

NOTES ON THE HIPPOBOSCIDAE (Diptera). II¹

By T. C. Maa

BISHOP MUSEUM, HONOLULU

Abstract: In addition to miscellaneous notes on various species, the suprageneric classificatory scheme of the family Hippoboscidae is readjusted to 3 subfamilies, and *Ornithomya apelta* (New Guinea etc.), *O. bequaerti* (Canada) as well as *Pseudolynchia mistula* (New Guinea) are described as new.

The following is chiefly a miscellany of records and notes selected from those accumulated since the appearance of the first installment of this series (1962, *Pacific Ins.* 4: 583-614). They are based largely upon the Bishop Museum collection. Materials from other sources are indicated by the same abbreviations in parentheses explained on p. 26 (and by LACM for Los Angeles County Museum).

For the privilege of studying and reporting on such materials, I am deeply indebted to the authorities of those institutes. The accompanying illustrations were kindly prepared by C. T. Lin, S. M. Kwang and P. Y. Hu.

SUPRAGENERIC CLASSIFICATION OF THE FAMILY

The suprageneric classification of the Hippoboscidae has been discussed in my earlier paper (1963: 76-78) where, by following Bequaert (1954: 14-20), 6 subfamilies were recognized. Since then Theodor et al. (1964: 17-18) suggested a new scheme by dividing the family into Hippoboscinae (Hippoboscini plus Ornithomyiini) and Melophaginae, with the tribe Hippoboscini placed at the very beginning of the family. By comparing about 50 characters including those employed by earlier authors for suprageneric classification (Table 1), it appears more reasonable to divide the family and to arrange the genera in the following scheme:

- 1a. Ornithomyinae: Ornithomyiini: *Ornithoica*, *Ornithophila*, *Ornithomya*, *Crataerina*, *Myophthiria*, *Ornithoctona*, *Stilbometopa*, *Proparabosca*, *Allobosca*.
- 1b. Ornithomyinae: Olfersiini: *Ortholfersia*, *Austrolfersia*, *Icosta*, *Phthona*, *Pseudolynchia*, *Microlynchia*, *Olfersia*.
2. Hippoboscinae: *Struthibosca*, *Hippobosca*.
3. Lipopteninae: *Lipoptena*, *Neolipoptena*, *Melophagus*.

As shown in Table 1, some characters of Hippoboscinae are in common with that of Ornithomyinae (particularly Olfersiini), whereas others are in common with Lipopteninae. Meanwhile, some of the listed characters show a continuous serial evolution with-

1. Partial results of a grant to B. P. Bishop Museum from the U. S. National Institutes of Health (AI-01723-11).

Table 1. Comparison of subfamilies and tribes of Hippoboscidae. (Abbreviations and symbols: fused w. o. = fused with other sclerite or vein; f. s.wg. = in or when wings full-sized; u.=usually; \pm =more or less; /=or)

	<i>1a.</i> Ornithomyini	<i>1b.</i> Olfersiini	2. Hippoboscinae	3. Lipopteninae
Head shape, front view	not shortened	as in <i>1a</i>	as in <i>1b</i>	shortened
Head-Thorax articulation	loose	"	"	tight
Postvertex, size	medium	medium/very large	"	medium
Antennal pits	open, paired /single	open, paired	closed, paired	as in 2
Antennal appendages, size	small to very large	medium	very small	"
Antennal bases	fused w. lunula or not	as in <i>1a</i>	fused w. lunula	"
Aristae	lamella-like	"	branched	"
Interantennal area	u. exposed	exposed	as in <i>1b</i>	"
Frontal processes	u. present	present	"	trace
Eyes	large (f.s.wg.)	u. large	large	reduced
Ocelli	u. present	u. absent	absent	u. present
Lunula	u. distinct	as in <i>1a</i>	fused w.o.	as in 2
Thorax, flattening	moderate	u. moderate	moderate	strong
Thorax, ventral vestiture	entirely of setae, rarely mixed with spines	entirely of setae	u. entirely of setae	entirely/almost entirely of spines
Humeral callus, forward projecting	u. strong	as in <i>1a</i>	weak	as in 2
Pronotum	\pm concealed	"	exposed	as in 2 fused w.o.
Anterior thoracic spiracles	u. dorsolateral	u. dorsolateral	dorsolateral	dorsal
Notopleura	distinct/fused w.o.	fused w.o.	as in <i>1b</i>	as in 2
Transverse mesonotal suture	interrupted, transverse	u. as in <i>1a</i>	complete, oblique	as in 2/absent
Metapleurotergal callus	u. weak	weak/strong	strong	weak
Prosternum	u. small	as in <i>1a</i>	large	small
Metasternum, anterior margin	bilobed	bilobed/subtruncate	subtruncate	as in 2
Metasternal processes	u. absent	u. absent	absent	"
Halteres	present	as in <i>1a</i>	as in <i>1b</i>	as in <i>1a</i> /absent
Calypters	small to absent	trace	distinct	absent
Wings, development	full/reduced; partly caducous/not caducous	full, not caducous	as in <i>1b</i>	full, caducous/rodlike
Wing-sensoria	reduced	as in <i>1a</i>	full/reduced	full (f.s.wg.)
Wing-microtrichia	u. present	"	absent	as in 2
Longitudinal veins	6-7(f.s.wg.), u. weakly crowding forward	6(7), u. strongly crowding forward	6(7), weakly crowding forward	3(f.s.wg.), hardly crowding forward
Crossveins	3	1-2	2	1(f.s.wg.)
Vein C, bulla	present (f.s.wg.)	absent	as in <i>1b</i>	present (f.s.wg.)

Table 1 (cont'd)

Veins M_{1+2} & <i>im</i> , bullae	present (f.s.wg.)	present	present (on <i>im</i>)	trace (on <i>im</i>)
Alula	large (in non- caducous wings)	large	as in <i>1b</i>	absent
Vein Cu+1A	strong	trace	"	fused w.o.
Pulvilli & claws (of each leg)	symmetrical	as in <i>1a</i>	symmetrical/ asymmetrical	as in 2
Empodia, branches	long, dense	"	as in <i>1b</i> /short, sparse	short, sparse
Claws	u. bifid	"	simple	as in 2
Tibiae & tarsi, sensoria and/or sensilla	present	"	absent	"
Tarsomeres 2-5, tactile setal patches	absent	"	present	"
Abdominal dorsum, striolate area	"	u. present	absent	"
Tergite 1	large, fused w.o.	as in <i>1a</i>	as in <i>1b</i>	trace
Tergites 4-5, median plates (♀)	u. present	u. absent	absent/present	u. present
Pregenital plate (♀)	"	"	present	present/absent
Tergite 6, median interruption	"	"	"	u. absent
Sternite 1	large, trape- zoid, moder- ately sclero- tized	small, trapezoid, weakly sclerotized	very large, trapezoid, heavily sclerotized	large, u. bilobed, heavily sclerotized
Laterite 2	short	as in <i>1a</i>	as in <i>1b</i>	u. long
Laterite 3	absent/trace	u. present	absent	u. present
Laterites 4-5	absent	u. absent	"	"
Abdominal spiracle 6	apart from anus	as in <i>1a</i>	as in <i>1b</i>	close to anus
Sternite 6(♂), side-pieces	u. absent	absent	"	as in 2
Supra-anal plate (♀)	small/absent	"	large	small
Tergite 7(♂), side-pieces	u. absent	"	absent/present	as in <i>1a</i>
Parameral apodemes (♂)	absent	"	as in <i>1b</i>	present/absent
Puparium, posterior "cap"	in 6 sectors	in 2/6 sectors	in 2 sectors	as in 2
Puparium, pneustic pores	u. unevenly arranged	as in <i>1a</i>	evenly arranged	"
Hosts	Aves, Primates	Aves, Marsu- pialia	Aves, Carnivora, Perissodactyla	Artiodactyla

in the family such as the antennal pits which evolved from open unpaired to closed paired condition. Therefore, the position of Hippoboscinae is apparently intermediate between the 2 other subfamilies. Other interesting features in the table are: (a) Each subfamily (or tribe) has one or more characters evidently more generalized than in other subfamilies, such as the relative size of pronotum and prosternum in Hippoboscinae; hence the relative antiquity of a given taxon cannot be relied solely upon such characters but all characters should be weighed and considered. (b) Some of the characters employed by earlier authors, such as the presence or absence of ocelli and the relative prominence of humeral callus, apparently have no subfamilial or even tribal importance

in Hippoboscidae. (c) Very few characters are unique for and at the same time universal within one subfamily or tribe. (d) Character A may act as a compensation of character B; for instance, the vestigial vein Cu+1A is clearly a compensation of the strong 2A, the "heels" of bifid claws are usually smaller, narrower than that of simple claws.

ADDITIONAL CASES OF PHORESY OF MALLOPHAGA

In addition to those cases of phoresy listed by me for *Ornithoica* (1966: 115, 139), *Ornithophila* (see p. 7) and *Icosta* (see p. 176), the following new cases of Mallophagan phoresy were noted:

Ornithoica exilis Wk. 1♀, NW New Guinea: Biak I., Mangrowawa, ex corvid, w. 1 louse. 1♀, SE New Guinea: Jumbora Plantation, ex *Melidora macrorrhina*, w. 2 lice.

Ornithomya avic. avicularia Linn. 1♀, W. Pakistan: Hazara Distr., Dungagali, ex *Garulax albogularis whistleri*, w. 1 louse.

Ornithomya fuscipennis Bigot. 1♂, 1♀, Taiwan: Kaohsiung hsien, Liukuei, ex *Zoothera dauma aurea*, w. 1 louse each. 1♀, Philippines: Mindanao, Agusan Prov., Mt Hilong-Hilong, ex *Phapitreron amethystina mindanaoensis*, w. 3 lice; 2♂♂, 2♀♀, *id.*, *Harpactes ardens ardens*, w. 2, 1, 1, 1 lice, respectively; 1♀, *id.*, *Irena cyanogaster hoogstraali*, w. 4 lice. 1♂, Philippines: Mindanao, Cotabato Prov., Mt Matutum, ex *Halcyon hombroni*, w. 1 louse. 1♀, Philippines: Mindanao, Zamboanga del Norte, Mt Malindang, ex *Turdus poliocephalus malindangensis*, w. 1 louse. 1♂, Philippines: Mindanao, Davao Prov., Mt Mayo, ex *Halcyon hombroni*, w. 2 lice. 1♀, NE New Guinea: Sepik Distr., Ambunti, ex *Mino dumontii*, w. 4 lice.

Ornithoetona australasiae Fabr. 1♀, Philippines: Mindanao, Agusan Prov., Mt Hilong-Hilong, ex *Hypocryptadius cinnamomeus* ssp., w. 1 louse. 1♀, Philippines: Mindanao, Bukidnon Prov., Mt Katanglad, ex *Basilornis miranda*, w. 1 louse.

In all these cases, the lice were found attached to the abdomen of the host, with their bodies lying parallel to that of their respective hosts.

