 3bc, 1r, 2r, 3r, 1m, 2m and a. For the same purposes, the anal tergite, the anterior and posterior genital plates of Bequaert and the plate immediately below the anus are here termed supra-anal, pregenital, postgenital and infra-anal plates respectively. No attempt is made to straighten out the homology of these parts. The camera lucida drawings of the terminalia, to demonstrate its usefulness in the differentiation of closely related species, were made by me from cleared specimens. The setae are largely indicated by their basal papillae.

#### **Ornitheza metallica** (Schiner) 1864

VIETNAM: 1 ♀, Dalat, 1500 m, off *Heterophasia* sp. (#204), 26.IX.1960, C. M. Yoshimoto & B. Feinstein; 1 ♀, Lao Bao, off *Garrulax* sp. (#528), 25. I. 1961, N. Spencer & B. Feinstein.

BORNEO: 1 ♂ (NAMRU #8694), Jesselton, N. Borneo, off *Copsychus malabaricus*, 27. VIII. 1960, R. E. Kuntz.

SOLOMON IS.: 1 ♀, Guadalcanal I., I. 1921, J. A. Kusche.

FIJI IS.: 1 ♀, Sovu, Lau, off a kingfisher, 27. IX. 1924, E. H. Bryan, Jr.; 1 ♀, Kimbombo, Lau, 29. IX. 1924, Bryan; 1 ♀, Ongea, Lau, 31. VII. 1924, Bryan; 4 ♀ ♀, Munia I., off a kingfisher, 25. IX. 1924, Bryan.

AUSTRALIA: 1 ♀ (MLM), N. S. Wales (no other data); 1 ♂, 1 ♀ (AM), Mt. Lyndhurst, 32 km E. of Farina, S. Australia, off spiny-eared honey-eater [*Acanthagenys rufogularis*], 29. XII. 1919, E. Troughton; 1 ♂ (AM #K19840), no locality, off green and blue bee-eater [*Merops ornatus*]; 1 ♂ (AM), Coolabah, N. S. Wales, off *Artamus leucogaster* [*A. leucorhynchus*], XI. 1915, A. J. North; 1 ♀ (AM), Dinner Creek, 25 km from Raven-shoe-Sherrin, Queensland, off flycatcher; 1 damaged example (AM), no locality, off *Eury-stomus australis* [*E. orientalis*]. Most of the Australian specimens listed above were determined by Bequaert.

#### **Ornithomya avicularia** (Linnaeus) 1758 Fig. 1.

EUROPE: 2 ♂ ♂ (MLM), "France, *Ornithomya viridis* Lat. L. *avicularia* H."

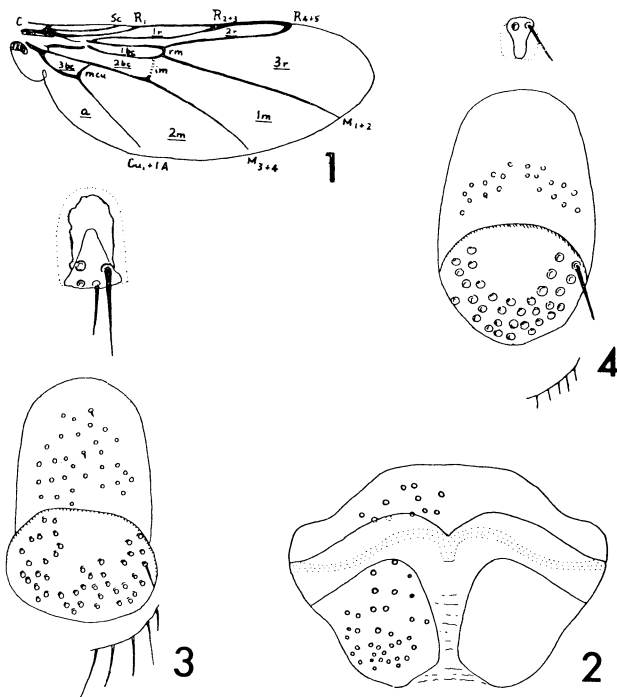
QUEENSLAND (SE): 1 ♀ (AM), Mt. Tamborine, 2. II. 1961, D. K. McAlpine; 1 ♀

(AM #K36969), Moreton Bay, off owl *Athenus strenua* [*Ninox strenua*], G. Masters.

N. S. WALES: 3 ♀♀ (MLM), Barrington, off "Lowrie" [*Platycercus* sp., Psittacidae], II. 1925, Sydney Univ. Zool. Exped.; 1 ♀ (AM), Barrington Tops, I-II. 1925, T. G. Campbell; 1 ♂ (MLM), Tilbuster, off a jay, VIII. 1823; 1 ♀ (LCT #154)<sup>2</sup>, N. S. Wales, off *Strepera* sp.; 2 ♀♀ (LCT #150, 151), same but no host records; 1 ♂ (AM), Wentworth Falls, Blue Mts., V. 1954, A. Harrison; 1 ♀ (AM), Hazelbrook, Blue Mts., off Blue Mountain parrot (*Trichoglossus moluccanus*), I. 1923, L. Abrahams; 1 ♀ (AM), same but 11. II. 1931, C. Steinberger; 1 ♀ (AM), same but 27. V. 1931 and no host record; 1 ♀ (AM), Clyde River, off *Platycercus pemanti* [*P. elegans*], G. Masters; 1 ♀ (AM), Culbirnie Moss Vale, off Rosella parrot [*Platycercus* sp.], 27. IV. 1953, C. W. Hodgson; 3 ♀♀ (AM), Calloola, off a "? hawk chicken", III. 1953, E. Wilson; 1 ♀ (MLM), "G. B." [? ex coll. George Bennett 1804-1893, in Sydney].

VICTORIA: 1 ♀ (AM #K 36958), Victoria (no other data).

TASMANIA: 1 ♀ (AM), Tasmania, off eagle-hawk neck, 17. I. 1960, D. K. McAlpine; 1 ♀ (AM), Burnie, 11. II. 1925; 2 ♀♀ (MLM), Tasmania (no other data); 9 ♀♀ (LCT #135), Launceston, off a falcon; 1 ♀ (LCT #155), same, off *Falco peregrinus*; 2 ♀♀ (LCT #140), same, off a hawk; 2 ♀♀ (LCT #139), off owls; 2 ♀♀ (LCT #159), same, off barn-owl [*Tyto alba*, Strigidae]; 1 ♂, 2 ♀♀ (LCT #138, 142, 144), same but no host records; 1 ♀ (LCT #156), same, off Guinea fowl [Numididae]; 1 ♂, 1 ♀ (LCT #152, 153), Blesington; 1 ♂ (LCT #137), Prospect, off "Brush-Wattle-Bird" [*Anthochaera chrysoptera*, Meliphagidae]; 1 ♀ (LCT #146), off *Ninox* sp. [Strigidae]; 1 ♂ (LCT #149), Tollgalee I.; 1 ♂ (LCT #157), Antill Ponds, off green Rosella [*Platycercus caledonicus*]; 1 ♀ (LCT #141), King I., off Chinese ring-neck pheasant (introduced), A. Stewart; 1 ♀ (LCT), Evandale, off an owl, coll. Foster.



Figs. 1-4. 1, *Ornithomya avicularia* (Linn.), ♀, wing, showing venational notation used in the present paper, notation for cells underlined; 2, *Lynchia suvaensis* Beq., neallotype ♀, postgenital and infra-anal plates, stippled area indicating their connection; 3, *Lipoptena rusaecola* Beq., ♀ from Mindanao, pregenital, postgenital and infra-anal plates, with part of supra-anal plate; 4, *L. pauciseta* Edw., ♀ from Vietnam, same plates and drawn to same scale as fig. 3.

2. All LCT numbers bear the prefix 1957-12-, details of data are not available to me.

This widely distributed Palaearctic species was introduced (presumably by pioneer settlers) to and established in Australia and New Zealand long ago. The earliest record as listed above is 1823, but the first introductions were probably still earlier. In Paramonov's (1954: 292) list of Australian Hippoboscidae, *O. avicularia*, *O. fringillina*, *O. biloba* and *Olfersia aenescens* were not included.

Specimens loaned from the Australian Mus., except a few recently collected ones, were determined by J. Bequaert, probably years ago, as "*O. nigricornis* Erichs." which is now generally accepted as a synonym of *avicularia*.

#### **Ornithomya fuscipennis** Bigot 1885

*Ornithomyia fuscipennis* Bigot 1885: 242, no sex, no host given. Type ♀, labelled by Bigot as "*fuscicornis*" and as from "Colombia", now at J. E. Collin coll., re-examined by Speiser (1902b: 167) and Bequaert (1954: 120).

*Olfersia macleayi*, Froggatt 1900: 1088-1094, figs. 3-4 (misinterpretation).

*Ornithomyia perfuga* Speiser 1902a: 331, no sex, no host given. Type series 5 examples, from N. S. Wales (no further details), probably at Budapest and partly at Berlin Mus.

QUEENSLAND (SE): 1 ♀ (AM #K36969), Moreton Bay, off *Athene strenua* [*Ninox strenua*], G. Masters; 1 ♂ (AM), Boobygan Rng. nr. Gayndah; 1 ♀ (AM), Molungool, Gin Gin, off pygmy flying phalanger *Acrobates pygmaeus* (#M5838), P. Gaden; 1 ♀ (AM), Montville via Brisbane, IX. 1929, H. C. Macartney.

N. S. WALES: 1 ♂, Ourimbah, XII. 1905, R. Helms; 1 ♀ (MLM), no locality, off winking owl *Ninox connivens*; 1 ♀ (LCT #1957-12-148), N. S. Wales, off an owl; 1 ♀ (LCT #1957-12-145), no locality, no host; 1 ♂, 4 ♀♀ (AM), Gosford, off *Podargus strigoides*, XII. 1927, W. Barnes; 1 ♀ (AM), Kogarah, off *Podargus* sp., 16. IV. 1934; 1 ♂, 9 ♀♀ (AM #K18306), no locality, off an owl; 1 ♀ (AM), Lindfield, in house on man, 18. XI. 1956, A. Musgrave; 1 ♂ (AM), no locality, no host; 3 ♀♀ (AM), Beecroft, off Boobook owl *Ninox novaeseelandiae*, 4. I. 1956, L. C. Haines; 1 ♀ (AM), Iluka, Clarence, IV. 1938, F. Sullivan.

