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A SYNOPSIS OF DIPTERA PUPIPARA OF JAPAN[1]

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Abstract. Diptera Pupipara previously recorded from Japan are briefly reviewed. Apparently 7 or 8 of them have been wrongly or doubtfully included in the list for that country. Insofar as this group of flies is concerned, the Japanese fauna is about as rich as and bears strong similarity to that of entire Europe. *Nycteribia oitaensis* Miyake 1919 is here reduced to synonym of *Penicillidia jenynsii* Wwd. 1834, whereas *Ornithomya aobatonis* Matsum., degraded as a subspecies of *O. avicularia* Linn. New forms described are *O. chloropus extensa, O. candida, Nycteribia allotopa mikado* and *Brachytarsina kanoi*. Illustrated keys and a host-parasite index are provided. Records of a few species from Korea and Ryukyu Is. are incorporated.

Thirteen nominal species of Diptera Pupipara have been described as new from Japan and her former territories by Matsumura (1905), Miyake (1919) and Kishida (1932). Their types have never been critically re-examined by any recent workers, their published descriptions are brief and inadequate and these flies are rare in most Japanese collections. The interpretation of such species is therefore extremely difficult. The following notes are presented with the hope of raising the interests of local collectors and they serve as a continuation of my earlier papers (1962, 1963) to straighten out the synonymy. They are partly based upon available material and partly a guesswork of published descriptions. The entire list contains 34 species (Hippoboscidae, 21; Nycteribiidae, 10; Streblidae, 3). Eight of them (each prefixed by an asterisk in keys and list) are considered to have resulted from either incorrect or doubtful records. The term "Japan" or "Japan Proper", as here employed, refers to Hokkaido, Honshu, Shikoku, Kyushu and their off-shore islets, not including her former territories Sakhalin, Kurile Is. Korea, Ryukyu Is., Taiwan and Micronesia. For convenience, records of a few species from Korea and the Ryukyus are incorporated.

The bibliography under each species is incomplete and only includes references to original description (extralimital synonyms are excluded) and more important previous records for Japan. The semidiagrammatic drawings (figs. 1-21, 54-59) are partly from specimens in alcohol and partly modified from earlier works; others are from microscopic slides. To save monotonous description for each species and to facilitate more correct determinations, more than one character is provided for each couplet in keys and many are illustrated. Microscopic details of male genitalia, though important for specific differentiation in many cases, are purposedly omitted. Names of birds are adopted from J. L. Peters' (1931 to date) "Check-List of Birds of the World", and those of mammals, from J. R. Ellerman & T. C. S. Morrison-Scott's (1951) "Checklist of Palaearctic and Indian

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Mammals 1758 to 1946." Specimens listed are in Bishop Museum unless otherwise indicated by abbreviations, thus AMNH for Amer. Mus. Nat. Hist. of New York, N. Y., GNV for Museo d. Storia Nat. of Genova, HKU for Ent. Inst. Hokkaido Univ. of Sapporo and LDN for Rijksmus. v. Nat. Hist. of Leiden.

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Family HIPPOBOSCIDAE Samouelle 1819

Key to Japanese Hippoboscidae

1. Wing either fully or partly functional, always much longer than head plus thorax 2
   Wing functionless, represented by either a solid cylindrical knob or thin-veined stub (or pad) much shorter than thorax alone; brachypterous, dealate and "apterous" forms 20

2 (1). Wing (figs. 2, 26) ample, 2–4× as long as wide, fully functional, with 1–3 crossveins; scutellum anteriorly truncate, subtruncate or gently concave, posteriorly distinctly convexly curved except in *Pseudolynchia* where scutellum is posteriorly broadly truncate and with a medially interrupted series of small finger-like setiferous tubercles and wing, as in fig. 11, with only 1 crossvein 3
   Wing (fig. 1) ribbonlike, 6–8× as long as wide, hardly functional, with 3 crossveins; scutellum with strongly convex anterior margin and posteriorly broadly truncate, but never with finger-like tubercles...11. **Crataerina hirundinis**