RECORDS OF AND NOTES ON SPECIES

Ornithoica (*Ornithoica*) *unicolor* Speiser, 1900

THAILAND: 9♂♂, 26♀♀. Chanthaburi, Khao Sabap, ex *Otus bakkamoena*, *O. spilocephalus*; Chanthaburi, Khao Soidaotai, ex *O. bakkamoena* (6 lots), *O. spilocephalus* (5 lots), *O. scops*, *Glaucidium brodiei*, *Cissa thalassina*, *Pitta soror*. Chiangkhong, ex *Otus bakkamoena*, *Pholidus badius*; Chiangmai, Doi Phahompok, ex *O. bakkamoena* (2 lots), *O. spilocephalus* (5 lots), *Batrachostomus hodgsoni*; Chiengrai, Chiengsaan, ex *O. bakkamoena*.

MALAYA: 1♂, 2♀♀. Gunong Bunga Buah, Selangor, ex *Otus spilocephalus*; Subang, Selangor, ex *O. bakkamoena*.

JAPAN: 1♀ (Hokkaido Univ.), Nukabira, Hokkaido, ex *Turdus naumanni eunomus*.

The genera and families *Batrachostomus* (Podargidae), *Pitta* (Pittidae), *Turdus* (Muscicapidae) and *Cissa* (Corvidae) are new stray host-records. The odd record from northern Japan ex *Turdus* is apparently a stray or mislabeling.

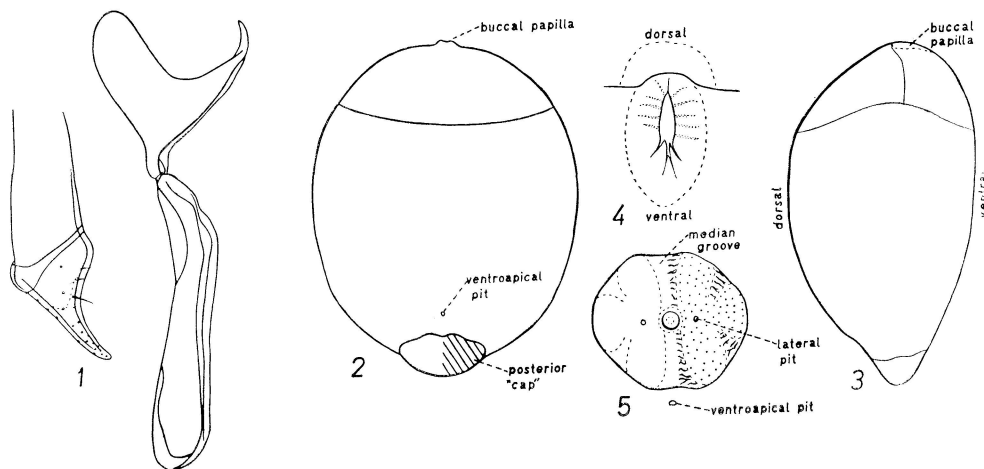


Fig. 1-5. 1, *Ornithoica confluenta* Say, Bahama Is. ex *Butorides*, ♂ genitalia; 2-5. *Ornithoica metallica* Schin., New Guinea ex *Cracticus*, prepuparium: 2, ventral view; 3, lateral view; 4, buccal papilla, more enlarged; 5, posterior "cap", showing distribution of pneustic pores.

***Ornithoica* (*Ornithoica*) *confluenta* (Say, 1823) Fig. 1.**

The ♂ genitalia of this species, based upon material from the Bahama Is. ex *Butorides virescens bahamensis*, is here presented for the first time.

***Ornithoica* (*Ornithoica*) *turdi* (Latreille, 1812)**

PORTUGUESE GUINEA: 1♂, 1♀ (GNV). Bissau, ex *Macrodipteryx longipennis*, 1898-99, L. Fea.

SÃO TOMÉ I.: 2♀♀ (GNV). Pelle, ex *Scops leucopsis*, VII.1900, L. Fea, labeled "Type. *Ornithoica simplex* m. P. Speiser det."; Ribeiro Palma, no host record.

CONGO: 1♂ (BRX). Eala, no host record. 2♀♀ (MCZ), Penghe, ex *Tockus fasciatus*.

ITALY: 1♀ (GNV). Alessandria, ex *Strix aluco*, X.1950, G. C. Doria.

The records from Port. Guinea, São Tomé I. and Italy and ex *Scops* (Strigidae) and *Macrodipteryx* (Caprimulgidae) are new. Speiser's manuscript name *O. simplex* is unpublished.

***Ornithoica* (*Ornithoica*) *vicina* (Walker, 1849)**

The following 8 new cases of mite infestation were found in the MCZ collection. 3♀♀, Londonerry, Vermont, ex *Zonotrichia albicollis*; 1♀, Groton, Mass., ex *Cyanocitta c. cristata*; 1♀, North Eastham, Mass., ex *Poecetes g. gramineus*, mite attaching under wing-base; Middletown, Rhode Island, ex *Zonotrichia albicollis*; 1♀, New Brunswick, N. Jersey, ex *Pipilo e. erythrophthalmus*; 1♀, Colorado Springs, Colorado, ex *P. fuscus mesoleucus*. Unless otherwise indicated, all mites were found attached to abdomen.

Ornithoica (Ornithoica) zamica Maa, 1966

NEW GUINEA: 2♂♂, 2♀♀, Jumbora Plantation, ex *Halcyon sancta*; Milne Bay, Sinaeada, ex *H. sancta*; Soputa R., ex *Xanthotis chrysotis*.

The genus *Halcyon* and family Alcedinidae are new host records.

Ornithoica (Ornithoica) rabori Maa, 1966

PHILIPPINES: 3♂♂, 1♀. Luzon, Mt Makiling, ex *Dicrurus balicassius*; Mindanao, Davao, Mt Mayo, Limot Mati, ex *Dicrurus hottentottus striatus*, *Megalurus timoriensis*.

Both *Megalurus* (Muscicapidae) and *Dicrurus* (Dicruridae) are new host records.

Ornithoica (Ornithoica) bistativa Maa, 1966

IRAN: 1♀, Fars Prov., ex mixture of *Hipposideros* & *Myotis* #3918–3922, XI.1963, H. W. Setzer. The host record is apparently a mislabeling or contamination.

W. PAKISTAN: 2♀♀, Hazara Distr., Dungagali, ex *Lophophanes melanolophus* (B 67499, 67501), IX.1963, A. B. Mirza. 2♂♂, 2♀♀, Hazara Distr., Shogran Kaghan Valley, ex *Mycerbas icteroides* (B 66024), VII.1963, R. Traub & M. Thompson.

NEPAL: 1♂, Pokhara, 910 m, ex bird BBM 30019, IX.1965, L. Quate.

THAILAND: 1♂, 10♀♀. Chiangmai, Doi Phahompok, ex *Alcippe poliocephala*, *Garrulax erythrocephalus*, *Hodgsonius phoenicuroides*, *Muscicapa banyumas*, *Pomatorhinus schisticeps* (2 lots), *Zosterops erythropleura* (2 lots); Chanthaburi, Khao Soidaotai, ex *Cissa thalassina*, *Pitta cyanea*, *P. soror*; Nakhonsithammarat, Khao Laung, ex *Myiophoneus caeruleus*, *Platylophus galericulatus*; ♀ ex *Hodgsonius* w. mites under wing-base.

MALAYA: 1♀, Sungei Way, ex *Centropus bengalensis*.

JAVA: 1♀, w mite on abd., Tjibodas, ex bird BBM 85453.

The records from Iran, W. Pakistan, Nepal, Java and ex *Hodgsonius*, *Pomatorhinus* (Muscicapidae), *Lophophanes* (Paridae), *Zosterops* (Zosteropidae), *Mycerbas* (Fringillidae) and *Cissa* (Corvidae) are new.

Ornithoica (Ornithoica) philippinensis Ferris, 1927

PHILIPPINES: 1♂, 3♀♀. Mindanao, Davao, Mt Mayo, ex *Rhipidura nigrocinnamomea*, *Turdus poliocephalus*, *Zoothera andromedae*.

All the above listed host records except *Turdus* are new. This species is about as large as smallest examples of *O. exilis* Wk. The criteria for the separation of the 2 species are the number and density of mesonotal punctures, relative robustness of setae on scutellum and of para-anal tuft, relative robustness of spines on mesosternum, relative size of anchor-like spines on ♀ urogenital area and shape of ♀ pregenital plate and pregenital tubercles.

Ornithoica (Ornithoica) stipituri (Schiner, 1868)

NEW GUINEA: 8♂♂, 29♀♀. Mt Lamington, Amboga R., ex *Cracticus cassicus*, *Manucodia ater*, *Melidora macrorrhina*; Lae, Singuawa R., ex *Alcyon azurea*, *Cracticus cassicus*, *Sauromartia gaudichaud*; Jumbora Pltn., ex *Dicrurus bracteatus*, *Halcyon sancta*, *Melidora macrorrhina* (3 lots); Soputa R., w. fungus, ex *Halcyon sancta*; Wau, Edie Creek, ex birds BBM 52260, 52580; Wau, Mt Missim, ex bird-of-paradise BBM 24621.

Ornithoica (Ornithoica) exilis (Walker, 1861)

THAILAND: 1♂. Chanthaburi, Khao Soidaotai, ex *Glaucidium brodiei*.

MALAYA: 3♀♀ (1 w. mite). Selangor, Kuala Lumpur, ex *Centropus sinensis*, *Pholidus b. badius*.

INDONESIA: 1♀, Lesser Sunda Is., Mojo I., ex bird BBM 85255.

PHILIPPINES: 15♂♂, 39♀♀. Luzon, Nueva Vizcaya, ex *Eurystomus orientalis*; Luzon, Laguna, Balian, ex *Ninox scutulata*; Luzon, Mt Makiling, ex *Dicrurus balicassius*; Tambo Munai, ex *Centropus viridis*; Mindanao, Davao, Mt Mayo, ex *Accipiter trivirgatus extimus* (2 lots), *Artamus leucorhynchus*, *Centropus v. viridis* (2 lots, 1♂ w. mite), *Chalcophaps i. indica*, *Chrysocolaptes lucidus* (8 lots, 1♀ w. mite), *Corvus macrorhynchos philippinus*, *Dicrurus hottentottus striatus*, *Dryocopus javensis*, *Eurylaimus s. steerii*, *Halcyon hombroni* (5 lots), *H. smyrnensis gularis* (2 lots), *Harpactes a. ardens* (4 lots), *Macropygia (Phasianella) tenuirostris* (2 lots), *Merops viridis americanus*, *Otus* sp., *Penelopides panini affinis*, *Prioniturus* sp., *Ptilinopus occipitalis*, *Spilornis cheela holospilus* (2 lots), *Sarcops calvus melanotus*.

NEW GUINEA: 16♂♂, 71♀♀, 1♂. Biak I., Mangrowawa (1♀ w. malloph. & mite), ex black-tailed corvid; Mt Lamington, Amboga R., ex *Centropus bernsteini*, *Cracticus cassicus* (1♂ w. mite), *Henicopernis longicauda*, *Melidora macrorhina*, *Larus roratus*, *Manucodia ater*, bird BBM 25156; Mt Lamington, active volcano, ex *Centropus* sp.; Lae, Singuawa R., ex *C. bernsteini* (1♀ w. fungus, 3♀ w. mites), *Dicrurus bracteatus*, *Megapodius freycinet* (1♀ w. mite), *Probosciger aterrimus*, *Sauromarptis gaudichaud* (2 lots), birds BBM 24665, 24761. Milne Bay, Sinaeada, ex *Dicrurus bracteatus*, *Halcyon sancta*, bird BBM 24544 (1♀ w. fungus); Jumbora Pltn., ex *Centropus* sp., *Dicrurus bracteatus*, *Halcyon sancta* (2 lots), *Melidora macrorhina* (3 lots, 1♀ w. 2 Mallophaga, 1♀ w. mites), *Merops philippinus*; Soputa R., ex *Dicrurus bracteatus*, *Halcyon sancta* (1♂, 1♀ w. mites), *Macropygia* sp., *Ninox rufa* (1♀ w. mite), bird BBM 25040 (4♀ w. mites on necks).