VICTORIA: 1 ♀ (AM #K36958), Victoria (no other data).

S. AUSTRALIA: 2 ♀♀ (AM #K36950, 36964), S. Australia (no other data).

From the material at hand, the distributional range and population density of *fuscipennis* and *avicularia* in Australia are nearly the same. And in at least one instance (Moreton Bay, see above), they were found together on the same host, although *fuscipennis* appears to have a more restricted host range. Its occurrence on the marsupial (*Acrobates*) and man is accidental.

On the average, *fuscipennis* is slightly larger than *avicularia* although the size-ranges of these 2 species overlap. The wing-length in the former species is ♂ 6.4-7.8 mm, ♀ 7.3-8.4 mm (in *avicularia*, ♂ 6.0-6.8, ♀ 6.5-7.5). Generally the inner orbit is more convex and the ocelli larger in *fuscipennis* than in *avicularia*, but the most convenient character for separating the 2 species is the relative width of the face. The minimum interocular distance is scarcely greater in *fuscipennis* (11:10) but distinctly greater in *avicularia* (12:8) than eye-width (measured in front view of head). The same distance in *fuscipennis* is subequal to (11-12:12) median scutellar length (in *avicularia*, 12:9.5). (The terminalia of the 2 species will be described elsewhere).

Specimens loaned from Australian Mus. have largely been determined as *perfuga* by Bequaert who is the first author (1954: 120) to suppress it as a synonym of *fuscipennis*.

**Ornithomya fringillina** Curtis 1836

W. AUSTRALIA: 1 ♀ (MLM), King George Sound (no other data); 1 ♂ (AM #K36963), same; 1 ♂ (AM #K36962), same place, off "*Platycercus pileatus*," IX. 1868. 1 ♂ (AM), "Fire-tail" [*Zonaeginthus* sp.] (no other data).

QUEENSLAND: 1 ♂ (AM #36968), Queensland (no other data).

N. S. WALES: 1 ♀ (LCT #1957-12-158), N. S. Wales (no other data).

The 3 ♂♂ and 1 ♀ in the Australian Mus. were all determined by J. Bequaert, probably years ago, as "*O. opposita* Wk." According to his recent paper (1953: 240), *opposita* Wk. 1849, as well as *nigricornis* Erichs. 1842 and *tasmanensis* Macq. 1851, all described from the Australian Region, appear to be indistinguishable from Palaearctic specimens of *avicularia* Linn. Falcoz (1929: 32) also considered *opposita* and *avicularia* to be synonymous. The specimens before me, however, are distinctly smaller than typical *avicularia*, have only 2-6 (mostly 4) black scutellar bristles and run to *fringillina* in Bequaert's key (1954: 119). The microtrichiate area of the wing is about the same as in typical *avicularia*, and less extensive than in the same author's figures (1954: 140, fig. 28 F, G, H).

**Ornithomya biloba** Dufour 1827

W. AUSTRALIA: 1 ♂ (AM), King George Sound, off "tree swallow *Collocalia arborea*" [*Hylochelidon nigricans*], X. 1868, G. Masters.

N. S. WALES: 2 ♂♂ (AM #K36960), Sydney, off *Chelidon arborea* [*Hylochelidon nigricans*], G. Masters; 1 ♂, 4 ♀♀ (AM), Cattai Creek, Hawkesbury Distr., off fairy martin *Hylochelidon ariel*, 18. X. 1958, S. G. Lane; 1 ♂, 1 ♀ (LCT #1957-12-143), N. S. Wales (no other data); 1 ♀ (MLM), Sydney, off a swallow.

S. AUSTRALIA: 1 ♂ (AM #K36964), S. Australia (no other data).

I have no authentic European material for comparison and am following Seguy's (1938 a: 75-78) and Bequaert's (1954: 119) interpretations to refer these specimens to *biloba*. In Europe, *biloba* is known as a specific parasite of *Hirundo rustica* but has been recorded from *Delichon* and *Riparia*. The taxonomy of this species-group is confused and Bequaert (1953: 317) suggested the possible synonymy of *O. fur* Schiner 1868 (type locality: Cape of Good Hope) with *biloba*. The ocelli of the Australian specimens are so small that they probably are not functional.

**Crataerina (Stenepteryx) hirundinis** (Linnaeus) 1758

EUROPE: 2 ♂♂, 1 ♀ (MLM), no locality but labelled, seemingly in W. E. Leach's handwriting, "*Ornithomyia hirundinis* Lat. *Hippobosca*. L." These specimens might have been a part of Leach's (1817) material.

**Crataerina (Crataerina) pallida** Latreille 1812

EUROPE: 1 ♀ (MLM), no locality but labelled as "*Oxypterus acuminatum* Kirby" seemingly in W. E. Leach's handwriting; 5 ♂♂, 15 ♀♀ (LDN), no locality but probably from the Netherlands; 1 ♂, 1 ♀ (MLM), France.

The name *O. acuminatum* has never been published. The original description of *O. kirbyanum* Leach (synonym of *pallida*) reads: "*O. fuscotestaceum*, alis acuminatis apice subrotundatus. Habitat in Anglia. Mus. Kirby, qui in com. Suffolk semel legit..." The specimen is unfortunately in very poor condition. Only a small fraction of the left wing survived museum pests, (the right wing is entirely missing), and I am not sure whether it can match the characteristic wing-shape of *kirbyanum*. But, since the label seems to have been written by Leach and the word "acuminatis" appeared in the description of *kirbyanum*, it is quite possibly the type or syntype of Leach's species.

#### **Myophthiria (Myophthiria) reduvioides** Rondani 1875

NE NEW GUINEA: 1 ♂, 3 ♀♀ (SHMS), Gatop, 600 m, Finschhafen Subdistrict, Morobe Distr., off *Collocalia vanikorensis* in limestone caves, X. 1960, B. McMillan.

*M. reduvioides* was originally described from Insula Bona Fortuna (=Borneo, probably referring to Sarawak) whereas its relative *M. capsoides* Rndn., from the Philippines. In both cases, the host was not given. Rondani (1878: 154) and Bequaert (1941b: 288) recorded "*reduvioides*" from Fiji Is. off *Coll. vanikorensis*; Ferris (1925b: 337), from Samar I., Philippines off *Coll. troglodytes*; Ferris (1927c: 218), from New Hebrides off *Coll. vanikorensis*; and Bequaert (1941b: 288), from Rockingham Bay, Queensland off an unknown host. The present record fills the previous gap between the Malaysian and Philippine Archipelagoes and Oceania. The group is expected to be found elsewhere in the Pacific in company with the cave-dwelling swiftlets *Collocalia*, and to be divisible into geographical races. The number and shape of the median dorsal plates on the abdomen varies. In the single ♀ from Samar (Ferris, *l.c.*), it is one and very small; in the 2 ♀♀ from New Hebrides (Ferris, *l.c.*), two and larger; and the 3 ♀♀ from New Guinea, three, 1st plate very small (in 1 of the ♀♀, bearing no seta and only slightly larger than a setigerous papilla, in another 2 specimens, larger and bearing 1 and 3 setae respectively), 2nd much larger, 1 to 2× as wide as long, 3rd largest, almost as wide as side piece of 1st preapical plate. On the other hand, these plates in ♂♂ from New Hebrides appear to be similar to those from New Guinea.

To supplement Ferris' (1925b, 1927c) descriptions and illustrations, a few characters may be noted: postvertex about as high as wide; anepisternum separated from prescutum by a clearly defined suture; median notal and transverse mesonotal suture faintly indicated; scutellum with sharply edged posterior margin and slightly before that with a deep transverse fovea; area between fore and mid coxae only with a vertical series of short setae; supraepimeron with 1 seta; hypopleural bristles entirely absent; basal tergal plate of abdomen with dense short erect black spines; abdominal spiracles all small, hardly larger than neighboring setigerous papilla; preapical plates 1 (♂) or 2 (♀) pairs, 2nd much smaller than 1st; in ♀, supra-anal plate transverse, anteriorly naked and posteriorly densely setose along margin, infra-anal plate also transverse and setose; pregenital plate absent; ♂ gonocoxite very small, bearing 3 or 4 setae; at sides of ♂ genital opening and before anus, with a pair of raised longitudinal sclerotized plates which are densely bristled.

#### **Ornithoctona plicata** (von Olfers) 1816

SUMATRA: 1 ♂ (LDN), W. Sumatra, J. W. v. Lansberge; 1 ♀ (LDN), Pad. Deli, E. Coast Sumatra, coll. Bultikofer.

JAVA: 1 ♀ (LDN), Buitenzorg, off *Gespalia striata*, II. 1922; 1 ♀ (LDN).

WETTER I.: 1 ♀ (LDN), 1898, S. Schädler.

SEROEA I.: 1 ♀ (LDN), Seroea, Banda Sea, 25. IV. 1923, coll. Ropstein.

ARU IS.: 1 ♀ (LDN), nr. Manoemboc, "op arando", 11-14. X. 1929, Snellius Exped.

WEST NEW GUINEA: 1 ♀, Hollandia, primary forest, off a wild pigeon, 3. VIII. 1959, R. T. Simon Thomas.

NEW BRITAIN: 1 ♂, Keravat, off *Ducula spilorrhoea*, 23. XI. 1959, T. C. Maa.

SOLOMON IS.: 1 ♀ (AM), Guadalcanal, off a pigeon (#032763), 18. V. 1930, C. E. Hart.