3 (2). Wing with 5–6 longitudinal veins and 1–3 crossveins, membrane often with setulae (microtrichia); eye (figs. 8, 15) large, much wider than inner orbit; postorbit usually much shorter than average width of inner orbit; sternite 1, when definable, small and posteriorly convexly curved 4
   Wing with 3 longitudinal veins and 1 crossvein, never with setulae on membrane; eye small, narrow, not or hardly wider than inner orbit; postorbit about as long as average width of inner orbit; sternite 1 large, posteriorly deeply emarginate 19

4 (3). Veins R_{4+5} and C (figs. 2, 4–5) well apart from each other except at extreme apices; right and left basal antennal segments (fig. 8) widely apart; vertical bristle (-s) not arising from nipple-like tubercle ; anal margin of wing not or hardly ciliate 7
   Apical 1/3 of vein R_{4+5} (fig. 14) running very closely to and almost conflu-

ent with C; right and left basal antennal segments (fig. 15) touching each other along median facial line; vertical bristle arising from nipple-like tubercle; anal margin densely ciliate..... 5

5 (4). Prosternum anteriorly truncate or weakly emarginate; ♀ with anchor-like spines near abdominal apex as large as or larger than those near abdominal base; wing not more than 3.5 mm long.....6

Prosternum anteriorly acute or subacute; ♀ with anchor-like spines near abdominal apex (fig. 16) markedly smaller than those near abdominal base; wing 3.9–4.4 mm long .....1. *__Ornithoica unicolor__

6 (5). Wing 2.8–3.5 mm long; setae of ♀ para-anal tuft (fig. 17) numerous, robust and long; scutellum with 4–6 pairs of preapical bristles .... 3. *__Ornithoica exilis__

Wing 2.4–2.7 mm long; setae of ♀ para-anal tuft (fig. 18) scanty, fine and short; scutellum with 2 pairs of preapical bristles .... 2. __Ornithoica momiyamai__

7 (4). Tarsal claws (fig. 12) seemingly bifid, actually simple; wing surface in pinned or fresh specimens strongly wrinkled, never with setulae (microtrichia); exposed part of antenna not or hardly longer than wide; pronotum not reduced, easily visible, lying on nearly same horizon as in prescutum..... 8

Tarsal claws (fig. 13) seemingly trifid, actually bifid; wing surface not or hardly with exceedingly fine wrinkles, usually with setulae; exposed part of antenna markedly longer than wide; pronotum much reduced, not or hardly visible without dissection, lying on much lower horizon than in prescutum..... 10

8 (7). Apical abscissa of vein R_{4+5} (fig. 4) not longer than full length of R_{2+3}; abdomen with 3 median tergal plates; anterior pulvilli of all legs ca 1/2 as long as their corresponding posterior pulvilli 9

Apical abscissa of vein R_{4+5} (fig. 5) 4–5× as long as full length of R_{2+3}; abdomen lacking median tergal plates; anterior pulvilli all vestigial..... .....18. *__Hippobosca variegata__

9 (8). Prosternum (fig. 7) hardly shorter than wide, anteriorly subacute; ♀ supra-anal plate hardly shorter than wide; scutellum usually almost entirely pale; crossveins usually much darker than other veins ... 17. __Hippobosca longipennis__

Prosternum (fig. 6) nearly 2× as wide as long, anterior margin gently convex; ♀ supra-anal plate markedly wider than long; scutellum usually pale at middle, dark at sides; veins nearly uniformly dark..... ..... 16. __Hippobosca equina__

10 (7). Wing (fig. 2) with 3 crossveins, hence 3 closed basal cells; vein Cu+1A well developed, 2A (except in *Ornithophila* where apical 3/5 of R_{2+3} fused with C) not or hardly definable.....11

Wing (fig. 11) with 1–2 crossveins; vein Cu+1A atrophied, represented by very short inconspicuous stub at base, 2A well developed 17