Ornithoica (Ornithoica) podargi Maa, 1966

NEW GUINEA: 8♂♂, 36♀♀, 6♂♂. Mt Lamington, Amboga R., ex *Podargus ocellatus*; Jumbora Pltn., ex *Aegotheles insignis*, *Podargus papuensis*. Soputa R., ex *Ninox rufa*.

The genus *Aegotheles* and family Aegothelidae are new host records. The genus *Ninox* probably also serves as a breeding host, since that from Soputa R. (BBM 24959) revealed 5♂♂, 15♀♀ of *O. podargi* (5♂♂, 2♀♀ of these are w. fungus).

Ornithoica (Ornithoica) pusilla (Schiner, 1868)

As pointed out previously (Maa 1966: 96), this species is endemic and widely spread over the Central Pacific atolls and small islets on marine and aquatic birds. For new host and distributional records, see Maa (1968: 325).

Ornithoica (Lobolepis) submicans Maa, 1963

PHILIPPINES: 1♀, Mindanao, Davao, Kibawalan, ex bird SU-BBM 210.

Ornithoica (Lobolepis) curvata Maa, 1963

THAILAND: 3♂♂, 6♀♀. Chanthaburi, Khao Soidaotai, ex *Anthracoceros albirostris*, *Centropus sinensis*, *Garrulax leucolophus*, *Phragmaticola aedon*, *Picus vittatus* (in 2 lots).

MALAYA: 1♂, 2♀♀. Selangor, ex *Centropus sinensis* (BL 3186), 1♀ w. mites under wing-base.

CEYLON: 2♂♂, 1♀ (BMNH), Uva Hills, 600 m, ex *Accipiter trivirgatus*.

The records from Malaya and Ceylon and ex *Garrulax*, *Phragmaticola* (Muscicapidae) are new to the species.

Ornithoica (Lobolepis) hirtisternum Maa, 1963

NEW GUINEA (SW): 1♂, Onin Penin., Bomberi, ex bird TMP 022.

Ornithophila metallica (Schiner, 1864) Fig. 2-5.

The puparium of this genus appears to be heretofore unknown. A description follows.

Length $2.8 \pm$ mm, breadth $2.3 \pm$ mm, thickness $1.4 \pm$ mm. Broadly oboval, widest at a point of *ca* anterior 1/3; in lateral view long, oboval, with almost straight ventral margin. Surface bare, moderately shining, with minute network of engraved lines and numerous shallow punctures which are uniform in size but not quite so in density, many arranged in irregular transverse series and interspaced by a distance *ca* $2 \times$ punctural diameter; discal punctures slightly sparser than lateral ones. Anterior end ventrally with a broadly elliptical buccal papilla which is transversely wrinkled and with median slit. Anterior 1/4 of lateral margin distinctly keeled and partly situated very close to buccal papilla. Posterior "cap" small, transverse, somewhat hexagonal, its discal depression rather deep, transversely elliptical, with pair of pale minute pits ("buttons") at sides; median groove evenly broad, irregularly rugose; lateral oblique grooves broad, narrowed and shallowed concentrically, not meeting lateral pits of discal depression of cap. Polyneustic sectors subequal in size to one another, each with $25 \pm$ scattered pores arising from minute papillae. Described from a fully matured puparium from Bechuanaland and several fully grown larvae dissected from New Guinea ♀♀.

Differing from puparium of *Ornithoica* in having (1) body distinctly narrowed caudad and in profile not ventrally convexly curved, (2) lateral margin of body not evenly keeled along its full length, (3) lateral pits of posterior cap not lying inside discal depression. Differing from puparium of most species of *Ornithomya* in points (1) and (2) mentioned above and in having polyneustic pores within each polyneustic sector not arranged in single series.

Ornithomya avicularia avicularia (Linnaeus, 1758)

W. PAKISTAN: 1♂, 2♀♀ (1♀ w. mallophagan), Hazara Distr., Dungagali, ex *Garrulax albogularis whistleri* (B 67500), IX.1963, A. B. Mirza. 7♂♂, 6♀♀, Hazara Distr., Shogran Kaghan Valley, ex *Mycerbas icteroides* (B 66024), VII.1963, R. Traub & M. Thompson.

W. Pakistan and the genus *Mycerbas* (Fringillidae) are records new to the species. The "*avicularia* Linn." from Australia (Beq. 1953: 327, Maa 1962: 593) is referable to *O. avicularis nigricornis* Erichs. which is noticeably larger and differs in details of palpus, legs and abdominal chaetotaxy from the nominotypical form.

Ornithomya fuscipennis Bigot, 1885

MATERIAL. 29♂♂, 97♀♀.

ASSAM: 1♂ (Zool. Surv. India), Upper Assam, labeled as "type of *Ornithomyia altiliaria* Speiser", which is an unpublished manuscript name.

BURMA: 2♀♀ (GNV). Carin, 1200–1400 m, ex *Pyrotrogon* [*Harpactes*] *erythrocephalus* & “un Picchio”, 1888–89, L. Fea.

THAILAND: 7 ♂♂, 27 ♀♀. Chiangmai, Doi Inthanon, ex *Harpactes erythrocephalus*, *Myiophoneus caeruleus temminckii*, *Otus bakkamoena*, *O. spilocephalus* (2 lots), *Pholidus badius*, *Turdus obscurus*; Chiangmai, Doi Pui, ex *Glaucidium brodiei*, *Otus spilocephalus* (3 lots); Chiangmai, Phahompok, 2000 m, ex *Batrachostomus hodgsoni*, *Cuculus sparverioides*, *Garrulax erythrocephalus*, *Otus bakkamoena* (3 lots), *O. spilocephalus* (3 lots).

MALAYA: 3 ♂♂, 9 ♀♀. Selangor, ex *Otus scops*; Mt Brinchang, Cameron Highlands, ex *Harpactes erythrocephalus*, *Muscicapa grandis*, *Otus spilocephalus* (7 lots).

SUMATRA: 1 ♂, 1 ♀ (GNV). Si-Rambé, 1890–91, E. Modigliani.

JAVA: 3 ♀♀. Tjibodas, ex birds BBM 85345, 85367.

BORNEO: 1 ♀ (CNHM).

PHILIPPINES: 17 ♂♂, 27 ♀♀. Leyte, Mt Lobi Range, Tambis Burauen, ex *Harpactes ardens lineae*; Mindanao, Agusan Prov., Mt Hilong-Hilong (Balangbalang; Hanggos; Cabadbaran), ex *Halcyon hombroni*, *Harpactes a. ardens* (6 lots), *Irena cyanogaster hoogstraali* (2 lots), *Phapitreron amethystina mindanaoensis*; Mindanao, Cotabato Prov., Mt Matutum, Tupi, ex *Accipiter trivirgatus extimus*, *Chrysocolaptes l. lucidus*, *Halcyon hombroni*, *Harpactes a. ardens* (2 lots); Mindanao, Davao Prov., Malalag, Kibawalan, ex *Harpactes a. ardens*; Mindanao, Davao Prov., Mt Mayo, Limot Mati, ex *Cacomantis m. merulinus*, *Halcyon hombroni* (2 lots), *Harpactes a. ardens* (3 lots), *Macropygia phasianella tenuirostris*, *Otus bakkamoena*, *Phapitreron amethystina mindanaoensis* (2 lots), Mindanao, Zamboanga del Norte, Mt Malindang, ex *Halcyon hombroni*, *Hypocryptadius cinnamomeus malindangensis*, *Phapitreron amethystina malindangensis*, *Turdus poliocephalus malindangensis* (2 lots); Palawan, Brooke's Point, Mantalingajan Range, ex *Otus bakkamoena*; Palawan, Puerto Princessa, ex *Anthus gustavi*.

HONG KONG: 1 ♀. Maipo Marshes, ex *Emberiza rutila*.

TAIWAN: 10 ♂♂, 29 ♀♀. Alishan, Chiayi hsien, 1800 m, ex *Strix aluco yamadae*; Changhwa City, ex *Garrulax canorus taewanus*; Hualien City, ex *Nycticorax n. nycticorax*; Liukuei, Kaohsiung hsien, ex *Accipiter trivirgatus formosae*, *Chalcophaps indica*, *Glaucidium brodiei pardalatum*, *Gorsakius m. melanolophus*, *Myiophoneus horsfieldi insularis* (4 lots), *Ninox s. scutulata*, *Otus scops botelensis*, *Turdus dauma aureus* (3 lots), *Urocissa caerulea*; Nan-Ao, Yilan hsien, ex *Accipiter trivirgatus formosae*; Puli, Nanto hsien, ex *Dendrocitta f. formosae* (2 lots), *Otus bakkamoena glabripes*, *Turdus dauma aureus*; Tzepeng, Taitung hsien, ex *Otus bakkamoena glabripes* (2 lots), *Turdus dauma aureus*; Wulai, Taipei hsien, ex *Ketupa flavipes magnifica*, *Ninox scutulata japonica*; Wushe, Nantou hsien, ex *Alcippe nipalensis morisonia*, *Otus spilocephalus*.

NEW GUINEA: 8 ♂♂, 16 ♀♀. Ambunti, Sepik Distr., ex *Mino dumontii*; Bomberi, Onin Penin., ex corvid; Enarotali, ex black-bird BBM 21428, owl BBM 21525; Kebar Valley, Vogelkop Penin., ex bird BBM 143; Korgua, W. Highlands, ex dove BBM 28191; Nakata Ridge, ex frogmouth BBM 27794, small bronze-winged pigeon BBM 28566; Sibil, Star Mt Range, at light; Tari, S. Highlands, ex *Ninox theomacha*, *Tyto tenebricosa* (2 lots); Uinba, Kubor Range, ex *Podargus papuensis*; Wau, ex frogmouth BBM 20483, honeyeater BBM 20484, owl.

SOLOMON IS.: 1 ♀. Kolombangara, Gollifer's Camp, ex *Zosterops rendovae*.