FIJI IS.: 4 ♀ ♀, Moala I., off a pigeon, 12. VII. 1924, E. H. Bryan, Jr.; 2 ♀ ♀, Ongea, Lau, 21. VII. 1924, Bryan; 1 ♀, Ongea Ndriti, off a pigeon, 26. VII. 1924, Bryan; 1 ♀, Tuvutha, Lau, 10. IX. 1924, Bryan; 1 ♀, Olorua, Lau, off a pigeon, 28. VIII. 1924, R. H. Beck; 1 ♀, Nandarivatu, Viti Levu, X. 1937, J. M. Valentine; 1 ♀, Belt Road, W. of Suva, Viti Levu, off a pigeon, 22. VII. 1938, Y. Kondo; 1 ♀, Nausori, Viti Levu, off a wild pigeon, 12. VI. 1913, J. F. Illingworth.

QUEENSLAND: 2 ♀ ♀ (AM), Bammo Bay, Duke I., off grey goshawk [*Accipiter novaehollandiae cooktowni* Mathews], II. 1918, P. H. Banfield; 1 ♀ (AM), Berwick Is., Great Barrier Reef, W. Paradise; 2 ♀ ♀ (AM), Johnstone R., off *Macropygia phasianella* Temm. [*M. ph. robinsoni* Mathews], G. Masters; 1 ♀ (AM), Goondi, Johnstone R., off *Lopholaimus antarcticus* Shaw, VI. 1906; 1 ♀ (AM), Moreton Bay, off *Ptilinopus swainsonii* Gould [*Pt. r. regina* Swains.], G. Masters; 1 ♂ (AM #K36961), no locality, off *Eudynamys flindersii* [*Eu. scolopacea cyanocephalus* Latham]; 2 ♀ ♀ (AM #K31302), no data.

N. S. WALES: 1 ♀ (MLM), Clarence R.

Specimens loaned from the Australian Mus. all have been determined by Bequaert as this species but probably he did not publish the records.

*O. plicata* is one of the largest species of the family. The ranges of its host-relationship, distribution and size- and color-variation are all wide and accordingly the list of its synonyms is quite long. It is basically a palaeotropic insect (from Madagascar to Tonga but no definite records from continental Africa), and its occurrence in temperate countries such as Korea and N. S. Wales should probably be considered as accidental or seasonal.

#### ***Ornithoctona australasiae* (Fabricius) 1805**

JAVA: 2 ♀ ♀ (LDN), Tjinjirooan, Gouv. Kina-Ondern, 1700 m, Malabar Geb., W. Java, XII. 1909, H. W. v.d. Weele; 1 ♀ (LDN), Preanger, Gouv. Tangkoeban Prahoe, 1200-1600 m, V. 1936, F. C. Drescher.

WEST NEW GUINEA: 1 ♀ (LDN), Araboebivak, (#195), 26. X. 1939, K. N. A. G. 1939 New Guinea Exped.; 1 ♀ (LDN), Star Range, 1260 m, Sibil (at light), 18. VIII. 1959, Mus. Leiden Neth. New Guinea Exped.

#### ***Ornithoctona laticornis* (Macquart) 1835**

S. AFRICA: 2 ♀ ♀ (MLM), Cape of Good Hope.

#### ***Ornithoctona fusciventris* (Wiedemann) 1830**

CUBA (?): 3 ♀ ♀ (MLM), no data, possibly from Cuba since all other American



hippoboscids in the Macleay Museum were collected in Cuba.

**Ornithoctona erythrocephala** (Leach) 1817

CUBA: 11 ♀♀ (MLM), Cuba (no other data).

PERU: 1 ♀ (BSL), Sullana, Hda. Mallares, 12. V. 1956, W. Markl.

BRAZIL: 1 ♂ (BSL), Nova Teutonia, State Santa Catharina, I. 1956, F. Plaumann.

This species occurs from Canada to central Chile and Argentina and in the West Indies and breeds on birds of orders Falconi- and Columbiformes. It can be readily distinguished from other New World species of the genus by its very short antennal appendages (only about 2× as long as its greatest width) and entirely bare wings.

**Stilbometopa podopostyla** Speiser 1904

CUBA: 1 ♀ (MLM), Cuba (no other data).

**Lynchia albipennis** (Say) 1823

CUBA: 1 damaged example (MLM), Cuba, off a heron.

**Lynchia nigra** (Perty) 1833

HAWAIIAN IS. (HAWAII I.): 6 ♀♀, Kau, off *Brachytis cassinii*, 20. X. 1899, H. W. Henshaw; 1 ♂, 2 ♀♀, Kaiwiki, off *Buteo solitarius*, 26. II. 1900, H. W. Henshaw; 1 ♂, 1 ♀ Hilo, off "Io" [*Brach. cassinii*], XII. 1931, E. Y. Hosaka; 2 ♀♀ (Fn. Hawaii. colln. #435 & 436, paratypes of *Olfersia acarta* Speiser 1902), Kona, 900 m, off "short-eared owl" [*Brach. cassinii*], VI. 1892.

HAWAIIAN IS. (KAUAI I.): 1 ♀ (HSPA), Koloa, 28. IX. 1950, C. E. Pemberton; 1 ♂, 1 ♀ (Hawaii State Dept. Agric.), Kauai, off an owl, VI. 1910, MacBryde.

**Lynchia americana** (Leach) 1817

BRAZIL: 1 ♂ (BSL), Nova Teutonia, State Santa Catharina, 14. X. 1951, F. Plaumann; 1 ♀ (BSL), same data, but 3. II. 1952.

As pointed out by Bequaert (1955: 314), *L. wolcotti* (Swenk), *L. americana* and *L. angustifrons* (van der Wulp) occur in the same territory and on similar or even identical hosts and very possibly they are comparatively recent offshoots from a common ancestor. However, *wolcotti* is much rarer than the other 2 species. It differs from *americana* in having a much narrower face and from *angustifrons* in much larger body size. Relative measurements of the single ♂ before me are as follows (the ♀ is in rather poor condition): height of head from occipital margin to base of palpi including membranous area before frontal notch, 62 units; height of eye 48; length of postvertex 13 units, mediovertex 32, palpus 33, vertical bristle 18, orbital bristle 37; greatest width of eye in front view of face 21 units, inner orbit 8, postvertex 37; smallest width of mediovertex 28, interocular face 33.

**Lynchia suvaensis** Bequaert 1941      Fig. 2.

FIJI IS.: Neallotype ♀, Nandarivatu, Viti Levu, X. 1937, J. M. Valentine. Neallotype partly on pin and slide and partly in glycerine, in Bishop Mus.

*Female* (undescribed): By using a micrometer (83 units = 2 mm), relative measure-

ments of body parts and principal bristles were made as follows: height of head in front view (from occipital margin to anterior frontal notch) 53 units, postvertex 14, mediovertex 27; width of head incl. eyes 64, narrowest part of mediovertex 13, inner orbit 4, widest part of an eye in front view 24, between vertical bristles 32; length of palp 27 in front view and 20 in side view, vertical bristle 17, longest frontal bristle on lunula 28, frontal bristle at upper 3rd of inner orbit 16, terminal bristle on palp 20, (terminal bristles on antenna hardly shorter than longest frontal, but strongly curved and impossible to measure accurately), longest humeral bristle 22, notopleural, supra-alar, scutellar and longest mesopleural bristles 25-27, longest metepimeral bristles 13.

Basal antennal segment with 1 bristle (9 units long) and several soft hairs; occipital margin gently curved in front view and straight in dorsal view. Metepimeral bristles exceedingly strong. Wing with similar setulose areas on upper and lower surfaces, but vein C ventrally hardly setulose before apex of  $R_1$ ; cell a wider than that figured in original description, about 1/2 as wide as 2 m (both measured at their widest part), with a weak but perceptible convex vein near anal margin. Dorsum of abdomen transversely microstriate, with strong setae at side; median 3/5 bare; basal median tergal plate longitudinally microstriate at sides, no hairs, bristles and setigerous punctures; abdominal spiracles 3, 4 and 5 dorsal; apical median tergal plate slightly narrowed at middle, with 7-8 long bristles (about 14-15 units long), 2 much shorter ones and a number of soft hairs; 6th spiracle almost entirely concealed by lateral margin of the plate; no conspicuous small sclerotized plate behind each of 7th spiracles. Abdominal venter sparsely and evenly covered with fine brownish setae, area narrowly along lateral margin and around urogenital openings with strong black setae; basal sternal plate poorly sclerotized, with only fine short brownish setae; 1st pleural plate subtriangular, small, close to 2nd abdominal spiracles; 2nd pleural plate several times larger than 1st, oboval, its anterior end enclosing 3rd spiracle near inner dorsal margin. Supra-anal plate weakly sclerotized; infra-anal plate widely divided at middle, with fine soft hairs; postgenital plate transverse, its hind part narrowly overlapped by infra-anal plate. Length from frontal notch to posterior scutellar margin 3 mm; wing 7 mm. Other characters similar to ♂ as described.