11 (10). Veins R_{2+3} and C (fig. 22) well apart from one another except at extreme apices; axillary lobe lanceolate, of usual size and shape; vein 2A hardly definable, never deeply pigmented; ♀ pregenital plate either absent or in

single, bare, very tiny piece; basitarsus 3 ventrally with basal comb (fig. 38) formed by regularly arranged setae 12

Apical 3/5 of vein R_{2+3} (fig. 2) fused with C; axillary lobe subtriangular, exceptionally large; vein 2A prominent and deeply pigmented; ♀ pregenital plate (fig. 3) setose, divided into 2 (1+1) very large pieces; basitarsus 3 without such comb but with irregularly arranged setae ..... 4. **Ornithophila metallica**

12 (11). Antenna (fig. 19-20) large or very large, leaf or spoon-like, bare near extreme apex, dorsolateral margin often sharply rimmed; crossveins *rm* and *im* often apart from one another; axillary cord (fig. 19) with strong black bristles 13

Antenna moderately large, never leaf or spoon-like, extreme apex bearing bristles, dorsolateral margin never sharply rimmed; crossveins *rm* and *im* (figs. 26-28) always very close to one another; axillary cord with pale soft setae 14

13 (12). Wing 8-11 mm long, entirely bare, no setulae on surface; antennal apex (fig. 21) broadly rounded, slightly twisted; ♀ abdomen lacking median tergal plates ..... 6. **Ornithoctona plicata**

Wing 5.5-7 mm long, with setulae on surface of 2 apical cells (*3r* and *1m*); antennal apex (fig. 20) sharply pointed, not twisted; ♀ abdomen with 3 small median tergal plates..... 5. **Ornithoctona australasiae**

14 (12). Preapical bristles of scutellum slender, quite uneven in length and robustness, outermost ones much shorter, finer and usually paler than inner ones and than all other major bristles on head and thorax; vibrissal spines (figs. 22, 24-25) always long and strong; laterite 2 longer than its posterior bristles; femur 1 much shorter than 3; palpus (figs. 29-30, 32-34) unevenly spinose 15

Preapical bristles of scutellum unusually robust, even or nearly even in length and robustness, all as stout as or stouter than any other major bristles on head and thorax; vibrissal spines (fig. 23) absent or poorly developed; laterite 2 (fig. 42) shorter than its posterior bristles; femur 1 hardly shorter than 3; palpus (fig. 31) evenly spinose ..... 10. **Ornithomya candida**

15 (14). Basal comb (figs. 38-39) on venter of basitarsus 3 composed of single setal row; segments 2-4 of tarsus 3 ventrally each with 4 strong spine-like setae near apex in addition to small fine ones; laterite 3 (i. e., area around spiracle 3) (figs. 43-44) with long slender setae or short spines; 4-7 scutellar bristles; wing 4.1-5.0 mm long; venter of head with pair of triangular dark markings..... 16

Basal comb (fig. 36) on venter of basitarsus 3 composed of 2 setal rows; segments 2-4 of tarsus 3 ventrally each with 5 strong spine-like setae near apex in addition to small fine ones; laterite 3 (fig. 41) with moderately long spines; 6-10, usually 8, scutellar bristles; wing 5.3-6.5 mm long; venter of head almost always lacking such dark markings ..... 7. **Ornithomya avicularia aobatonis**

16 (15). Dark markings on venter of head extending forward to vibrissal area;

wing-setulae (fig. 28) more extensive, cell *2r* setulose at apex, *3r* bare only at basal corner, its posterior margin at least partly setulose; laterite 3 (fig. 43) with long slender setae; usually 6 scutellar bristles; wing 4.9–5.0 mm long..... 8. **Ornithomya chloropus extensa**

Dark markings on venter of head extending forward only to midway to vibrissal area; wing-setulae (fig. 35) less extensive, cell *2r* entirely bare, *3r* bare at basal corner, entire posterior margin as well as near middle of anterior margin; laterite 3 (fig. 44) with short spines; usually 4 scutellar bristles; wing 4.1–4.9 mm long..... 9. **Ornithomya fringillina**