Habitats. Widely spread over Oriental Region; at present, definitely known from Assam and Burma in the west, New Guinea, Solomon Is. and eastern Australia in the east, China Proper and Taiwan in the north. Probably breeding on Accipitridae, Columbidae, Strigidae, Trogonidae, Alcedinidae and Muscicapidae. Analysis of available host data follows. Ardeidae 2 records (*Gorsakius* 1, *Nycticorax* 1); Accipitridae (*Accipiter*) 3, Falconidae (*Falco*) 1; Columbidae 8 (*Chalcophaps* 1, *Macropygia* 1, *Phapitreron* 4, genera indet. 2); Psittacidae (*Platycercus*) 1; Cuculidae 3 (*Cacomantis* 1, *Cuculus* 2); Strigidae 41 (*Glaucidium* 2, *Ketupa* 1, *Ninox* 4, *Otus* 27, *Pholidus* 1, *Strix* 1, *Tyto* 2, genera indet. 2); Podargidae 4 (*Batrachostomus* 1, *Podargus* 1, genera indet. 2); Trogonidae (*Harpactes*) 16; Alcedinidae 6 (*Dacelo* 1, *Halcyon* 5); Picidae (*Chrysocolaptes*) 1; Muscicapidae 20 (*Alcippe* 1, *Emberiza* 1, *Garrulax* 2, *Muscicapa* 1, *Myiophoneus* 5, *Turdus* 9, genus indet. 1), Motacillidae (*Anthus*) 1, Irenidae (*Irena*) 2, Meliphagidae (genus indet.) 1, Zosteropidae 2 (*Hypocryptadius* 1, *Zosterops* 1), Sturnidae (*Mino*) 1, Corvidae 4 (*Dendrocitta*, *Urocissa* 1, genus indet. 1), Ptilonorhynchidae (*Sericulus*) 1. Besides these, the "*avicularia* Linn." listed by Bequaert (1953: 327) as from "tropical Asia" from Strigidae (*Otus*), Trogonidae (*Harpactes*), Muscicapidae (*Elachura*) and Corvidae (*Kitta*=*Cissa*) is most probably referable to *fuscipennis* instead, since true *avicularia* obviously does not breed in lowlands of the tropics. Not as in *avicularia*, the population density of *fuscipennis* on infested birds is usually very low. The host preference of the species is also rather different from that of *avicularia*.

Affinities. The type of *fuscipennis*, wrongly stated to have been from "Colombia", was first re-examined by Speiser (1902b: 167) who concluded it differs from *perfuga* Speis. in having "etwas schlankere und namentlich spitzere Schulterdornen, sowie dadurch, dass die Costalis, besonders zwischen der Mündung der Subcostalis und der Radialis gelbbraun statt schwarzbraun wie die übrigen Adern ist". Later, Bequaert (1954: 120) and Maa (1963: 35), on basis of the unique type, suppressed *perfuga* Speis. as its synonym. The species is closely related to *avicularia* Linn. but larger, face narrower, palpus more slender, hind tarsus more slender and with more numerous sensilla, laterite 2 with longer and more numerous bristles, ♀ urogenital area fenced by more numerous bristles and side-piece of tergite 6 narrower and with fewer setae. The ♂ genitalia of the 2 species are practically identical, while the puparia are easily distinguishable — in *fuscipennis*, the pneustic pores on each sector of posterior "cap" are numerous and rather evenly distributed, not arranged in double curved series.

***Ornithomya apelta* Maa, new species** Fig. 6-14.

MATERIAL. 3♀. NE NEW GUINEA: Holotype (BISHOP 7602), Wau, 1200 m, ex New Guinea Broadbill (H.C. 83), III.1962, H. Clissold. SOLOMON IS.: Paratype ♀, Kolombangara, Gollifer's Camp, 720± m, ex *Zosterops rendovae* (BBM 23355), I.1964, P. Temple. PHILIPPINES: 1♀ (not included in type series), Mindanao, Cotabato, Tupi, Kablon, Mt Matutum, 1200-1700 m, ex *Z. montana* (#2079), IV.1966, N. Wilson.

Habitats. Found sporadically in the Oriental Region; at present, known from the Philippines, New Guinea and Solomon Is., 700-1700 m. Host relationships unclear, probably on small passerine birds.

Affinities. Immediately recognizable from other members of the *Avicularia* group by the absence of median plates of tergites 3-5, for which the name *apelta* (*pelte*, Greek, a

small light crescent-shaped shield, here referring to the median tergal plate) is suggested. In size and other general features, the new species is, among known forms of the genus, apparently closest to *fringillina* Curt. Besides lacking those plates, it differs from the latter species in having head broader, postoccipital setal line interrupted, palpus broader, scutellar bristles more numerous (? constant), last abscissa of costa much shorter, sensilla on segment 5 of hind tarsi fewer, side-pieces of tergite 6 much narrower and partly enclosing spiracles 6 and ♀ urogenital area fenced by stronger and more numerous bristles. The lack of dark markings on venter of head probably also serves as a convenient character. The single ♀ from the Philippines probably represents a geographical race. It is slightly smaller, with fewer vibrissal spines and lateral abdominal bristles, and narrower tergite 6.

Description. ♀. Dorsum of head and thorax brownish, antennal appendage blackish. Venter of head (fig. 6) lacking definable dark markings, anteriorly slightly paler; 4-6 strong vibrissal spines; 6 gular spines; postoccipital setal line widely interrupted. Palpus (fig. 7) broad, unevenly setose. Width of head vs length from frontal notch to occipital margin 40 : 33; length of

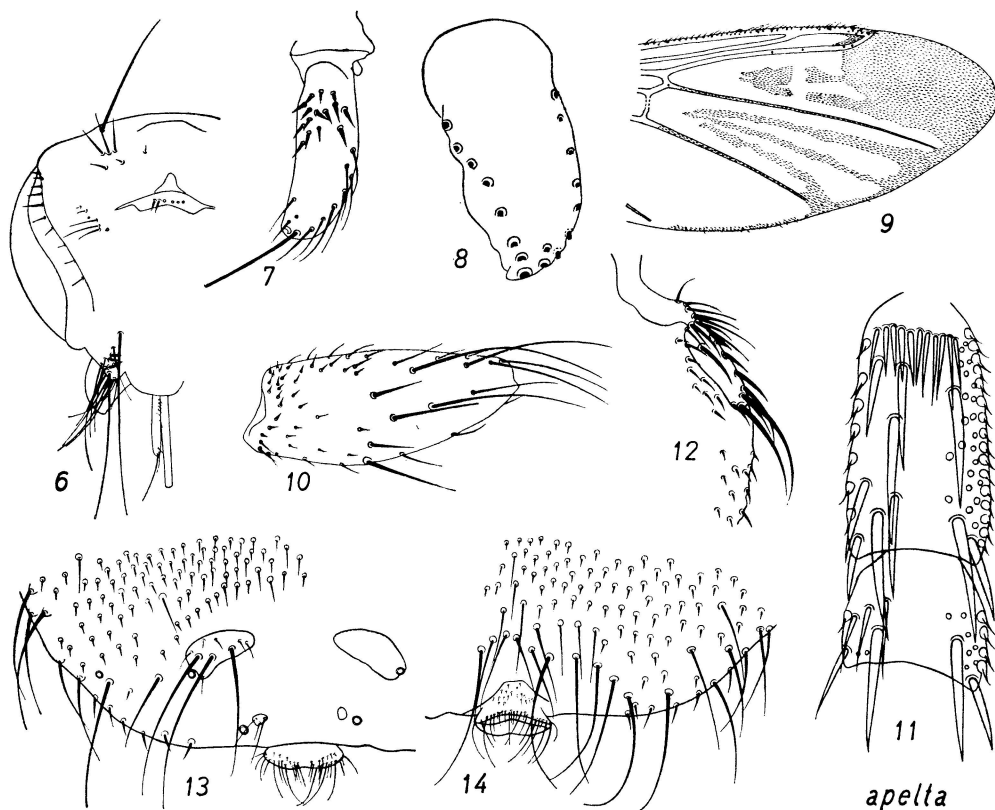


Fig. 6-14. *Ornithomya apelta* n. sp., holotype ♀: 6, venter of head, omitting setae on antenna; 7, palpus; 8, antenna; 9, wing; 10, fore femur, anterior surface; 11, hind tarsus, basal segments, ventral view; 12, anterolateral area of abdomen, ventral view; 13, abdominal apex, dorsal view; 14, ditto, ventral view.

eye vs greatest width of eye (in front view of head) vs smallest width of face 24 : 12 : 16. Face narrowest at level of ptilinal suture; inner orbit wider than in average specimens of *fringillina*. Antenna (fig. 8) relatively broader than in *fringillina*. Anterior thoracic spiracle normal. Median length from anterior mesonotal margin to posterior scutellar margin vs interdistance of outer notopleural margins 44 : 53; 1 small presutural, no supra-alar, 3 postalar (1 large, 2 very small), 2 posterior dorsocentral (1 very small) and 6 scutellar bristles; innermost pair of scutellars *ca* as long as but finer than notopleural, and *ca* $2\times$ as long as 2nd pair which in turn is *ca* $1.5\times$ as long as 3rd pair. Wing (fig. 9) 4.3 mm long; setulae slightly less extensive than in average specimens of *fringillina*; cell *2m* entirely bare; last abscissa (i.e., interdistance of apices of veins R_{2+3} and R_{4+5}) of vein C unusually short; M_{1+2} and M_{3+4} both extensively setulose; *im* fairly long; relative widths of cell *2bc* at levels of veins *mcu* and *im* *ca* 4 : 12.5; *3bc* long, with acute antero-apical angle; alula 14 : 16, *ca* as large as cell *3bc*, relatively longer, narrower than in *fringillina*. Femur 1 (fig. 10) much shorter (37 : 46) than 3, anterior surface similarly setose as in *fringillina*; femur 2 as long as 3; tibia 2 hardly shorter (41 : 43) than 3. Tarsus 3 (fig. 11) with single row of dense setae forming basal comb on venter of segment 1, with 3 spine-like setae beneath each of segments 2-4; segment 5 with *ca* 3 and 4 sensilla on anterior and posterior margins respectively. Abdomen (fig. 12-14) with comparatively stronger setae than in *fringillina*; no trace of any median tergal plates; side-piece of tergite 6 narrow, enclosing spiracle 6, with *ca* 7 small setae and 3 bristles; side-piece of tergite 7 roundish, with 3 setae. Urogenital area anteriorly fenced by stronger and more numerous bristles than in *fringillina*. Pregenital plate subtriangular; postgenital plate bearing $20\pm$ small spiniform setae, not flanked by small spines.

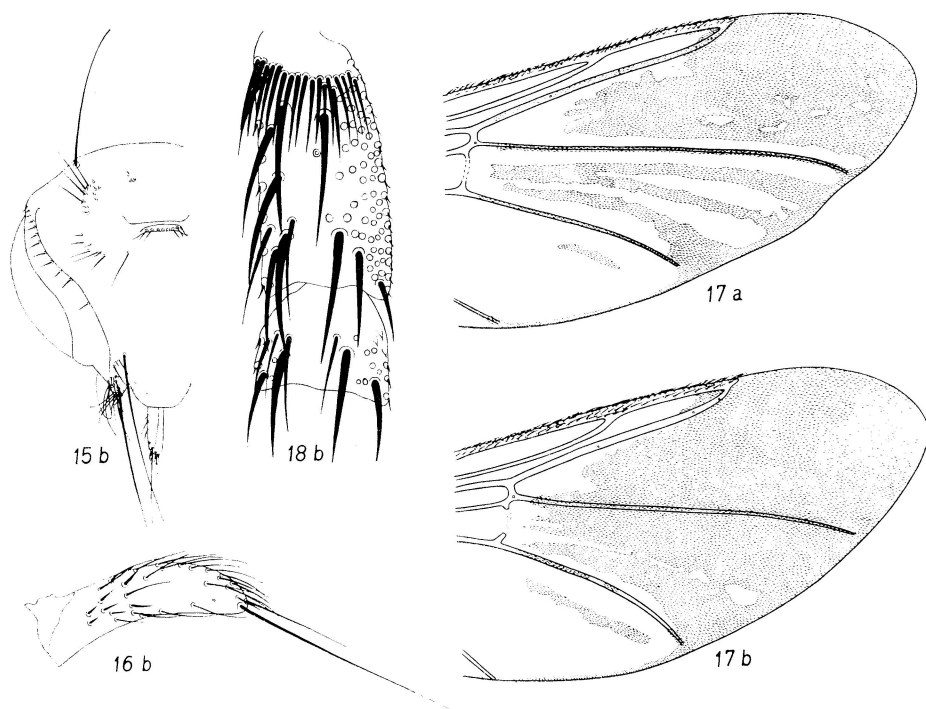


Fig. 15-18. *Ornithomya anchineuria* Speis. (a), Osgoode, Ontario, ex bronzed grackle and *O. bequaerti* n. sp. (b), St Paul, Alberta, ex magpie, ♀♀. 15, venter of head, omitting setae on antenna; 16, palpus; 17, wings, in same scale; 18, hind tarsus, basal segments, ventral view.