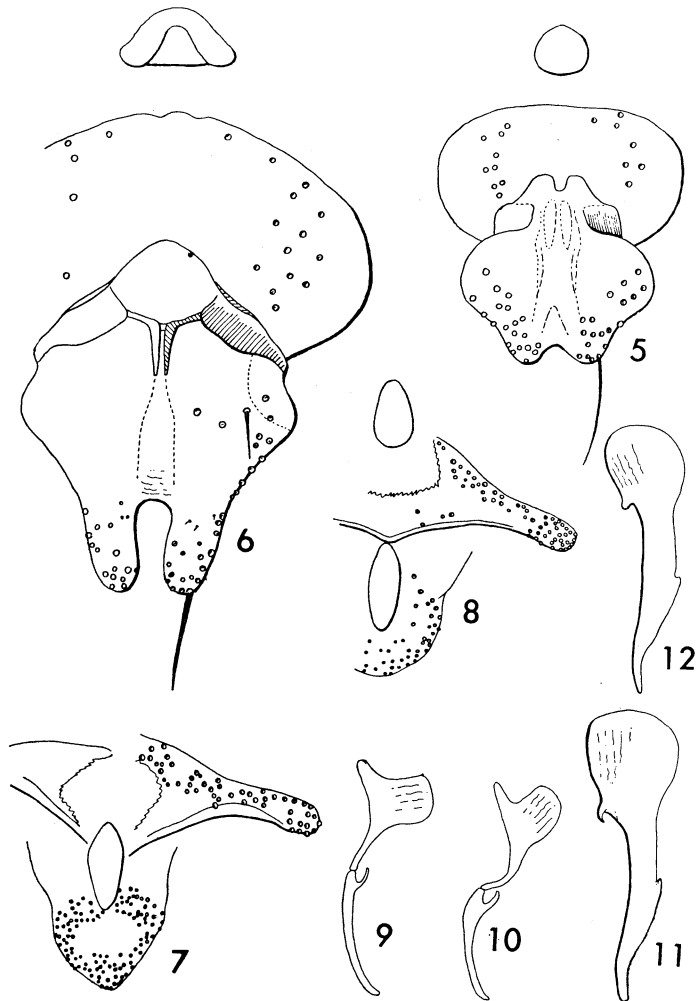
The full-grown third instar larva or the so-called prepuparium, dissected out from the neallotype, is about 3 mm long, 2.8 mm wide. It is similar to the puparium of *L. nigra* (Perty) as figured by Bequaert (1955: 317, f. 60 E-G), but the fovea dividing the two polypneustic lobes is much deeper and conspicuous and, in ventral view, the anterior margin of the blackened polypneustic area nearly straight, not sinuate at middle as in dorsal view.

#### ***Pseudolynchia canariensis* (Macquart) 1840**

MADAGASCAR: 1♂ (BSL), Maroantsetra, Tamatave, J. Vadon.

HAWAIIAN IS. (all except the last place [Lihue] are of Oahu I.): 9♂♂, 5♀♀, Quarantine I., off a pigeon, VI. 1937, C. E. Frank; 1♀, Manoa, S. Uno; 1♂, Manoa, E. Chun; 1♂, 3♀♀ (Hawaii State Dept. Agric.), Alakea Dock, Honolulu, IV. 1911, E. M. Ehrhorn; 1♀, Honolulu, in house, 20. IV. 1916, H. L. Lyon; 1♂, Honolulu, 4. XI. 1929, E. Hosaka; 1♂ (HSPA), Honolulu, at window, 16. VI. 1933, F. X. Williams; 1♂, Honolulu, 3. I. 1925, J. Oliveira; 3♂♂, 2♀♀ (HSPA), Honolulu, 21. V. 1928, Chung; 1♂, Waianae Mts., M. Shigami; 1♂, Nuuanu, P. Young; 1♂, Univ. Hawaii, off a pigeon, 10. I. 1914; 1

♂, Univ. Hawaii Farm, M. Koga; 4 ♂♂, 5 ♀♀, Kaimuki, 16. V. 1926, J. F. Illingworth; 1 ♂, Kaimuki, H. K. F. Lee; 1 ♂, Kaimuki, R. Shiraki; 1 ♀, Kaimuki, off a chicken, 15. III. 1919, O. H. Swezey; 1 ♀ (HSPA), Kaimuki, 10. II. 1912, O. H. Swezey; 1 ♀ (HSPA), Kaimuki, in pigeon house, 13. VI. 1911, A. F. Cooke; 2 ♂♂, 1 ♀, 2 puparia, Oahu, bred from a pigeon nest, 5. IV. 1911 & 4. III. 1912, H. H. Severin; 7 ♂♂, 4 ♀♀, 1 puparium,



Figs. 5-12. *Olfersia aenescens* C. G. Thoms. from Marquesas Is. (5, 7, 9, 11) and *O. spinifera* (Leach) from Jarvis I. (6, 8, 10, 12), same organ of the two species drawn to same magnification. 5-6, venter of ♀ terminalia, with postgenital and infra-anal plates stretched on a same plane; 7-8, venter of ♂ terminalia (caulis and aedeagus detached) showing the presence of a pregenital plate in *spinifera* and difference in setal distribution of the 2 species; 9-10, aedeagus and its supporting piece, viewed from left-side; 11-12, caulis, viewed from left side.

Oahu, off a pigeon, 1914-15, J. F. Illingworth; 1♂, 2♀♀ (HSPA), Kawailoa, off a pigeon, 17. IX. 1914, H. T. Osborn; 1♀ (HSPA), Waimanalo, 13. I. 1928, Beveridge; 5♀♀ (HSPA), Lihue, Kauai I., 22. IX. 1930, Sloggett.

CUBA: 15♂♂, 5♀♀ (MLM), Tome (? Tauna), off a pigeon.

**Olfersia aenescens** C. G. Thomson 1868 Figs. 5, 7, 9, 11.

GOENOENG API I.: 1♀ (LDN), 14. IV. 1930, Snellius Exped.

HAWAIIAN IS.: 1♂, Lisiansky I., 18. V. 1923, S. C. Ball. 3♀♀ (Hawaii State Dept. Agric.), French Frigate Shoals, 24. IX. 1919, D. T. Fullaway. 1♀, Necker I., 19. VI. 1923, E. H. Bryan, Jr. 1♀ (Hawaii State Dept. Agric.), Rabbit I. nr. Oahu I., 31. VIII. 1946, K. L. Maehler; 2♂♂, same, off *Puffinus* sp., 30. VIII. 1944, W. W. Wirth; 1♀, same, 26. VIII. 1934, E. H. Bryan, Jr. 1♂, Moku Manu I. nr. Oahu I., I. 1948, B. Hayashi; 1♀, same, 23. VI. 1954, J. L. Gressitt. 9♂♂, 7♀♀ (Hawaii State Dept. Agric.), Mokapu, Oahu, V. 1953, A. W. Wirth; 2♀♀, Oahu, 15. II. 1948, C. B. Keck; 1♀ (Hawaii State Dept. Agric.), Lanikai, Oahu, in house, 12. I. 1961, C. J. Davis. 1♂, Puu Ka Pele, Kauai I., 4. IX. 1920, O. H. Swezey. 1♀, on yacht "Kaimiloa", on the sea between Hawaii Is. and Tahiti, 16. XII. 1924, G. P. Wilder.

PALMYRA I.: 1♂, II. 1948, N. L. Krauss.

JARVIS I.: 1♂, 1♀, 10. VIII. 1924, L. A. Whitney; 1♀, off frigate bird [probably straggler or by contamination], 11. V. 1935, W. W. Graf.

PHOENIX IS.: 1♂, Canton I., 11. III. 1924, E. H. Bryan, Jr.

MARQUESAS IS. (all by Pacific Ent. Surv.): 2♂♂, 34♀♀, Haavei Valley, Ua Huka, off *Sterna fusca*, 19. III. 1931, Le Bronnec & H. Tauraa; 1♀, Hana Valley, Ua Huka, 90 m, 9. III. 1931, same collectors. 1♀, Amatea, 600 m, Tahuata, 27. VI. 1930, same collectors. 1♂, Hakahetau Bay, Ua Pou, 12. XII. 1929, R. R. Whitten. 3♂♂, 13♀♀, Teuaua I., off "Uahuka", *Sterna fusca*, 21. IX. 1929, A. M. Adamson.

AUSTRAL IS.: 1 ex., abdomen missing, probably ♀, Raivavae I., in house, 28. II. 1922, A. M. Stokes.

FIJI IS.: 2♀♀, Latei Tonga, Lau, 6. IX. 1924, E. H. Bryan, Jr.; 1♀, Vanua Masi, Lau, 15. IX. 1924, Bryan.

AUSTRALIA: 1♀ (MLM), off marine birds on reefs on Australia, F. M. Rayner; 1♂, 1♀ (AM), Michaelmas Cay off Cairns, Queensland, VII. 1926, T. Iredale & G. P. Whitley; 1♀ (MLM), "R. Id." [? ex coll. R. Illidge 1846-1929, in Queensland].

The wing venation in one of the 3♂♂ from Teuaua I. is quite unusual. There is no crossvein im, and  $M_{1+2}$  and  $M_{3+4}$  run very close to each other. Basal 1/3 (at left wing) or 1/6 (at right wing) of  $M_{3+4}$  is represented by very short sections at extreme base and at a point of about basal 1/5 respectively and thence by faint, non-sclerotized streaks.

**Olfersia spinifera** (Leach) 1817 Figs. 6, 8, 10, 12.

HAWAIIAN IS.: 1♂, Lisiansky I., 18. V. 1923, S. C. Ball. 1♂, Laysan I., VIII. 1930, G. P. Wilder; 3♀♀, 1 puparium, Laysan I., IV-V. 1959, G. Butler. 2♀♀, French Frigate Shoals, off frigate bird, 26. VI. 1923, E. H. Bryan, Jr. 14♀♀, Necker I., on frigate bird, 19-20. VI. 1923, Bryan. 4♂♂, 38♀♀, Nihoa I., on frigate bird, 11 & 15. VI. 1923, Bryan;

3 puparia, Nihoa I., 15. VI. 1923, C. M. Cooke. 2 ♀♀, Moku Manu I. nr. Oahu I., off *Puffinus pacificus cuneatus* [almost certainly straggler or by contamination], 23. VI. 1954, J. L. Gressitt. 2 ♀♀, on yacht "Kaimiloa", on the sea between Hawaii Is. and Tahiti, 16. XII. 1924, G. P. Wilder.

JOHNSTON I.: 6 ♀♀, 4 puparia, off frigate bird, 14. VII. 1923, E. H. Bryan, Jr.

CHRISTMAS I.: 2 ♂♂, 2 ♀♀, 16. VIII. 1924, L. A. Whitney.

HOWLAND I.: 3 ♂♂, IX. 1924, E. L. Caum.

JARVIS I.: 7 ♂♂, 6 ♀♀, 8. VIII. 1924, L. A. Whitney; 3 ♀♀, off *Fregata minor*, 25. III. 1935, W. W. Graf; 5 ♂♂, 38 ♀♀, off frigate bird, 11. V. 1935, Graf.