17 (10). Wing (fig. 11) with only 1 crossvein; scutellum posteriorly at each side with a transverse series of small finger-like tubercles each bearing small seta; each side of prescutum with 25–30 long recumbent laterocentral bristles extending beyond level of transverse mesonotal suture..... ..... 14. **Pseudolynchia canariensis**

Wing with 2 crossveins; scutellum lacking above-described tubercles; laterocentral bristles represented by few short setae far from reaching transverse mesonotal suture 18

18 (17). Head as usual, postvertex much smaller, shorter than and well defined from mediovertex, occipital margin entire, no submedian notches; metapleurotergal callus weakly convex, not produced into strong process; scutellum with 1 pair of preapical bristles; metasternum anteriorly hardly curved forward at middle.....13. **Icosta ardeae ardeae**

Head (fig. 8) quite unusual, postvertex much larger, longer than and either confluent with or hardly definable from mediovertex, occipital margin with pair of deep submedian notches; metapleurotergal callus (fig. 9) strongly produced into L-shaped bar at side of scutellum; scutellum lacking preapical bristles; metasternum anteriorly angularly produced forward ..... 15. ***Olfersia spinifera**

19 (3). Mesonotum rather evenly covered with 45± setae at each side; palpus almost 2× as long as antennal pit; ♀ pregenital plate in 3 large pieces, altogether bearing 17± bristles; length (head+thorax) 2.5 mm ....19. ***Lipoptena japonica**

Mesonotum (fig. 10) quite unevenly covered with 15± setae on each side; palpus subequal in length to antennal pit; ♀ pregenital plates very small, inconspicuous, altogether bearing 4± bristles; length (head + thorax) 1.3 mm..... 20. **Lipoptena fortisetosa**

20 (1). Wing represented by transparent veined stub or pad; haltere present; palpus much shorter than height of head in front view; anepisternum, prescutum and scutum clearly separated by sutures; abdomen with median tergal plates.....21

Wing represented by solid veinless knob; haltere absent; abdomen lacking median tergal plates; palpus as long as height of head in front view; anepisternum, prescutum and scutum practically entirely fused together; no median tergal plates ..... 21. **Melophagus ovinus ovinus**

21 (20). Wing apically rounded, veins very thick and dark, anterior marginal setae largely longer than width of wing; tarsal claws (fig. 13) seemingly trifid;

head in front view much longer than wide; thoracic venter with few scattered setae, no spines..... 12. ***Myophthiria reduvioides**

Wing apically irregularly broken off, veins very fine and pale, anterior marginal setae only about as long as width of veins; tarsal claws (fig. 12) seemingly bifid; head in front view much shorter than wide; thoracic venter rather evenly covered with short heavy spines 19

1. *Ornithoica (Ornithoica) unicolor Speiser, 1900 Fig. 16.

Ornithoica unicolor Speis., 1900, Ann. Mus. Stor. Nat. Genova **40**: 556. Type ♀, in Genova Mus., ex (?) bird, Sumatra.

HOKKAIDO: 1♀ (HKU), Nukabira, ex *Turdus naumanni eunomus*, VII.62, H. Ono.

Widely distributed in Indo-Chinese and Malaysian Subregions; oligoxenous on Strigidae (Strigiformes). The single Hokkaido record ex *Turdus* (Muscicapidae, Passeriformes) is almost certainly either a straggler or a mislabeling.

2. Ornithoica (Ornithoica) momiyamai Kishida, 1932 Fig. 18.

Ornithoica momiyamai Kishida, 1932: 245, fig. 474, ♀. Type ♀, Kishida coll. or lost, ex *Turdus naumanni* and *Lanius b. bucephalus*, no precise locality.— Maa, 1962: 587, translation of orig. des., sunk as syn. of *exilis* Wk.; 1963: 48, 88, listed as syn. of *stipituri* Schin.; 1966: 68, records fr. Honshu, status discussed.

Ornithoica turdi (nec Latr.): Bequaert, 1953: 277, listed fr. "Japan" ex *Lanius*, apparently teste Kishida.