♂ unknown.

Ornithomya anchineuria Speiser, 1905 Fig. 15a-22a.

This species is so closely related to *chloropus* Bergr. of the Palaearctic Region that it should perhaps be rated as a subspecies of the latter. More significant differences of the 2 forms are the presence or absence of black markings on venter of head, average number of vibrissal spines and scutellar bristles, extent of wing-setulae and details of abdominal chaetotaxy. The accompanying figures, for comparison against *bequaerti* n. sp., are based upon a ♀ from Ontario, Osgoode, ex *Quiscalus quiscula aeneus*.

Ornithomya bequaerti Maa, new species Fig. 15b-22b.

MATERIAL. 5♂♂, 10♀♀. Holotype ♀ and most paratypes in Canadian National Collection, Ottawa; paratypes (1♂, 3♀♀) (BISHOP).

CANADA: Holotype ♀, NW Territory, Fort Simpson, McKenzie R., IX.1922, C. H. Crickmay. Paratype, 1♀, Brit. Columbia, Salmon Arm, ex *Bonasa umbellus togata*, IX.1924, E. R. Buckell. 1♂, 1♀, Alberta, St Paul, ex *Pica pica hudsonia*, VIII.1948, A. E. Sovereign. 1♂, Alberta, Tilly, on Alfalfa leaves, VI.1938, R. W. Salt. 1♀, Saskatchewan, Muscow, ex cage tree-sparrows [*Spizella*] & juncos, X.1930, R. H. Carter. 1♂, Low Bush, Lake Abitibi, ex *Bonasa umbellus togata*, VII.1925, N. K. Bigelow. 1♀, Ontario, Macdiarmid, ex *Aegolius a. acadicus*, VII.1922, Bigelow. 1♀, Ontario, Ottawa, ex *Colaptes a. afer*, VIII.1949. 1♂, 1♀, Ontario, Smoky Falls, Kapuskasing, ex *Carpodacus p. purpureus*, VII.1934, R. V. Whelan; 1♂, 1♀, *id.*, *Zonotrichia albicollis*. 1♀, Ontario, Westree, VII.1929, H. S. Fleming.

Habitats. Widely distributed in Canada and the United States, on small passerine birds particularly Fringillidae. The occurrence on Strigidae (*Aegolius*), Picidae (*Colaptes*), Phasianidae (*Bonasa*) and Corvidae (*Pica*) as listed above is probably accidental or occasional. Several years ago I saw a number of specimens from the United States, but I did not keep their collection data. The distributional and host ranges of this species, though not yet clear regarding their exact limits, most probably overlap extensively that of *anchineuria* Speis. with which it has long been mixed up in collections and in literature. And in one case (Alberta, St Paul, I.VIII.1948), the 2 species were, as labeled, both found on *Pica pica hudsonia* (? on same individual bird). It is also likely that the occurrence of *bequaerti* in northern Canada is seasonal since none of the above listed specimens were collected in winter, early spring or late autumn.

Affinities. As mentioned above, this species has long been confused with *anchineuria* Speis. due to the superficial similarities in body size, color pattern and general structural features and to the overlapping (if not coincidence) of distributional and host ranges. The criteria of their separation are the average number of vibrissal spines, extent and distribution of wing-setulae, relative length of lateral abdominal setae near spiracles 3 and 4, relative length and average number of bristles on and near abdominal apex, shape of side-piece of tergite 6 and site of abdominal spiracles 6 and 7 (see figures). Most of these characters cannot be seen with ease in dry, shriveled or non-engorged specimens and have, therefore, been overlooked by previous workers. For instance, Bequaert (1954: 141-146) gave a lengthy discussion on the wing length, relative width of interocular face,

size of ocelli, distribution of wing-setulae, venation, number of vibrissal bristles, size and shape of median tergal plates, shape of parameres and color pattern of the 2 N. American species against *fringillina* Curt., *chloropus* Bergr. (= *lagopodis* Sharp) and *avicularia* Linn. of Europe and reached the conclusion there was only one variable small *Ornithomya* species (*fringillina*) to be found all over the Holarctic Region. On the other hand, Smart (1939: 119) and Hill (1962: 12-17) separated the 2 British forms of small *Ornithomya* (*fringillina* and *chloropus*=*lagopodis*) by color pattern, wing length, distribution of wing-setulae, average number of scutellar bristles and size of puparia. These characters, as those selected and employed by Bequaert, have the advantage of being easily observable regardless the state of preservation of the specimens in question. But with exception of the distribution of wing-setulae, none of them is useful for the differentiation of the 2 N. American species. *Bequaerti* stands as an intermediate form between *fringillina* on one hand, and *chloropus* plus *anchineuria* on another, and appears to be most closely related to *fringillina* from which it can easily be recognized by larger size, more extensive wing-setulae, much more elongate side-pieces of tergite 6 and stronger abdominal chaetotaxy. The species is named in honor of Prof. Joseph C. Bequaert, formerly of Harvard University, for his valuable contributions (1926-57) to the knowledge of Hippoboscidae.

The selection and application of the name *anchineuria* Speis. (nom. nov. pro *pallida* Say 1823 non *pallida* Latr. 1812, *pallida* v. Olfers 1816) for the more richly setose of the 2 N. American *Ornithomya* species is more or less arbitrary. The type is lost and the original description is equally applicable to both species. The only helpful point suggested by Say was the type host being *Sialia s. sialis* Linn. (Muscicapidae) of the United States (no precise locality). Since muscicapids (s.l.) are apparently more preferred by the more richly setose *Ornithomya* than by the less richly setose one, the name *anchineuria* is here used for the former.

Description. ♀. Dorsum of head and thorax brownish, antennal appendage (base) and ocellar triangle often blackish. Venter of head (fig. 15b) lacking definable dark markings, practically uniformly pale; 0-4 (usually 2 or 3) moderately long vibrissal spines; 5-9 (usually 7 or 8) gular spines; postoccipital setal line widely interrupted at middle. Palpus (fig. 16b) fairly narrow, with slightly longer basal setae than in *anchineuria*. Width of head vs length from frontal notch to occipital margin 40:33.5; length of eye vs greatest width of eye (in front view of head) vs smallest width of interocular face 23:10.5:17.5. Face narrowest at level of ptilinal suture; inner orbit hardly narrower than in average specimens of *anchineuria*. Anterior thoracic spiracle relatively shorter, broader than in *anchineuria*. Median length from anterior mesonotal margin to posterior scutellar margin vs interdistance of outer margins of notopleura 49:56; 1-3 small pale presutural, no supra-alar, 3 postalar (1 large, 2 small and pale), 1 posterior dorsocentral and 4 (occasionally 6) scutellar bristles; inner pair of scutellars usually 1.3-1.5× as long as outer pair and subequal in length to but slightly finer than notopleural. Wing (fig. 17b) 4.4-5.0 mm long; setulae more extensive than in *anchineuria*; cell *3r* lacking bare strip along posterior margin; *1m* at most with 2 bare strips (4 in *anchineuria*), the median one narrow and often short, interrupted at middle or even entirely absent; last abscissa of vein C normal in length, M_{1+2} and M_{3+4} both extensively setulose, *im* fairly long; relative widths of cell *2bc* at levels of veins *mcu* and *im* ca 4:9; *3bc* long, with acute antero-apical angle; alula 16×7, distinctly smaller than cell *3bc*. Femur 1 (fig. 19b) much shorter (41:49:55) than 2 and 3, anterior surface slightly more richly setose than in *anchineuria*; tibia 2 slightly shorter (43:47) than 3. Tarsus 3 (fig. 18b) with single row of dense regularly arranged setae to form basal comb on venter of segment 1, with 4 heavy spine-like setae beneath each of segments 2-4; segment 5 with ca 5 and 9 sensilla on anterior and posterior margins, respectively. Abdomen (fig. 20b-22b) with fewer,

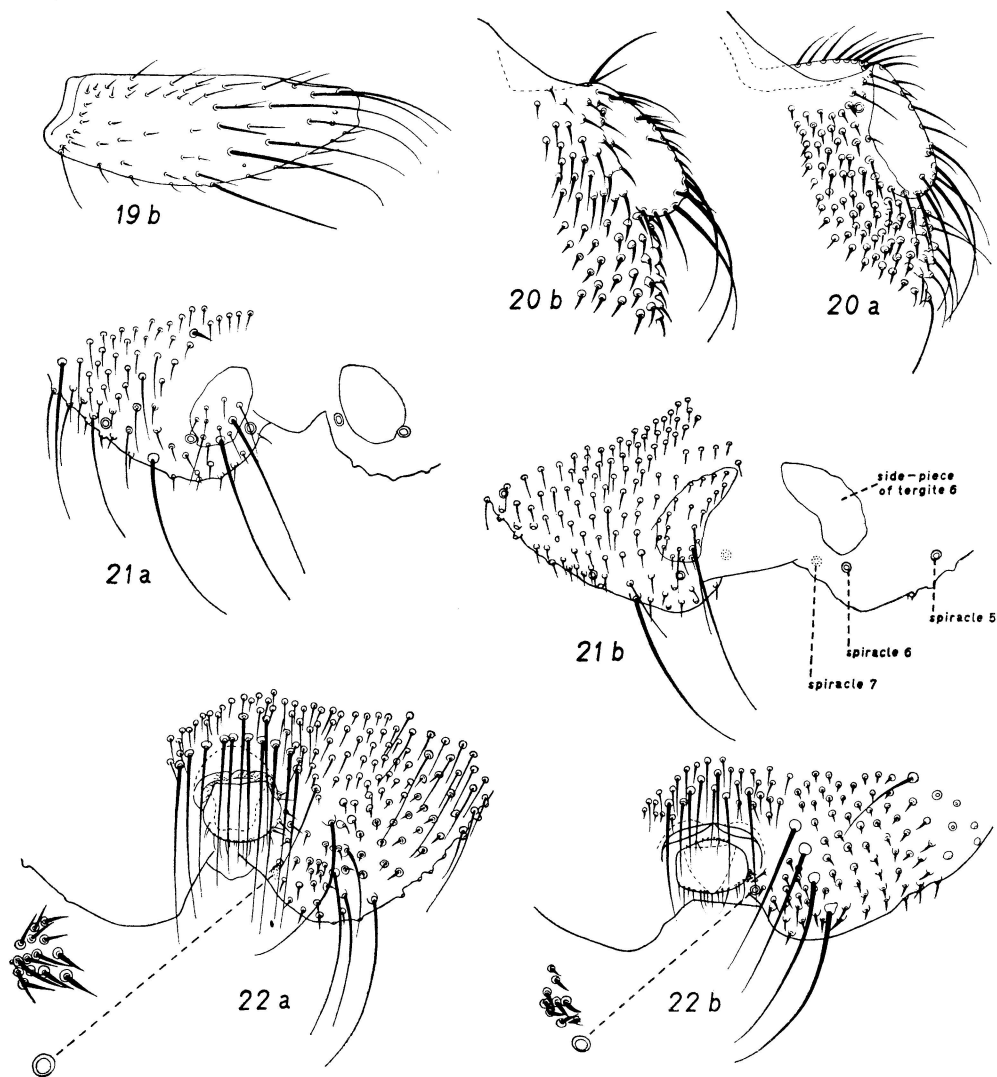


Fig. 19-22. *Ornithomya anchineuria* Speis. (a) and *O. bequaerti* n. sp. (b), ♀♀. 19, fore femur, anterior surface; 20, anterolateral areas of abdomens, ventral view; 21, abdominal apices, dorsal view; 22, ditto, ventral view, with patch of spines at side of anus and near spiracle 7 more enlarged; otherwise all figures in same scale.