PHOENIX IS.: 4 ♀♀, Phoenix I., 10. III. 1924, E. H. Bryan, Jr. 2 ♀♀, Canton I., 11. III. 1924, Bryan; 1 ♂ (HSPA), Canton I., off frigate bird's head, 28. VII. 1940, R. H. Van Zwaluwenburg.

MARQUESAS IS.: 1 ♀ (Pacific Ent. Surv.), Mohotani I., 200 m, off *Fregata minor*, 4. II. 1931, Le Bronnec & H. Tauraa.

FIJI IS.: 1 ♂, 1 ♀, Naiambo, Lau, 7. VIII. 1924, E. H. Bryan, Jr.

AUSTRALIA (?): 1 ♂ (MLM), "R. Id." [? ex coll. R. Illidge 1846-1929, in Queensland].

This and the preceding species have often been confused, largely because of the arbitrary interpretation of *spinifera*, and their superficial similarities. For instance, the long series of *aenescens* from the Marquesas Is. were labelled by Ferris as "All what is commonly accepted as *Olfersia spinifera* (Leach)." With some reluctance, I am here following Speiser's (1902b: 179) and Bequaert's (1941b: 273, 1957: 429) interpretations in referring the frigate-bird louse-fly to *spinifera*. As already pointed out by Bequaert (*l. c.*), Leach's type might have been lost and his figure of the venation (1817a: pl. 26, f. 3) agrees better with *aenescens*.

Bequaert (1957: 433, 442) gave a long list of differentiating characters for *aenescens* and *spinifera*, but the most conspicuous and reliable ones appear to be the extent of the setulose area on the under surface of the wing (anal area setulose in *aenescens*, bare in *spinifera*), and the shape of the ♀ infra-anal plate (very shallowly emarginate at apex in *aenescens*, with 2 finger-like apical lobes in *spinifera*). In ♂ *spinifera*, there is a small, weakly sclerotized pregenital plate which is entirely undefinable in ♂ *aenescens*. I confess that I cannot appreciate the other characters such as the head shape and venation which vary intraspecifically and intergrade interspecifically. The difference in ♂ genitalia of the 2 species is slight.

#### *Olfersia bisulcata* Macquart 1847

COLOMBIA: 2 ♂♂ (BSL), Macarena, 500-650 m, off *Sarcorhamphus papa* (Cathartidae), I-II. 1950, L. Richter.

Restricted to the Neotropics, breeding on Falconiformes. This species is related to *O. fumipennis* (Sahlberg) and *O. fossulata* Macq., but cell 2bc is much shorter (about 2× as long as wide) than in the 2 latter species.

#### KEY TO GENERA AND SPECIES OF ORTHOLFERSIINAE

1. Wing with 5 longitudinal vein (incl. anal vein 2A which is pigmented only near

- base) behind subcosta; R 2-branched, without setae; antennal pit anteriorly extending to level of basal 1/3 of palp, its anterior margin in profile roundly curved into both upper and lower margins; dorsolateral area of mesothorax without very heavy spine-like setae. (Genus *Austrolfersia* Beq.) ..... **A. ferrisi**
- Wing with 6 longitudinal veins (incl. anal vein) behind subcosta; R 3-branched, R<sub>4+5</sub> dorsally with strong setae; antennal pit extending to or slightly beyond level of midpoint of palp, its anterior margin in profile angulate either to lower margin or to both upper and lower margins; dorsolateral area of mesothorax with very heavy spine-like setae. (Genus *Ortholfersia* Speis.) ..... 2
2. Wing thin and clear-transparent, without microtrichiae on upper and lower surfaces; antennal pit in profile almost truncate anteriorly, with anterior margin subangulate to both upper and lower margins; median length of postvertex not more than maximum width of inner orbit; frons, particularly its upper portion, depressed (never carinated) along median line; all metapleural bristles arranged in a regular vertical row; wing 3.5–4.7 mm long.....**O. minuta**
- Wing slightly leather-like, not clear-transparent and, except very narrow anal area, densely covered with brownish microtrichiae on upper and lower surfaces; antennal pit in profile more or less snout-like, its anterior margin broadly rounded into upper margin but angulate or subangulate to lower margin ..... 3
3. Median length of postvertex 1.5–2× maximum width of inner orbit; antennal appendage apically with very few short fine hairs and 4–6 long black stiff bristles, the latter reaching about level of apex of palp; scutellum with only 2 long stiff bristles near posterior margin; frons fairly flattened, not longitudinally depressed submedially, its median line not carinated, not depressed; wing 5.3–7.3 mm long ..... **O. macleayi**
- Median length of postvertex not or hardly more than maximum width of inner orbit; antennal appendage apically with many short fine hairs but only 1 long black stiff bristle which reaches about level of apex of palp; scutellum with 4 long stiff bristles near posterior margin; frons with distinct median carina and submedian fovea; wing not more than 6.5 mm long ..... 4
4. Median lengths of mediovertex and frons equal; upper end of mediovertex distinctly wider than lower end; maximum width of eye (in front view of head) and minimum width of mediovertex subequal; discal area of meso- and metathoracic basisterna in ♀ with short stiff black setae; wing in ♂ 3.4 mm, in ♀ 4.2 mm long ..... **O. bequaerti**
- Median length of mediovertex distinctly less than that of frons; upper and lower ends of mediovertex nearly equally wide; maximum width of eye (in front view of head) distinctly more than minimum width of mediovertex (16 : 13); discal area of meso- and metathoracic basisterna in ♀ without short stiff black setae; wing in ♂ 5.1–5.8 mm, in ♀ 5.8–6.3 mm long..... **O. phanoneura**

The Ortholfersiinae or "wallaby louse-flies" have been so little observed and collected that their biology is hardly known and they are usually very rare in collections. Their larviposition has never been observed, nor the puparium described. Two engorged pregnant ♀♀ of the 2 genera are at hand. In superficial appearance, the prepuparia therein are similar to those of Hippoboscinae, although the microsculpture is somewhat different.

This subfamily so far has been recorded only from Tasmania and the eastern coast of continental Australia from medium- and small-sized Macropodinae of the genera *Protemnodon* and *Thylogale* (but not from *Macropus* s. s. or large kangaroos). However, it would not be a surprise to find such flies in other areas where the medium- and small-sized Macropodinae still exist, particularly the interior and western coast of Australia and southern New Guinea. One of the specimens of *Austrolfersia ferrisi* at hand was labelled as collected in N. Queensland off a "rat-kangaroo" which is referable either to *Hypsiprymnodon moschatus* (Hypsiprymnodontinae, Macropodidae) or *Aepyprymnus rufescens* (Potoroinae, Macropodidae). This suggests the probability that the Ortholfersiinae may not restrict themselves to Macropodine wallabies, although the possibility of finding these flies on other Marsupial families seems to be very low. Records on animals other than marsupials, such as "settled frequently on collector" and "on dog's coat" (see below under *O. phaneroneura*), can be explained as a natural sequence when the true host is killed or disturbed. The following is a summary of the distribution and host ranges of the species, based partly on previous records and partly on the present material:

- 1) *Ortholfersia minuta* Param. SE Queensland, N. S. Wales, on "kangaroo."
- 2) *O. bequaerti* Maa SE Queensland, on *Protemnodon dorsalis* and *Thylogale eugeni*.
- 3) *O. phaneroneura* Speis. E. Australia from SE Queensland to Tasmania, on *Protemnodon rufogrisea* and *P. bicolor*. This is the commonest and most widely distributed species of the subfamily.
- 4) *O. macleayi* (Lch.) SE Queensland, N. S. Wales, on *Protemnodon elegans*, *P. dorsalis* and *Thylogale thetis*. The record from *Macropus major* (= *gigantea* auctt.) probably refers to *Protemnodon canguru* (see Troughton 1941).
- 5) *Austrolfersia ferrisi* Beq. N. Queensland, on *Thylogale stigmatica* and a "rat-kangaroo" (see above). This is the only species found in the tropics and is the one once found on rat-kangaroo.

From the very limited records, *Ortholfersia* is apparently a genus restricted to the temperate zone and *Austrolfersia* to the tropics. These 2 genera do not overlap in distribution; also, the overlapping of host ranges in the species is quite slight—only *Protemnodon dorsalis* is known to harbor both *Ortholfersia bequaerti* and *O. macleayi*, the body-size of which represent the 2 extremes of the genus.

The taxonomy of this group has been little worked on and there exists some serious confusion. While the material at hand is scanty and largely not in satisfactory condition, the notes here presented are admittedly preliminary in nature. The only intention in presenting them is to raise the attention and interest by collectors and to supplement Dr. S. J. Paramonov's (1954) paper.

The evolutionary trend within this group seems quite clear in certain respects. From the profile shape of the antennal pit, the presence and absence of microtrichiae on wings and the wing venation, *Ortholfersia minuta* and *Austrolfersia ferrisi* evidently represent the 2 extremes in phylogeny. By referring to the extremes, the remaining species can easily be placed in order. Regarding the interrelation of Ortholfersiinae and other subfamilies, there appears to be nothing to add to Bequaert's (1954: 69-75) discussions and conclusion.

#### ***Ortholfersia minuta* Paramonov 1954**

N. S. WALES: 3 ♂♂, 2 ♀♀ (MLM), Mudgee, N. S. Wales, off "kangaroo."

The type series (3 ♂♂, 2 ♀♀) was from Eidsvold, Brisbane and Tambourine Village (all in SE Queensland), off an unknown host.

As in *phaneroneura*, setae on the ♀ abdominal venter in *minuta* are distinctly longer than those on the pleural area. Although it was named *minuta*, this species is distinctly larger than *O. bequaerti* and *Austrolfersia ferrisi*. Its thin, colorless and non-microtrichiate wings and anteriorly truncate antennal pits are unique for the subfamily and serve as very distinctive characters for its recognition.