HOKKAIDO: 5♀♀ (HKU), Nukabira, ex *Garrulus glandarius pallidifrons* [=*brandtii*], IX.62, H. Ono. 1♀ (HKU), Rebun I., ex *Emberiza spodocephala personata*, VIII.55, K. Hattori.

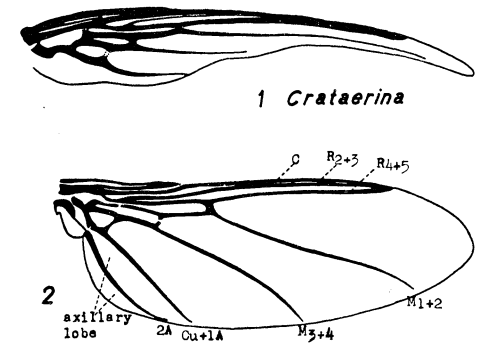
HONSHU: 1♀, Asahigaoka, Yamanashi-ken, ex *Zoothera sibirica davidsoni* (H 0120), VII.64, Migr. Anim. Path. Surv. 1♀, *id*, ex *Turdus cardis* (H 0121), VIII.64.

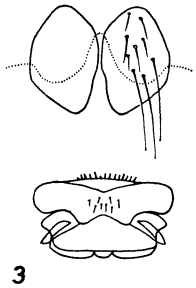
As pointed out in my 1966 paper (l. c.), the status of this species can not be ascertained before a re-examination of the type (if still existing) and the discovery of the male and gynandromorph. Possibly it is identical with *tridens* Maa 1966 of Taiwan. If that proves to be the case, *momiyamai* would have priority.

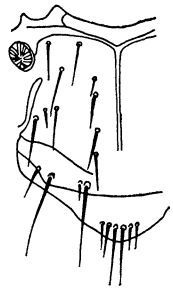
3. *Ornithoica (Ornithoica) exilis (Walker, 1861) Figs. 14–15, 17.

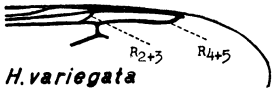
Ornithomyia exilis Wk., 1861, J. Proc. Linn. Soc. Lond. Zool. **5**: 254. Type ♀, in Brit. Mus. Nat. Hist., ex (?) bird, NW New Guinea.

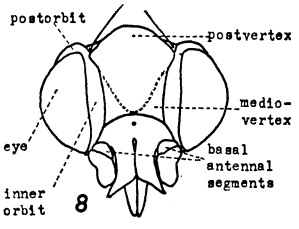
Figs. 1–21. 1, *Crataerina hirundinis*, wing; 2–3, *Ornithophila metallica*, wing, pregenital plate and anal sclerite (venter view); 4–5, *Hippobosca* spp., wings; 6–7, *Hippobosca* spp., prosterna and supra-anal plates; 8–9, *Olfersia spinifera*, head (front view) and part of thoracic dorsum; 10, *Lipoptena fortisetosa*, thoracic dorsum; 11, *Pseudolynchia canariensis*, wing; 12–13, Tarsal claws of *Melophagus ovinus* (12) and *Crataerina hirundinis* (13), showing seemingly bifid and trifid apices respectively; 14–15, *Ornithoica exilis*, wing and head (front view); 16, *O. unicolor*, abdominal venter; 17–18, *Ornithoica* spp., para-anal areas of abdominal dorsum; 19, *Ornithoctona australasiae*, part of thoracic dorsum; 20–21, *Ornithoctona* spp., antennae in front and lateral views.