weaker setae-bristles than in *anchineuria*; median tergal plates well developed; side-piece of tergite 6 more than $2\times$ as long as wide, much narrowed forward, surface bearing *ca* 20 short setae and 2 long bristles; side-piece of tergite 7 elongate, its spines much shorter than in *anchineuria*; spiracle 6 rather apart from side-piece of tergite 6; ventral membranous area near spiracle 2 with strong setae which are much longer than those on median ventral area and than those in *anchineuria*; lateral membranous area near spiracles 3 and 4 with no or very few bristles; bristles forming anterior fence of urogenital area much shorter than in *anchineuria*. Pregenital plate

subtriangular; postgenital plate bearing $30 \pm$ spiniform microsetae.

♂. Similar except sexual characters. Bristles on lateral and posterior abdominal areas and on tergites 5-6 fewer and more or less shorter than in ♂ *anchineuria*; genitalia practically identical to that in *anchineuria*.

***Ornithomya fringillina* Curtis, 1836**

BELGIUM: 1♀ (BRX), Oudler, ex bouvreuil (bullfinch).

ITALY: 1♀ (MLN), Portici, no host. Probably this is the first definite record of this species for Italy. The "*fringillina* Curt." of Australia (Beq. 1954: 134, Maa 1962: 596) should be corrected to *O. opposita* Wk. (= *variegata* Bigot) which is so closely similar to *O. chloropus* Bergr. that the latter may probably be considered a subspecies of *opposita*. More material is necessary to decide the true status of the 2 nominal species.

***Ornithomya biloba* Dufour, 1827**

NEPAL: 3♀♀, Pokhara, 910 m, ex bird BBM 30059-62, 30068-75, 30092, IX.1965, L. Quate & R. Mitchell.

New to Nepal. In addition, I saw 1♀ (MLN) labeled "Macou" (no other details) which perhaps referred to Macon in eastern central France or Macao or Macau in Kwangtung, S China. The spine-like setae on its abdominal apex are slightly weaker than in average specimens from Europe, but I have no doubts regarding its identity. The "*biloba* Duf." doubtfully recorded by me (1962: 596) from Australia is a new species to be published soon by the late Dr. S. J. Paramonov. Its wing-setulae are more extensive and the spines and bristles at ♀ abdominal apex fewer, shorter and with much smaller basal papillae than in true *biloba*.

***Ornithomya roubaudi* Séguy, 1938**

CONGO: 1♀ (MLN), "Congo. Na Cambare".

GABON: 1♂ (CNHM), M'Bigou, Mt du Chaillu, ex *Pedilorrhynchus comitatus* (#669), VII.1951, H. A. Beatty.

New to Gabon. The host record *Pedilorrhynchus* (Muscicapidae) is apparently a stray or contamination. The species is closely related to *comosa* Aust. but, besides other structural details, can be immediately recognized by distinctly weaker abdominal chaetotaxy.

***Ornithomya comosa* Austen, 1930**

NEPAL: 1♀, Reu-Rapti R., Chitwan Distr., ex *Riparia paludicola chinensis* (5E 1511), XII.1964.

THAILAND: 2♂♂, 10 ♀♀, Bangkok, ex *Hirundo rustica* (MAPS 3861-75), I.1966.

MALAYA: 4♂♂, 1♀, Bentong, Pahang, ex *H. rustica* (6E 1500, etc.), II. & IX.1966.

All above listed specimens were collected by Migr. Anim. Path. Surv. They compared favorably with 2 pairs of paratypes kindly donated by the Indian Inst. Agric. Res., New Delhi. The species was unknown heretofore from Nepal, Thailand and Malaya, and from *Hirundo*.

Crataerina hirundinis (Linnaeus, 1758)

AFGHANISTAN: 2♂♂ (MCZ), Bamian, ex *Erythrura salimalii*.

SZECHWAN. 4♀♀ (MCZ), Uin-Gin (=Wenchuen) hsien nr Chengtu, no host.

TAIWAN: 1♂ (MCZ), Kodamasan nr Alishan, 2800 m, ex *Delichon urbica* subsp., VI. 1937, N. Yamada.

Hitherto unrecorded from Afghanistan, Szechwan (W. China) and Taiwan. Its occurrence on *Erythrura* (Ploceidae) is apparently accidental.

Myophthiria capsoides Rondani, 1878

PHILIPPINES: 2♀♀ (MLN), Teledo, Cebu, ex *Pelargopsis gigantea*, XI.1906. 1♂ (MCZ), "Philippines", ex coll. Oldenburg, perhaps a paratype ex coll. Osten Sacken.

This species was generally suppressed as a synonym of *reduvioides* Rndn. chiefly on the basis of wing venation. Before the genus can be thoroughly reviewed, it seems best to keep *capsoides* provisionally as a distinct species. The odd record ex *Pelargopsis* (Alcedinidae) is obviously a stray.

Myophthiria reduvioides Rondani, 1875

BORNEO: 1♀ (MCZ), Sandakan, no further details.

A direct comparison of the lectotypes of *reduvioides* Rndn. (♂) and *lygaeoides* Rndn. (♂) at Genova Mus. revealed that the former species is smaller, its wings shorter, broader in proportion, ca 1.5× (in *lygaeoides*, ca 2×) as long as wide, "concave" veins (Sc, R₂₊₃) not traceable (in *lygaeoides*, weak but distinct), median pit of lunula lying on disc (in *lygaeoides*, very close to anterior margin), postvertex squarish, anteriorly subtruncate and laterally contacting inner orbits almost for its full length (in *lygaeoides*, distinctly longer than wide, anteriorly distinctly narrowed, laterally hardly contacting inner orbits). The comparison is not conclusive particularly because the state of preservation of the 2 lectotypes (both pinned) did not permit a closer examination of the chaetotaxy of head (venter), legs and abdomen. The ♀ from "Is. Viti. D. Röder 1877" in Genova Mus. appeared to be closer to *lygaeoides* than to *reduvioides*, notwithstanding that Rondani (1878: 155) placed the very specimen under *reduvioides*.

Stilbometopa podopostyla Speiser, 1904

BRAZIL: 1♀ (LACM), Goiás, São Jose da Aliança, IV.1956, F. Truxal & K. Stager. New to Goiás State.

Stilbometopa ramphastonis Ferris, 1930

BRAZIL: 1♀ (LACM), Goiás, Formosa, 24 km E, V.1956, F. S. Truxal. New to Goiás State.

Ortholfersia phaneroneura Speiser, 1902

AUSTRALIA: 1♀ (CAS), Queensland, Burleigh Highlands, 25 km SW, X.1962, E. S. Ross & D. Q. Cavagnaro.

Ortholfersia macleayi (Leach, 1817)

AUSTRALIA: 1♀ (CAS). Victoria, E. Base, Mt Buffalo, 250 m. 2♂♂, 6♀♀ (BMNH). Queensland, Mackay; Upper Dawson R., 600 m. All lacking host records.

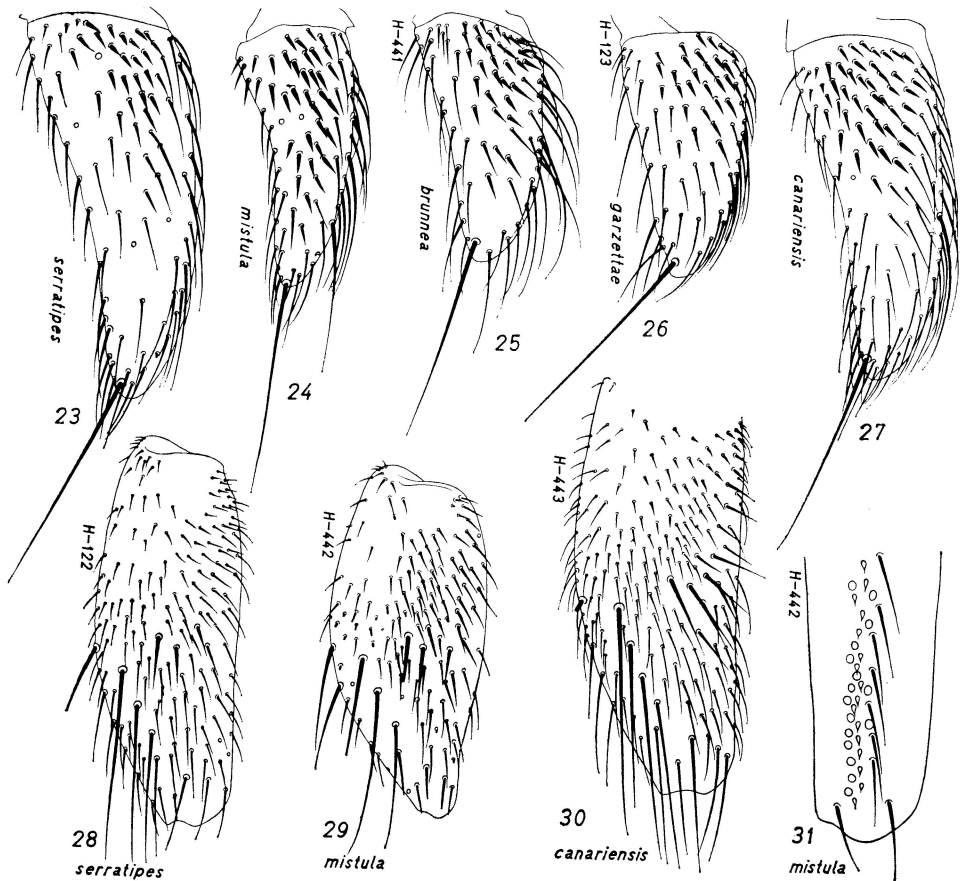


Fig. 23-31. *Pseudolynchia*, palpi (23-27), fore femora (28-30) and hind tibia (31). All palpi and all femora in same respective scales. *Ps. brunnea* Latr. (♂) from Surinam; *Ps. canariensis* Mcq. (♀), Israel; *Ps. garzettae* Rndn. (♀), Taiwan; *Ps. mistula* n. sp. (♀), New Guinea; *Ps. serratipes* Maa, (♀) New Guinea.

***Pseudolynchia serratipes* Maa, 1966**

Fig. 23, 28.