***Ortholfersia bequaerti* Maa, n. sp.**

QUEENSLAND: Holotype ♂, Allotype ♀, (AM #K36959), Moreton Bay nr. Brisbane, SE Queensland, off *Macropus eugenii* Desm.=*thetidis* Lesson [*Thylogale eugenii*], probably collected by G. Masters; paratype ♀ (AM #K36955), same data, but off *Macropus dorsalis* Gray [*Protemnodon dorsalis*]. Holo- and allotypes, both pinned, in Australian Mus.; paratype, head and abdomen missing, in Bishop Museum.

*Male*: Head in front view much wider than high (40: 29, height measured from occipital margin to anterior frontal margin along median line), widest at level of center of mediovertex, median length of mediovertex equal to that of frons (12: 12; in *phaneroneura*, 16: 21), inner eye-margins more distinctly convergent forward than in *phaneroneura*, ratio of minimum interocular distance vs. interdistance of vertical bristles 18.5: 23. Post-vertex short, its lower margin very gently curved, median length less than 1/2 that of mediovertex (5: 12) and subequal to maximum width of inner orbit (5: 4.5); upper end of mediovertex distinctly wider than lower end (in *phaneroneura*, upper and lower ends virtually equally wide); orbital bristles as in *phaneroneura*, mostly pale, fine and short, only 1 pair each at level of center of mediovertex and at level of midpoint of ptilinal suture black, stiff and long. Frons smooth, shining, slightly narrowed anteriorly (distinctly narrowed in *phaneroneura*), anterior 2/3 of median line strongly carinate (posterior 1/3 slightly depressed), lateral margin raised, thus leaving interspace between median line and lateral margin broadly foveated. Antenna evenly narrow in front view of head (in *phaneroneura*, widened apicad), apically with 1 long stiff black bristle and several fine short hairs; arista about 2× as long as wide (in *phaneroneura*, more than 3×). Antennal pit in profile similar to that in *phaneroneura*, distinctly snout-like, anterior rim gently curved into upper rim but angulate to lower rim, lower rim straight. Palp shorter than median length of frons (9: 12). Relative length of bristles: vertical 22 micrometric units, longest orbital 7, longest antennal 13, longest gular 22. Thorax similar in shape and chaetotaxy to *phaneroneura* but metapleuron with fewer bristles, about 5–8 arranged in a more or less vertical row, other 5–8 irregularly arranged. Wing similar to that in *phaneroneura* but marginal cilia relatively longer, apex of vein Sc lying basad to or at level of R-furcation (in *phaneroneura*, usually apicad to furcation); legs and abdomen similar to those of *phaneroneura*, as far as observable in dry specimens. Wing 3.4 mm long.

*Female*: Similar. Discal area of meso- and metathoracic basisterna, as in *minuta*, with sparser short black setae than in ♂ (in ♀ *phaneroneura* and in ♂♀ *macleayi*, this area is bare except a few long soft hairs). Setae on abdominal venter stouter and longer than those at pleural area. Wing 4.2 mm long.

Respectfully named after Prof. J. C. Bequaert, leading authority of the taxonomy of



Hippoboscidae during last 3 decades. The material at hand does not permit a description of the details of the abdominal chaetotaxy and terminalia, but the body size and other characters given in the key and description probably will suffice to separate it from its closest relative, *phaneroneura*, and eliminate any possibility of its being the synonym of described forms.

**Ortholfersia phaneroneura** Speiser 1902b: 153, no sex, no host given. Type series, 3 examples from N. S. Wales (no further details), probably lost.

*Hippobosca tasmanica* Wesché 1903: 385, figs. 1-4, "♂ or ♀", off *Macropus ruficollis* [now known as *Protemnodon rufogrisea* Desmarest, of which the Tasmanian race is *frutica* Ogilby]. Type from nr. Launceston, Tasmania, at Brit. Mus. (Nat. Hist.), re-examined by Austen (1903: 260) and Bequaert (1953: 284). **New Synonymy.**

N. S. WALES: 1 ♂, National Park, X. 1912, R. Helms; 1 ♂, 1 ♀ (AM), same place, 18. XI. 1955, D. K. McAlpine; 1 ♂ (AM), same data, but 10. IX. 1955; 1 ♀ (AM), same but settled frequently on collector, 3. XII. 1954; 1 ♂ (AM det. Paramonov), Waterfall, National Park, 12. IV. 1925, I. M. Mackerras; 1 ♂ (AM), Burrupine via Marksville, on dog's coat, 26. IX. 1942, M. Hurst; 1 ♂, 2 ♀♀ (AM), Jervis Bay, off *Macropus ualabatus* [*Protemnodon bicolor* Desm.], 24. V. 1914, A. R. McCulloch; 1 ♀ (MLM), Port Macquarie, off "kangaroo."

TASMANIA: 2 ♂♂, 1 ♀ (MLM), Tasmania, off "brush kangaroo" [*Protemnodon rufogrisea frutica* Ogilby, type host of *tasmanica*]; 1 ♂, 1 ♀ (LCT), Smithton, off Bennett's wallaby [*P. rufogrisea frutica*], 1957.

As in *macleayi*, the original description of *tasmanica* (fully quoted by Paramonov 1954: 286) is of little help for its recognition, except the dimensions (body 8 mm long, to wing apex also 8 mm). By comparing specimens from N. S. Wales and Tasmania and by consulting literature on the nominal species involved, I am fairly sure that *tasmanica* is a junior synonym of *phaneroneura*.

In addition to those mentioned in the key and in the description of *bequaerti*, the following characters may be noted: lateral margin of mediovertex strongly curved; mesoscutum with many more setae than in *macleayi*; metapleuron with a cluster of bristles partly arranged in a vertical row and partly irregularly arranged; posterior margin of metasternum gently curved, not angulate at middle. The apex of the subcosta varies in extent, it may lie either at level of or apicad to the R-furcation; the relative distances between apices of R-branches also varies, but generally  $R_{2+3}$  is closer to  $R_1$  than to  $R_{4+5}$ .

**Ortholfersia macleayi** (Leach) 1817

*Feronia macleayi* Leach 1817a: 12, no sex, no host given. Type from "Australasia", apparently lost.

*Ortholfersia raveni* Ferris 1924b: 4, figs. 3-4, ♀, off "*Macropus*" sp. Type unique, from Glen Ferneigh, N. S. Wales, now not traceable in Stanford Univ. **New Synonymy.**

QUEENSLAND (SE): 1 ♀ (MLM), Gayndah, off *Macropus parryi* Benn. [*Protemnodon elegans* Lambert]; 1 ♀ (AM #K36949), no locality, off same host; 1 ♀ (AM #K36955), Moreton Bay, off *Halmaturus dorsalis* Gray [*Protemnodon dorsalis*], G. Masters.

N. S. WALES: 1 ♀ (AMNH), Upper Allyn, off *Thylogale thetis* Lesson (#160126),

I. 1930, H. M. Van Deusen; 1 ♂ (AM det. Paramonov as *O. raveni*), N. S. Wales, off *Macropus major* Shaw [possibly confused with *Protemnodon canguru* Muller], 1 ♂ (AM), Lanrugaris Creek nr. Coolong Caves, Gerrunderie Distr., 18, VII. 1927, T. G. Campbell.

Apparently types of both *macleayi* and *raveni* have never been re-examined and reported on by later workers. The original description of *macleayi* reads: "*F. luteo-flava*, thorace angulis anticis in tubercula acuta productis, alis lutescentibus. Habitat in Australasia. Mus. Dom. Francillon. Magnitudo omnino *Ornithomyia viridis*." The only criterion contained therein is the size which fits both Paramonov's (1954) and my interpretations (*O. viridis* Latr. is a junior synonym of *O. avicularia* Linn., wing 6–7.5 mm long). The J. Francillon collection was partly auctioned by Stevens and is scattered in Macleay Mus., British Mus., Oxford Univ. and perhaps some other institutions. The type of *macleayi*, originally in that collection, is not found in Macleay, Oxford or British museums.

Two of the specimens examined (♂ off "*Macropus major*," ♀ from Gayndah) agree in every respect with Ferris' description and illustration of *raveni*. Their only difference from other specimens is that the apex of vein  $R_{2+3}$  is nearly equidistant from those of  $R_1$  and  $R_{4+5}$ . This is by no means a reliable character and I feel safe in sinking *raveni* as a synonym, notwithstanding having no chance to examine its type.

*O. macleayi* is the largest species of the subfamily Ortholfersiinae. Besides the characters given by Paramonov (1954: 287–288) and in the above key, it differs from its congeners in the scantiness of setae on the thorax and legs, (discal area of meso- and metathoracic basisterna naked in both sexes), weakly curved lateral margins of mediovertex, relatively longer frons, very broad arista, etc. The ♀ from Moreton Bay is unusually small (wing 5.3 mm long), its wings are darker than in average specimens, and its postvertex is semicircular rather than triangular.

#### **Austrolfersia ferrisi** Bequaert 1953

*Ortholfersia tasmanica*, Ferris 1924b: 2, figs. 1–2, ♀ ♂ (misinterpretation, not of Wesché 1903).

*Austrolfersia ferrisi* Bequaert 1953: 284, n. name for *tasmanica* Ferr. not Wesché.

*Austrolfersia tasmanica*, Paramonov 1954: 292 (incorrectly lumping *tasmanica* Wesché, *tasmanica* Ferr. and *ferrisi* Beq. together).

QUEENSLAND (N.): 1 ♂ (STF, syntype, on 2 slides), Evelyn, off *Macropus stigmaticus* Gould [*Thylogale stigmatica*]; 3 ♂ ♂, 2 ♀ ♀ (MLM), Atherton, off rat-kangaroo, [either *Hypsiprymnodon moschatus* Ramsay or *Aepyprymnus rufescens* Gray], I–III. 1945, D. H. Colless.