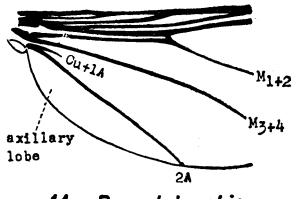


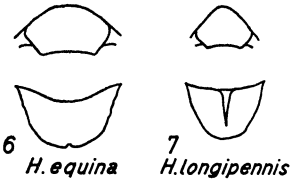


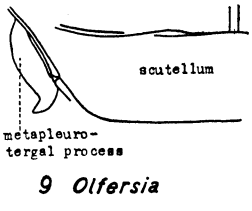


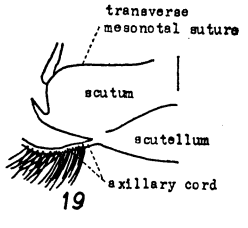


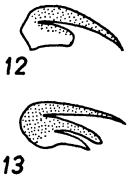


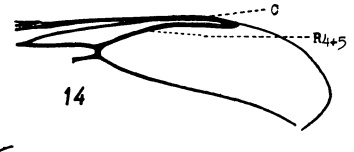


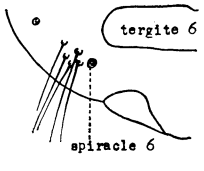


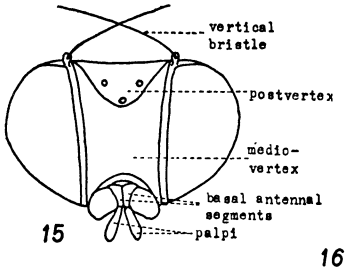


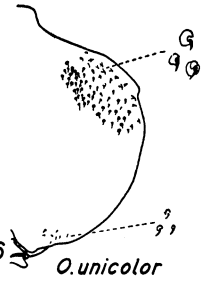


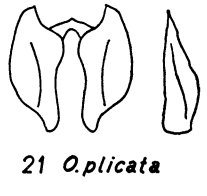












Ornithoica

Ornithoctona

Ornithoica (Ornithoica) exilis: Maa, 1966: 74, figs. 1, 4, 20, 36, 39, 43, 55, redes., records fr. Ryukyus.

Ornithoica distincta Kishida, 1932: 245, fig. 475, ♀. Type ♀, in Kishida coll. or lost, ex kingfishers, no precise locality.—Maa, 1962: 588, translation of orig. des., sunk as syn. of *O. exilis.*

RYUKYU IS.: 2♀♀, Ishigaki I., ex crow, XI–XII.52, G. E. Bohart.

Very widely distributed over Oriental and Australian Regions, but very rare in Ryukyu Is., Taiwan and China Mainland; polyxenous on Coracii-, Passeri-, Psittaci-, Cuculi- and Falconiformes. Its occurrence in Japan needs confirmation. Possibly Kishida's specimen (-s) might have been from the Philippines or Micronesia where the species is fairly common.

4. Ornithophila metallica (Schiner, 1864) Figs. 2–3.

Ornithomyia metallica Schin., 1864, Fn. Austriaca Dipt. **2**: 646. Type ♀, in Wien Mus., ex (?) bird, Austria.

HONSHU: 1♀, Tsunoshima, Yamaguchi-ken, ex *Emberiza cioides* (6E 1477), X.66, Migr. Anim. Path. Surv.

SHIKOKU: 1♂ (HKU), Awa, Tokushima-ken, VII.13, E. Gallois (Takeda).

New to Japan. Widely spread over Old World tropics and subtropics, polyxenous on Passeri-, Coracii- and Piciformes, with stray records from many other birds. It has once been taken in Bering Strait.

5. Ornithoctona australasiae (Fabricius, 1805) Figs. 19–20.

Hippobosca australasiae Fabr., 1805, Syst. Antliat.: 337. Type lost, ex (?) bird, "Pacific island."

HONSHU: 1♀, Mt Fuji, military maneuver field, ex *Parus major minor*, IX.58, H. Takahasi.

New to Japan. Widely distributed in the Malaysian, Wallacea and Papuan Subregions; probably breeding on Passeri-, Columbi- and Falconiformes, with stray records from other birds. The single record given above is apparently a straggler.

6. Ornithoctona plicata (von Olfers, 1816) Fig. 21.

Ornithomyia plicata Olf., 1816, De Veget. et Anim. Corporibus: 102. Type ♀, in Berlin Mus., ex (?) bird, Mauritius.

Ornithomyia tropica Kishida, 1932: 244, fig. 473, ♀. Type ♀, in Kishida coll. or lost, ex *Dicrurus macrocercus harterti* and cuckoo-shrikes, Taiwan and Philippines.—Bequaert, 1941: 269, sunk as syn. of *plicata* Olf.—Maa, 1962: 591, translation of orig. des.