As a supplement to the original description, the palpus and fore femur are here illustrated. The vibrissal process is strongly projecting; anepisternum similar in shape as in *canariensis*, and with similar pale soft setae in addition to 1 black bristle; prescutellar bristle pale; anterior surface of fore femur uniformly covered with pale setae besides several black spines and bristles.

***Pseudolynchia mistula* Maa, new species**

Fig. 24, 29, 31, 32.

MATERIAL. 2♀♀. SE NEW GUINEA: Dobadura, ex small quail # 376, U. S. Typhus Comm. Holotype (MCZ), paratype (BISHOP).

Habitats. At present known only from SE New Guinea, possibly widely spread in Pa-

puan Subregion including northern Queensland. Host relationship unclear, perhaps as in *garzettae* and *brunnea*, on Caprimulgidae and Strigidae particularly because those birds have been little collected for ectoparasites in New Guinea.

Affinities. This is an intermediate form between *brunnea* and *canariensis*. From the former species, with which the size of body and the shape and setular distribution of wings are similar, *mistula* can be distinguished by broader interantennal area, broader interocular face, more acute palpus, finer laterocentral bristles on prescutum, broader and blunter apex of anepisternum in dorsal view, more strongly setose femora and abdomen, weaker metasternal process and denser sensoria on hind tibia. From *canariensis*, it can be recognized by smaller body size, weaker vibrissal and metasternal processes, shorter and more acute palpus, smaller prosternum, fewer laterocentral bristles, much shorter fore femur, denser and more numerous sensoria on hind tibia, and more readily by the relative size of cell 2a and setular distribution of wing. In my key (1966: 126) to species of the genus, *mistula* runs to couplet 2 which may be revised as follows.

2. Scutellum posteriorly with a short transverse series of well developed finger-like processes on each side; segment 1 of hind tarsus much shorter than $2+3+4$, with $13\pm$ sensilla loosely arranged along posterior (inner) margin, segment 4 distinctly asymmetrical, its postero-apical lobe markedly longer than corresponding antero-apical lobe... 2a
 Scutellum posteriorly with vestigial finger-like processes (diameter of which only ca 1/2 that of scutellar bristles at their bases); segment 1 of hind tarsus slightly longer than $2+3+4$, with $35\pm$ sensilla densely arranged along posterior margin, segment 4 virtually symmetrical **serratipes**
- 2a. Old World species; interantennal area of frons ca as wide as its shortest distance to eye-margin; apex of anepisternum in dorsal view broadly blunt, not conical; prosternum ca 1/2 as broad as anterior mesosternal process; interspaces of sensoria (fig. 31) on posterior surface of hind tibia almost all smaller than sensorial diameter..... **mistula**
 New World species; interantennal area of frons much narrower than its shortest distance to eye-margin; apex of anepisternum clearly conical in dorsal view; prosternum subequal in width to anterior mesosternal process; interspaces of sensoria on posterior surface of hind tibia all clearly greater than sensorial diameter **brunnea**

Description. ♀. In front view of head, interocular face ca $2\times$ ($21:9.5$) as wide as eye. Palpus (fig. 24) much shorter ($18:26$) than mediovertex, strongly narrowed apicad, surface covered with rather strong setae. Interantennal area of frons 1/4 as long (along median line) as wide; width subequal ($7:8$) to shortest distance to eye-margin. In lateral view of head, gena (i.e., area ectad to antennal pit and anteriorly to eye) $2\times$ as long as wide; vibrissal process squarish, hardly projecting. Laterocentral bristles on each side of prescutum pale, fine, in single series ($13\pm$ in number), reaching bases of prescutellar bristles, anteriorly fenced by another single series of much shorter finer setae of similar number; interspaces of basal punctures of laterocentral bristles largely more than $2\times$ punctural diameter. Anepisternum with black stiff setae plus 1 bristle; apex in dorsal view broadly blunt. Prescutellar bristle black, robust. Median length of scutellum 1/3 interdistance of bases of scutellar bristles; posterior scutellar margin practically straight, visible in dorsal view of insect, with well developed finger-like processes, and subangulate to posterolateral margin; preapical transverse carina fairly strong, straight; area posteriorly to that carina sloping down rather abruptly to posterior margin. Prosternum ("prothoracic presternum") very small, ca 1/2 as wide as anterior mesosternal process, bearing only 1 pair of small setae. Metabasisternal process shorter than wide at base, apically blunt. Wing 5.2 mm long, similar to *brunnea* in shape of cell 2a and in extent of setulae. Fore femur (fig. 29) more swollen, much shorter and with more uniform setae on anterior surface than in *canari-*

ensis. Posterior surface of hind tibia (fig. 31) with $17 \pm$ sensoria, interspaces of which largely much smaller than sensorial diameter. Segments 1-4 of fore, mid and hind tarsi with 1-0-1-0, 1-?-?-? and 2-2-2-2 apical spines, respectively. Hind tarsus (fig. 32) short, its sensilla not quite prominent; segment 1 in dorsal view slightly longer than $2+3$, with *ca* 2 and 13 sensilla on anterior and posterior margins, respectively; segment 2 slightly, 3-4 distinctly wider than long; segment 4 distinctly asymmetrical, 3 slightly so. Abdomen with stronger setae than in *brunnea* and *canariensis*; median plate of tergite 6 anteriorly truncate, posteriorly with 4-5 pairs of bristles which are distinctly more robust, though not longer, than in *canariensis*; setae fencing urogenital area longer but not significantly darker and more robust than at ventral disc; setae elsewhere on membranous area rather uniform in length and robustness. Pregenital plate longitudinally linear, hardly pigmented and sclerotized. ♂ unknown.

***Pseudolynchia brunnea* (Latreille, 1812)**

Fig. 25, 33, 34.

SURINAM: 1♂, 2♀♀ (LDN), Republiek, no host, X.1965. New to Surinam.

♂. Similar to ♀ except for sexual characters. Vibrissal process moderately projecting. Palpus as in fig. 25. Fore femur as in *mistula*. Segments 1-4 of fore, mid and hind tarsi with 1-0-0-0, 1-0-1-0 and 2-2-2-2 apical spines respectively; mid tarsus (fig. 33) similar to that in *garzettiae* but setae on anterior 1/2 of venter of segment 1 much stouter. Aedeagus and paramere (fig. 34) shorter in proportion than in *garzettiae* and *canariensis*.

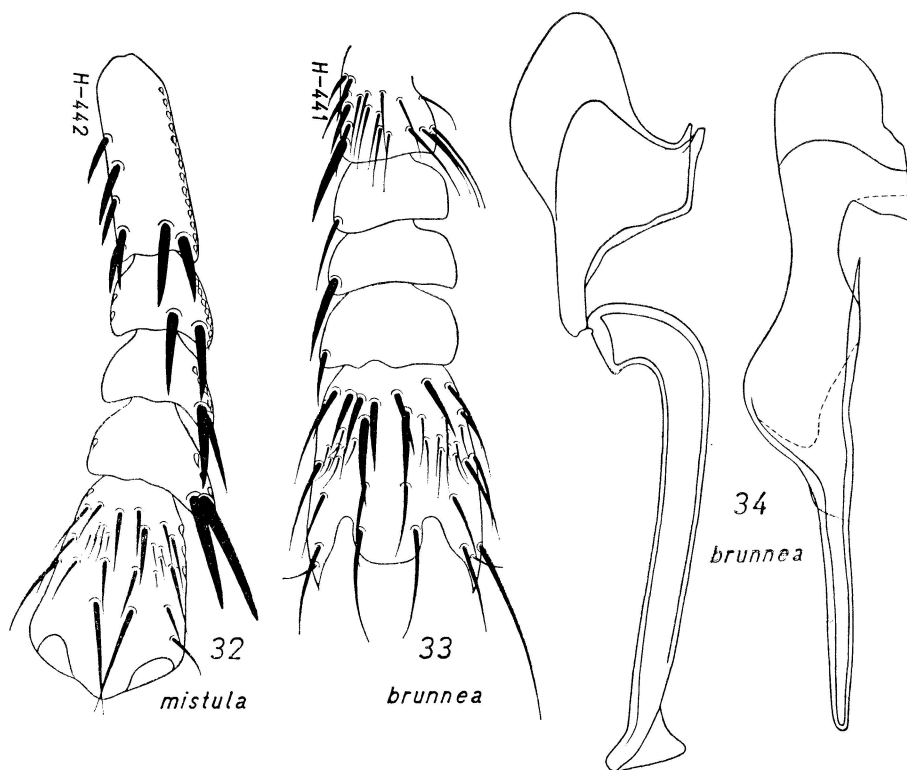


Fig. 32-34. *Pseudolynchia*, ♀ hind tarsus (ventral view, 32), ♂ mid tarsus (ventral view, 33) and ♂ genitalia (lateral view, 34).

In my earlier paper (1966: 125-40), this species is placed at the top of the genus. Following the availability of the ♂ sex of *brunnea* and the discovery of *mistula* n. sp., the arrangement of these species is readjusted. It now becomes more evident that *brunnea* and *garzettae* are very closely related both in structure and in host relationships.

Pseudolynchia garzettae (Rondani, 1879) Fig. 26.

MOZAMBIQUE: 1♂, 2♀♀, 8 km W of Mapulawguene, III.1964.

THAILAND: 1♀, Ubulrajchatani, ex *Caprimulgus macrurus* (MAPS 1168). 1♀, Chanthaburi, same host, #01941, B. King. 1♀, Chiangmei, no host (MAPS 1855).

PHILIPPINES: 1♂ (MLN), Bantayan I., ex *Caprimulgus manillensis*, IX.1906.

The palpus (fig. 26) of this species is short, broad; vibrissal process strongly projecting; anepisternum similar to that of *canariensis* but with black stiff setae; fore femur as in *mistula* and *brunnea*, rather uniformly setose.

Pseudolynchia canariensis (Macquart, 1840) Fig. 27, 30.

MALAYA: 2♂♂, 1♀, Kuala Lumpur, ex domestic pigeon.

PHILIPPINES: 1♂, Calatagan, Batangas, ex *Streptopelia bitorquata*. 1♀, Candugay, Siaton, ex *Streptopelia* sp. Both collected by Migr. Anim. Path. Surv.

INDONESIA: 1♀, Sapudi I., ex bird BBM 85262.

Although this is now a very widely distributed species, it probably has not been definitely recorded from Malaya and the Philippines. The palpus (fig. 27) of this species is fairly long and apical 1/2 of anterior surface covered with pale soft setae in contrast to those black stiff ones on basal 1/2; vibrissal process moderately projecting; anepisternum with pale soft setae in addition to 1-2 black bristles, apical lobe similar in shape as in *garzettae*; fore femur (fig. 30) with pale soft setae on apical 1/2 of anterior surface.

Microlynchia pusilla (Speiser, 1902)

MEXICO: 1♀ (LACM), Copala, Sinaloa, ex *Momotus mexicanus*, I.1947, K. Stager.

The genus *Momotus* and family Momotidae are new to the species.

Olfersia sordida Bigot, 1885

GALAPAGOS: 2♀♀. Santa Cruz I., ex *Ardea herodias cognata*, I-III.1964, P. H. Vercammen-Grandjean; Fernandina I., Punta Espinosa, II.1964, R. L. Usinger.