Besides the small size (smallest for the subfamily) and reduced wing venation, *A. ferrisi* can also be separated from other Ortholfersiinae by: body setae very scattered, even fewer than in *O. macleayi*; maximum interocular distance much more than length of eye; postvertex very short, its lower margin virtually straight and median length distinctly less than maximum width of inner orbit; metapleuron with 3–4 bristles; setae on ♀ abdominal pleural area as long as but much finer than those on abdominal venter; sidepiece of preapical plates of ♀ abdomen exceedingly small. Some of these characters may prove to be of generic importance.

**Hippobosca equina** Linnaeus 1758 Figs. 13, 15, 17, 20, 22.

EUROPE: 2 ♂♂, 2 ♀♀ (BSL), Sardinia, VI. 1956, A. Gansser, 2 ♂♂ (MLM), France.

TRIPOLI: 1 ♀ (MLM), Tripoli, coll. Ritchie; 1 ♀ (MLM), no data, perhaps of same series.

SINKIANG: 1 ♀ (BSL), Karakorum, Chalt, 12. VI. 1954, F. Schmid.

VIETNAM: 11 ♂♂, 24 ♀♀, Muine, Phan Thiet, on cattle, 5. XI. 1960, C. M. Yoshimoto.

SUMATRA: 1 ♀ (LDN), W. Sumatra, J. W. v. Lansberge.

JAVA: 1 ♀ (LDN), Ambarawa, coll. Ludeking.

AMBOINA: 1 ♂, 2 ♀♀ (LDN), off cows, F. Muir.

NEW HEBRIDES: 33 ♂♂, 12 ♀♀, Tanna I., 1923, E. Robertson.

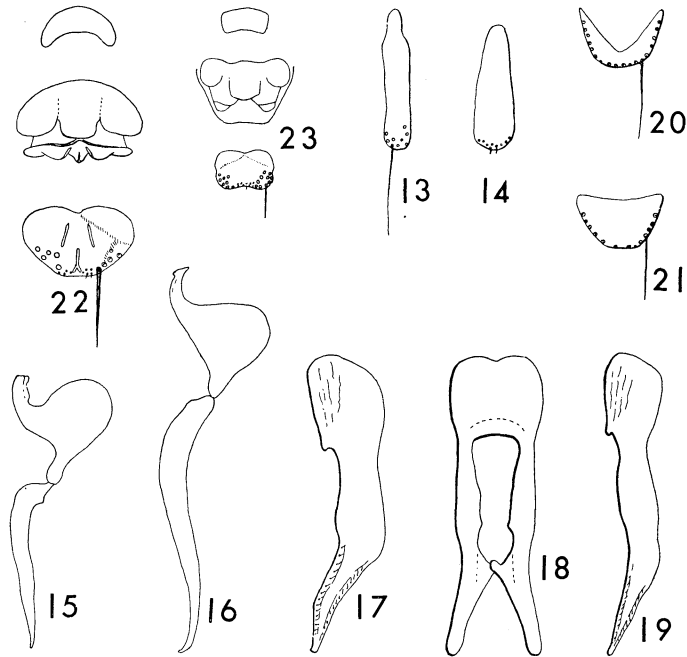
NEW CALEDONIA: 1 ♂, Noumea, 7. XI. 1925, W. H. Ford; 3 ♂♂, 1 ♀, Houailou, 23. IX. 1925, Ford; 1 ♂, 1 ♀ (AM), Noumea, off dog; 1 ♀ (AM), same but off horse.

The color pattern of this common Palaearctic species has been described and figured by many authors. Ferris (1930b: 539-544, f. 1-4) studied some of its morphological details and reached the conclusion that *equina* was structurally inseparable from *longipennis* (= *capensis*) and hence the two "supposedly distinct" species were the same thing. He admitted however that he had not attempted to work out details of the ♂ genitalia and called for examination of more material. In fact, the two species have often been confused in literature and in collections, particularly in cases of dried specimens, since their body-size, superficial characters, and host and distributional ranges more or less overlap. Comparisons of the terminalia of both sexes convinced me that they are closely related but clearly distinct.

In cleared ♂ specimens, median tergal plates 1 and 2 more ribbon-like than in *longipennis*, their setae about as stout and long as those around 4th abdominal spiracle; plate 3 confluent with 1st pair of lateral subapical plates, with numerous long bristles at each end; postgenital plate almost evenly broad, suddenly narrowed at base, apically with very long setae; side view of caulis shorter, broader and apically more bent ventrad than in *longipennis*; aedeagus less than 2/3 as long as caulis, in side view apically nearly straight; aedeagal supporting piece very broadly rounded dorsad. In cleared ♀ specimens, median tergal plates all much smaller, shorter and slightly narrower than 1st lateral subapical plate; supra-anal plate hardly projected beyond level of infra-anal plate, anterior margin of its dorsal surface deeply, angulately sinuate, its setae about as long as those on 2nd lateral subapical plate; infra-anal plate with 1 median and 2 submedian short sharp carinae, and with 2 large lateral flaps; median lobe of postgenital plate about as long as but narrower than side lobe; pregenital plate about 3× as wide as long, lateral margin of its invaginated part subangulate to anterior and posterior margins.

In pinned specimens, this species can be separated from *longipennis* by: median length of mediovertex nearly 2× (in *longipennis*, 1.4-1.5×), its minimum width and slightly greater than (in *longipennis*, not greater than) median length of lunula plus frons; anterior (lower) margin of frons gently curved, forming a rounded notch at middle; (in *longipennis*, V-shaped, forming a sharp notch at middle); wing veins almost unicolorous (in *longipennis*,

crossveins and adjacent parts of longitudinal veins usually conspicuously darker, giving an appearance of short black streaks on the wing). Other characters, such as the relative length and curvature of vein *mcu*, body size and number of scutellar bristles, are fairly variable.



Figs. 13-23, *Hippobosca equina* Linn. from New Hebrides (13, 15, 17, 20, 22) and *H. longipennis* Fabr. from Kiangsu (14, 16, 18, 19, 21, 23), same organ of the two species drawn to same magnification. 13-14, ♂ postgenital plate; 15-16, ♂ aedeagus and its supporting piece, viewed from left-side; 17-19, caulis, viewed from left-side (17, 19) and venter (18); 20-21, ♀ supra-anal plate; 22-23, ♀ pregenital plate, postgenital plate (with part of infra-anal plate as seen from venter of body, in fig. 23, supra-anal plate also shown in part) and infra-anal plate.

***Hippobosca longipennis* (Fabricius) 1805**

Figs. 14, 16, 18, 19, 21, 23.

CHINA: 1 ♂, Suisapa, 1000 m, Lichuan Distr., W. Hupeh, 2. VIII. 1948, J. L. Gressitt; 1 ♂, Macao, Kwangtung, F. Muir; 2 ♂♂, 1 ♀, Foochow, Fukien, VII. 1924, J. F. Illingworth; 2 ♂♂, 1 ♀, Nanking, Kiangsu, Illingworth; 27 ♂♂, 27 ♀♀, Chinkiang, Kiangsu, 20. VI and 19. VII. 1924, Illingworth; 1 ♂, Yangchow, Kiangsu, 3. VIII. 1924, Illingworth; 1 ♀, Mokanshan, Chekiang, 18. VII. 1924, Illingworth.

INDIA: 2 ♂♂, 1 ♀ (MLM), Calcutta, off dogs; 1 ♂ (MLM), Bengal; 1 ♂ (MLM), no data; 1 ♀ (MLM), no data but labelled as "*parva*" [no author's name. *Ornithomya parva* Macquart 1830 is a Neotropic species and has nothing to do here].

GEORGIA: 1 ♂ (MLM), Georgia (no other data). This is presumably the Georgia

in Transcaucasia.

AFRICA: 1 ♂ (MLM), Africa, no other data, but labelled as "*H. equina* β", perhaps by W. E. Leach.

In cleared ♂ specimens, median tergal plates 1 and 2 larger than in *equina*, their setae distinctly finer and shorter than those around 4th abdominal spiracle; plate 3 generally with not more than 10 long bristles near posterior margin at each end; postgenital plate gradually narrowed toward base, apically with very short setae; side view of caulis longer and narrower than in *equina* and apically hardly bent ventrad; aedeagus slightly shorter than caulis, in side view distinctly bent ventrad near apex; aedeagal supporting piece subtriangular, distinctly narrowed dorsad. In cleared ♀ specimens, median tergal plates all much larger, wider and slightly or not shorter than 1st lateral subapical plate; supra-anal plate projected much beyond level of infra-anal plate, anterior margin of its dorsum straight, its bristles shorter than those on 2nd lateral subapical plate; infra-anal plate without carinae; median lobe of postgenital plate slightly longer than and about as wide as side lobe; pregenital plate nearly 4× as wide as long, lateral margin of invaginated part rounded into anterior and posterior margins.

#### *Hippobosca variegata* Megerle von Mühlfeld 1803

MADAGASCAR (all of Basel Mus., collected by F. Keiser): 2 ♂♂, 2 ♀♀, Ambalabonga, Majunga, VI. 1958; 1 ♂, Ambalavao, Fianarantsoa, I. 1958; 2 ♂♂, 1 ♀, Ambato-Boeni, Majunga, at light, VI. 1958; 2 ♀♀, Amborovy, Majunga, VI. 1958; 1 ♂, 1 ♀, Ambovombe, Tuléar, II. 1958; 1 ♂, Ankarafantsika, Majunga, VI. 1958; 1 ♂, 2 ♀♀, Joffreville, Diégo-Suarez, V. 1958; 1 ♂, 1 ♀, Mahatsinjo, Tananariva, VI. 1958; 1 ♀, Mandraka, Tamatave, X. 1957; 1 ♀, Perinet, 1000 m, Tamatave, XII. 1957; 2 ♂♂, 2 ♀♀, Ranohira, Fianarantsoa, III. 1958; 1 ♂, Sakaraha, Tuléar, at light, III. 1958; 1 ♂, Vohiparara, Fianarantsoa, IX. 1958.