Ornithoica annalis Kishida, 1932; 247, fig. 479, ♀. Type ♀, in Kishida coll. or lost, ex *Goisakius goisagi*, "widely distributed", no precise locality.—Maa, 1962: 592, translation of orig. des., sunk as syn. of *plicata.*

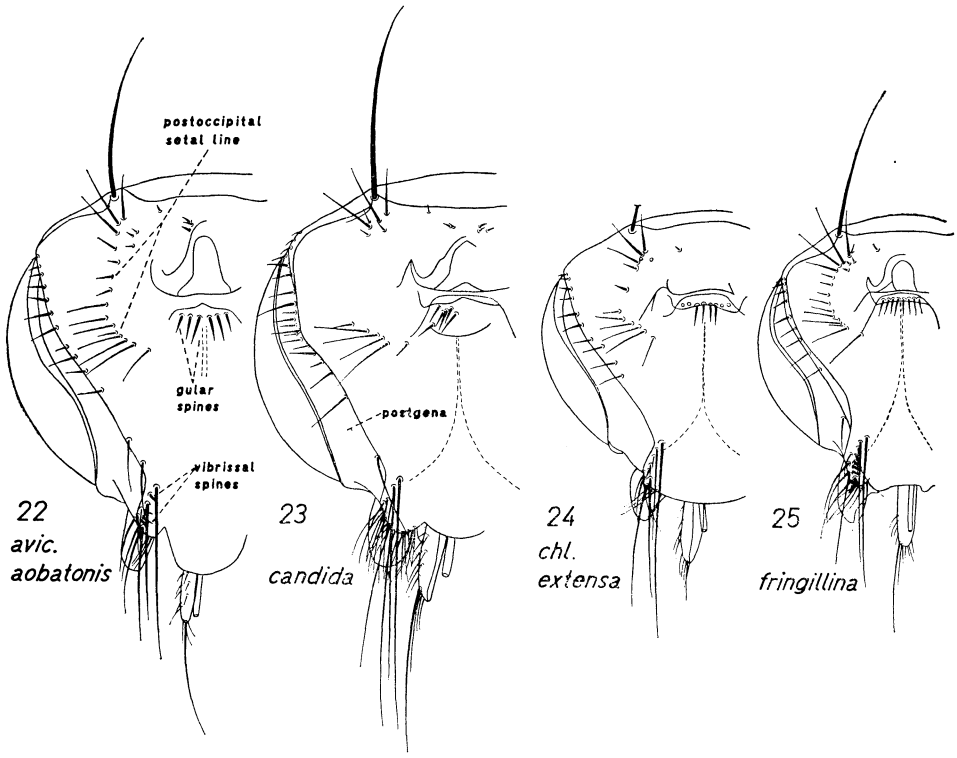
HONSHU: 1♀ (HKU), Kyoto, ex hawk, X.16, S. Matsumura. 1♀ (HKU), Matsumoto, Nagano-ken, ex *Ninox scutulata japonica*, XI.28.

Common in the Old World tropics except continental Africa; polyxenous on Columbi-, Passeri- and Falconiformes, with stray records from many other birds. Its occurrence in Japan, as well as in Mongolia and Kurile Is. (Maa 1963: 159), is apparently seasonal or accidental although Kishida mentioned that his *annalis* was found (? in Japan) throughout the year.

7. Ornithomya avicularia aobatonis Matsumura, 1905, n. status

Figs. 22, 26, 30, 36, 41, 46, 50.

(?) *Hippobosca oculata* Motschulsky, 1860, Bull. Soc. Nat. Moscou **32** (for 1859) (3): 504. Type in (?) Moscou Univ., ex(?) bird, Amur R. betw. Schilka and Nikolaevsk.



Figs. 22–25. *Ornithomya*. ♀ heads, ventral (hind) view, drawn to same scale. Setae on antennae omitted.