The genus *Ardea* (Ardeidae) is a new host record. The wing membrane of this species was said (Beq. 1957: 426) to be extensively covered by setulae (microtrichia). This is not true. The seemingly setulose area evidently results from the darkening of the membrane. The infra-anal plate is bare, posteriorly produced into 2 short, rounded, moderately sclerotized and pigmented lobes. The transversely arranged laterolateral bristles on prescutum are almost uniformly long and strong. These are characters supplementary to that enumerated by Bequaert (1957: 426, 472) and Maa (1963: 123) for this remarkable species. The puparium is undescribed. A young larva (length 2.2 mm) dissected out of a pregnant ♀ was found having no spines on its surface.

Olfersia fumipennis E. Sahlberg, 1886

CANARY IS.: 1♂ (GNV), Gomera, 1922. U. Nonui.

S. AFRICA: 3♂♂, 3♀♀ (STK), "Caffraria", ex *Pandion haliaetus*, coll. J. Wahlberg.**Olfersia aenescens** C. G. Thomson, 1869CAPE VERDE IS.: 2♂♂ (GNV), Dheo Razo, ex *Oceanodroma cryptoleucura*, XII.1898, L. Fea.E. PACIFIC: 2♀♀ (LACM), Revilla Gigedo Is., Clarion I., ex *Sula piscata*, III.1938, G. Willette. 2♂♂ (LACM), Clipperton I., ex *S. leucogaster*, VIII.1958. 1♀ (CAS), Galapagos Is., Isla Darwin, I.1964, D. Q. Cavagnaro.C. PACIFIC: 1♀, Tokelau Is., Atafu, Fenualoa, III.1965, G. A. Samuelson. 2♂♂, Jarvis I., IGY house (w. *Sula sula rubripes* roosting on roof), at light, III.1965, Samuelson. 1♂ (BISHOP); Ruturu I., Upopepe Valley, VIII.1934, E. C. Zimmermann. 1♀ (BISHOP), Marquesas Is., Teuaua I., off Uahuka, ex *Sterna fuscata*, Pacif. Ent. Surv. 4♀♀ (BISHOP), Marotiri, VII.1934, Zimmermann.**Olfersia spinifera** (Leach, 1817)INDIAN OCEAN: 15♀♀ (Paris Mus.). Tromelin I., 400 km NE of Madagascar, ex *Fregata minor aldabrensis*, X.1965, J. G. Pointel. 1♀ (STK). "Ind. Orient."E. PACIFIC OCEAN: 1♀ (CAS), Isla del Coco, Bahia Catham, ex *Fregata* sp., III.1964, R. O. Schuster. 1♂ (CAS), Galapagos, Isla Espanola, Punta Saurez, II.1964, E. G. Linsley. 2♂♂ (LACM), Galapagos, Indefatigable I., Canal de Itabaca, II.1957, J. R. Northern.C. PACIFIC: 2♂♂, 12♀♀ (BISHOP), Marquesas Is., Hatutaa, ex *Fregata minor*, IV.1931, Lebronnec & H. Tauraa. 9♀♀ (BISHOP), Oeno I., VI.1934, E. C. Zimmermann. 2♀♀ (BISHOP), Henderson I., ex frigate bird, VI.1934, Zimmermann. 1♀ (BISHOP), Marotiri, VII.1934, Zimmermann. 1♀, Jarvis I., IGY house (frigate bird nesting ca 100 m away), at light, III.1965, G. A. Samuelson; 1♂, *id.*, in *Sula dactylatra personata* colony; 1♂, 10♀♀, *id.*, in frigate birds colonies.PHILIPPINES: 2♂♂ (LACM), Cavilli I., ex *Fregata aquila*, Philipp. Bur. Sci. Acc. # 13923.**Struthiobosca struthionis** (Janson, 1889)

Fig. 35-37.

This genus was erected in 1963 chiefly on the bases of host specificity and leg structure. By comparing against *Hippobosca* (as now restricted), it may be redefined as follows. Palpus more strongly setose, with distinct median preapical bristle; frons longer than and somewhat simulating that in *Olfersia*. Pronotum larger in proportion; median angle formed by transverse mesonotal suture relatively sharper; transverse series of scutellar bristles widely interrupted at middle; metafurcasternum posteriorly more deeply emarginate. Vein R_{4+5} with only $4 \pm$ sensoria arranged near its apex (in *Hippobosca*, with $8 \pm$ sensoria scattered over entire length of the vein); *im* short, almost perpendicular to M_{1+2} , less than $1/2$ as long as 2nd abscissa of that vein. Legs relatively long and slender; fore coxa with strong knob-like apicodorsal protuberance which is somewhat flattened and distinctly paler and less sclerotized than other parts of the segment; all femora and

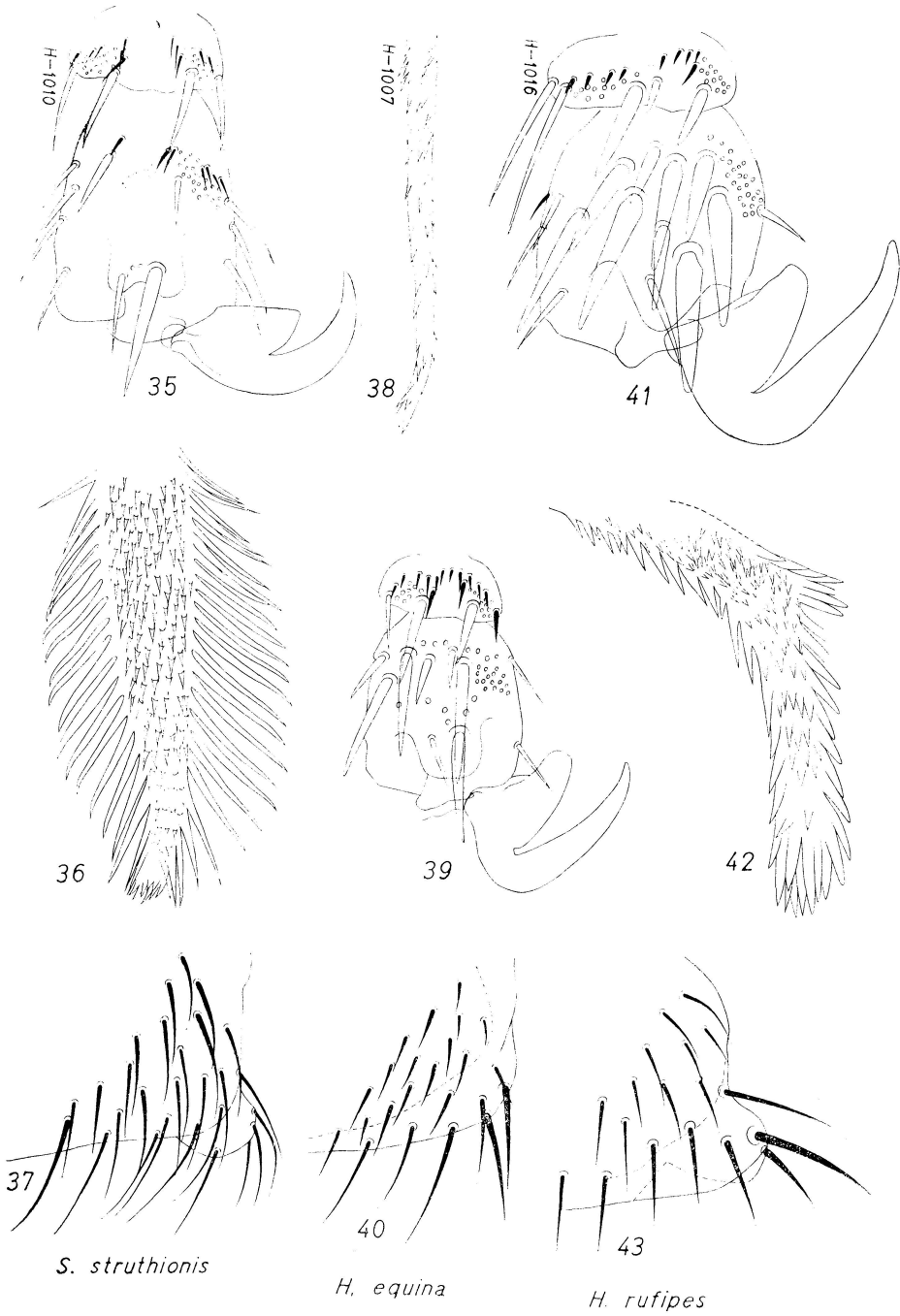


Fig. 35-43. *Struthiobosca* and *Hippobosca*, ♀♀, fore tarsi (ventral view, apical segments, 35, 39, 41), empodia (36, 38, 42) and fore coxae (dorsal view, 37, 40, 43), in same respective scales.

tibiae practically uniformly setose, lacking long robust bristles; tarsal segments of each leg virtually symmetrical at their apices; segment 5 of all tarsi long, ventrally without heavy robust spines; empodia broad, flattened, feather-like in full length; anterior pulvilli and claws nearly as large and long as corresponding posterior ones; "heels" of claws very short, acute at apex. Abdomen lacking median tergal plates in both sexes; syntergite 1+2 posteriorly very weakly broadly emarginate, not subangulately notched at middle.

Some of the characters enumerated above may of course be considered as merely of specific rather than generic importance. The criteria of distinction of the genus appear to be the structure and chaetotaxy of legs and the distribution of wing-sensoria, both of which more significantly simulate that in *Olfersia* and relatives than does *Hippobosca*. The genus apparently serves as a link between Ornithomyiinae and Hippoboscinae, and, therefore, it is placed at the beginning of the latter subfamily.

Hippobosca equina Linnaeus, 1758 Fig. 38-40.

The accompanying figures of the foreleg are based on a ♀ specimen from Indonesia. The species is closely similar to *longipennis* Fabr. in this respect.

Hippobosca longipennis Fabricius, 1805

In the Zool. Surv. India, Calcutta, there is 1♂ from Bengal labeled as "type" of *Ornithoica indiana* Bigot. It is clearly referable to this very common species of that country. The assignment of it to *Ornithoica* by that French Dipterist is surprising. Quite fortunately the name *indiana* has never been published, otherwise it would be a puzzle if solely from the description.

Hippobosca rufipes von Olfers, 1816 Fig. 41-43.

This species approaches Lipopteninae in having short heavy spines on body particularly thoracic surface. The apicodorsal protuberance of fore coxa is much more prominent than in its congeners. It is, however, similarly pigmented and sclerotized as other parts of the segment and is not flattened as in *S. struthionis*.

LITERATURE CITED

- Bequaert, J. 1953. *Ent. Ann.* n. ser. **33**: 211-442.
1954. *Ibid.* **34**: 1-232.
1957. *Ibid.* **36**: 417-611.
Hill, D. 1962. *Proc. Ent. Soc. Lond.* B **31**: 11-18.
Maa, T. C. 1962. *Pacific Ins.* **4**: 583-614.
1963. *Pacif. Ins. Monogr.* **6**: 1-186.
1966. *Ibid.* **10**: 1-148.
1968. *J. Med. Ent.* **5**: 325-28.
Rondani, C. 1878. *Ann. Mus. Stor. Nat. Genova* **12**: 150-70.
Smart, J. 1939. In F. W. Edwards, H. Oldroyd & J. Smart: *Brit. Blood-sucking Flies*: 118-124 & 127.
Speiser, P. 1920b. *Zts. Syst. Hym. Dipt.* **2**: 145-80.
Theodor, O. & H. Oldroyd. 1964. In E. Lindner: *Die Flieg. pal. Reg.* **65**: 1-70.