CEYLON (all of Basel Mus., collected by F. Keiser): 1 ♀, Elephant Pass, N. P., I. 1954; 1 ♂, Hettipola, W. P., XI. 1953; 1 ♂, Kalkudah, E. P., off man, VIII. 1953; 1 ♀, Kalpitiya, N. W. P., I. 1954; 2 ♂♂, 1 ♀, Kandy, C. P., off man, bullock and on window respectively, VI, VII & XI. 1953; 2 ♂♂, 4 ♀♀, Kuchchaveli, N. P., off bullocks, VII. 1953; 1 ♂, Polonnaruwa, N. C. P., VII. 1953; 1 ♀, Pudavaikaddu, N. P., "a. Lili saugend", VII. 1953; 4 ♀♀, Puttalam, N. W. P., I. 1954; 1 ♀, Rajakadalawa, N. W. P., VIII. 1953; 1 ♀, Tissamaharama, S. P., off cattle, I. 1954.

INDIA: 1 ♀, Anamalai Hills, Cinchana, S. India, 1050 m, IV. 1956, P. S. Nathan; 1 ♂ (MLM), Bengal.

TIMOR: 2 ♀♀ (LDN), Nenas en omgeving Moetisgebergte Timor, IX. 1937, W. P. de Roever; 8 ♂♂, 9 ♀♀ (LDN), Timor, off *Bos* sp., 2. VII. 1932, H. Boschma; 38 ♂♂, 58 ♀♀ (LDN), Timor, IV. 1930, J. W. C. van Heurn; 30 ♂♂, 23 ♀♀ (LDN), Koepang, off cow, 17. XI. 1929, Snellius Exped.; 1 ♀ (LDN), *Bos*, 25 km W. of Ambahoabe, 9-10. XII. 1938, H. J. Lam & A. D. J. Meeuse; 2 ♀♀ (MLM), no collection data, but one with a very old label "*Hipp. equina*."

According to Bequaert (1939b: 72), the 8 species of the genus may be divided into 4 groups: (1) *equina* Linn., *longipennis* Fabr., *fulva* Austen; (2) *variegata* Megerle, *rufipes* Olf., *hirsuta* Austen; (3) *struthionis* Janson; (4) *camelina* Leach. The last 2 groups are

endemic to the Ethiopian Region, and parasitic on ostriches and camels respectively. In the Oriental Region there exist only 3 species discussed here. From the material at hand, the first 2 groups may be compared as follows:

| <i>equina</i> -group  | <i>variegata</i> -group   |
|---|---|
| Vein $R_{2+3}$ not shorter than apical abscissa of $R_{4+5}$ ; $R_{4+5}$ entirely bare.   | Vein $R_{2+3}$ distinctly shorter than apical abscissa of $R_{4+5}$ ; basal part of $R_{4+5}$ dorsally with sparse setae about as long as those on costa. |
| Abdomen in both sexes with 3 median tergal sclerotized plates.  | Abdomen lacking such median plates.   |
| Inner pulvilli of all legs clearly visible, about 1/2 as long as outer pulvilli which are all fully developed.                                | Inner pulvilli of all legs scarcely visible; outer pulvilli fully developed in fore and mid legs, scarcely visible in hind leg.                           |
| Postvertex much broader than long; lateral margins of mediovertex almost straight and parallel.   | Postvertex as long as broad or longer than broad; mediovertex narrowed upward, its lateral margins distinctly concavely curved.                           |
| Thorax slightly less than 2× as wide as head.   | Thorax slightly more than 2× as wide as head.   |
| Notopleural, supra-alar and scutellar bristles fewer in number, not shorter than median length of scutellum but as fine as vertical bristles. | All these bristles numerous, shorter than median length of scutellum and more or less stouter than vertical bristles.                                     |

The above tabulation shows that the *equina*- is apparently more generalized than the *variegata*-group. And even without considering details of the terminalia, it is also apparent that the significance of the 2 species-groups is stronger than that of the so-called subgenera *Pseudornithomyia* (of *Ornithomya*), *Brachypteromyia* (of *Myophthiria*), *Ornithopertha* (of *Ornithoctona*), and *Dorcadophagus* (of *Melophagus*).

#### **Hippobosca rufipes** von Olfers 1816

AFRICA: 1 ♀ (LDN), "Z. Afrk." (no further details), 9. X. 1938; 1 ♂, 1 ♀ (MLM), Cape of Good Hope; 1 ♀ (MLM), no data.

This species was previously known from South Africa, and has only recently been found in the Congo and Tanganyika. It differs from *H. variegata* in the following points: Size larger, wing 7–9 mm long (in *variegata*, 7–8 mm); postvertex about as long as wide (in *variegata*, much longer than wide); major bristles black (in *variegata*, yellowish white); vein  $R_{2+3}$  about 3× as long as  $rm$  (in *variegata*, hardly longer than  $rm$ ); mesoscutum posteriorly more strongly depressed at middle; supra-anal plate (♀) much longer than wide at base (in *variegata*, hardly longer than wide); setal papillae on venter of ♀ abdomen between subapical lateral plates, not distinctly larger than those on the plates, setae about as long as diameter of papillae (in *variegata*, papillae between plates exceedingly large, several times larger than those on plates, setae indistinct, much shorter than diameter of papillae).

The limitation of material at hand does not permit me to dissect and compare the

terminalia of the two species.

**Hippobosca camelina** Leach 1817

AFRICA: 1 ♀ (MLM), abdomen missing, bearing a printed label "Africa" and an old handwritten label "*Hippobosca cameli* (sic) Savigny."

Leach's type of this species is in the Brit. Mus. (Nat. Hist.), but it is quite possible that the unique specimen in the Macleay collection is a syntype. The original description reads: "*Hippobosca camelina* Savigny MSS. Habitat in Aegypti camelo. Mus. Savigny, Macleay, Nost. ex Savigny dono..."

**Lipoptena pauciseta** Edwards 1919      Fig. 4.

VIETNAM: 5 dealated ♀♀, Djiring, 1000 m, off *Muntiacus muntjak vaginalis* (#362), 12. X. 1960, C. M. Yoshimoto & B. Feinstein.

**Lipoptena rusaecola** Bequaert 1942      Fig. 3.

PHILIPPINE IS.: 7 ♂♂, 6 ♀♀, all dealated, Bukidnon, Mt. Katanglad, 1480 m, Mindanao, off *Cervus (Rusa) nigellus*, 27. X. 1959, L. W. Quate.

The host animal was kindly determined by Prof. D. S. Rabor of Silliman University, Negros Oriental, P. I. He remarked: "This form may even prove to be distinct from either the Mt. Malindang or Mt. Apo form, although it comes closest to the former. It is a form of small deer from the highlands of Mindanao." The type host is *C. (R.) unicolor philippinus*.

As pointed out by the author, this species is "extremely close to *L. pauciseta*." The differentiating characters mentioned by him are: relatively wider inner orbits, longer palps, more elongate 2nd pleurite, poorly or not differentiated 1st median tergal plate (distinct in *pauciseta*), longer and narrower 2nd to 4th plates, and strongly sclerotized ventral portions of pleurites 2, 4 and 5. In addition to these, the following characters of the ♀ terminalia may be noted: supra-anal plate poorly defined, with setae much longer than those on infra-anal plate (in *pauciseta*, setae on supra-anal plate much shorter and finer than on infra-anal plate); postgenital plate membranous, entirely invaginated inside gonopore in natural conditions, with rather evenly distributed, very short setae (in *pauciseta*, these setae arranged in a transverse band near posterior end); pregenital plate large, elongate, strongly invaginated, with 2 long and 2-5 shorter setae far behind anterior end (in *pauciseta*, small, short, with only 2 setae at anterior end); membranous area before pregenital plate with 4-8 long setae of similar length and robustness arranged in a more or less arcuate series (in *pauciseta*, with only 2 long setae, occasionally with an additional, much shorter one). The shape of the basal sternal plate, as in other hippoboscids, appears to be variable in this and the preceding species. The male of *pauciseta* is not available to me and no comparison of the terminalia and genitalia can be made with *rusaecola*.

**Lipoptena mazamae** Rondani 1878

CUBA: 1 ♀ (MLM), Cuba, off Virginia deer, labelled as *Leptotena* (sic) *cubensis* (no author's name).

*Cubensis* is apparently an unpublished name. The label possibly was written by W. E. Leach.

The unique specimen is in poor condition. Its abdominal apex and 3 of the legs are missing, and is here assumed to be ♀ only on the basis of the relatively sparse setae on the abdominal venter. The inner orbit has only 1 long seta, fore and mid tibiae 1 stout apical spur each, mesonotum only a few scattered setae. Doubtless the specimen is referable to the common Neotropic species *mazamae*.

**Melophagus ovinus** (Linnaeus) 1758

HAWAIIAN IS.: 1 ♀, Honolulu, Oahu, found on bag of seed from Honohina, Hawaii I., nr. sheep run, XII. 1926, H. L. Lyon; 1 ♂ (HSPA), Keanakolu, 1700 m, Hawaii I., in saddle room, 4. X. 1931, O. H. Swezey & F. X. Williams; 2 ♂♂, 9 ♀♀ (HSPA), Puu Laau, 2700 m, W. slope of Mauna Kea, Hawaii I., off sheep, VI. 1946, L. W. Bryan.

AUSTRALIA: 1 ♂ (AM), Blue Mts., N. S. Wales, off dog, 12. IX. 1932; 1 ♀ (AM), Bridport, Tasmania, XII. 1915; 1 ♂ (AM #K62012), no data; 4 ♂♂, 8 ♀♀ (MLM), "B. H."

This species is now evidently permanently established on feral sheep on Hawaii I. There is no record of its occurrence on Oahu, Kauai and other islands.

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## RECENT LITERATURE ON PACIFIC INSECTS

### HEMIPTERA-HOMOPTERA

- Beardsley, J. W. 1959. On the taxonomy of pineapple mealybugs in Hawaii, with a description of a previously unnamed species (Homoptera: Pseudococcidae). Hawaii. Ent. Soc., Proc. 17 (1): 29-37, 2 figs.
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