Ornithomyia aobatonis Matsum., 1905: 119, pl. 28, fig. 12. Type lost, ex *Sphenocercus s. sieboldii*, Honshu and Hokkaido.—Maa, 1962: 589, translation of Kishida's redes., sunk as syn. of *O. avicularia*.

Ornithomayia (sic) *aobatonis*: Kishida, 1932: 244, fig. 472, ♂, redes.

Ornithoica nipponensis Kishida, 1932: 246, fig. 476, ♀♂. Types in Kishida coll. or lost, ex *Corvus macrorhynchos japonensis*, no precise locality.—Maa, 1962: 588, translation of orig. des., sunk as syn. of *O. avicularia*.

Ornithoica kibitaki Kishida, 1932: 246, fig. 477, ♀♂. Types in Kishida coll. or lost, ex *Zanthopygia n. narcissina*, no precise locality.—Maa 1962: 589, translation of orig. des., sunk as syn. of *O. avicularia*.

Ornithoica diomedeae Kishida, 1932: 247, fig. 479, ♀♂. Types in Kishida coll. or lost, ex *Diomedea albatrus*, no precise locality.—Maa, 1962: 589, translation of orig. desc., sunk as syn. of *O. avicularia*.

HOKKAIDO: 1♂, 4♀♀, incl. neotype ♀, Sapporo, ex *Accipiter nisus nisosimilis*, no date, S. Matsumura. 2♀♀, Makomanai, Sapporo, ex *Emberiza f. fuscata*, VIII.34, 1 of these ♀♀ originally labeled "*Ornithoica hohoaka* n. sp. Type." 1♂, Mt. Soranuma, Sapporo, flying onto human arm, VII.63, S. Takagi. 7♀♀, Utoro, Shiretoko Penin., ex *Corvus macrorhynchos japonensis*, VII.61, S. Takano; 3♂♂, *id*, no host records. 1♂, Shintoku, VII.62, H. Omori. 1♀, Tobinitai, ex *Motacilla grandis*, VIII.60. 2♀♀, Obihiro, ex hawk, IX. Toyama. 1♀, w. 1 mallophagan on abd., Nukabira, ex *Accipiter virgatus gularis*, VIII.55. 1♂, 1♀, Rebun I., ex *Emberiza aureola ornata*, VIII.55, K. Hattori; 1♀, *id*, *E. spodocephala personata*; 2♀♀, *id*, *Erithacus calliope*, IX.55; 1♀, *id*, no host record, VII.55. 1♂, Shiragawa, ex *Cinclus pallasii hondoensis* [*p. pallasii*], IX.18; 2♀♀, *id*, chick of *Emberiza cioides ciopsis*. 3♂♂, 1♀, no locality prob. Hokkaido, ex mixture of crows & sparrows. All above listed Hokkaido specimens were of Hokkaido Univ., the last 3 lots were examined through courtesy of Dr Kano. 2♀♀, Sapporo, no host record (FOG 23331, 332), XII.51, rec'd fr. Inst. Med. Res. Malaya.

HONSHU: 1♂, 6♀♀ (HKU), Izu-Oshima, I.34, N. Yamada. 1♂, 1♀, Mt. Asama, Nagano-ken, VIII.60, H. Takahasi. 1♀, Asahigaoka, Yamanashi-ken, ex *Zoothera sibirica* (H 0120), VIII.64. 1♀, Nango, Mikura I., Tokyo, ex *Hypsipetes amaurotis* (5E 122), IV.64. 1♀, Tarobo, Gotemba, Shizuoka-ken, ex *Emberiza spodocephala* (5E 124), VII.64. 2♂, 1♀, Tsunoshima, Yamaguchi-ken, ex *Otus scops* (5E 2418, 6E 1479), IX.66. Last 6 specimens collected by Migr. Anim. Path. Surv.

KOREA: 2♀♀, Kunja, ex *Emberiza spodocephala extremi-orientalis* (BBM 75079), X.65, Lee Joon Koo. 1♀, Nao Chon Myun, Kyunggi-do, ex *E. tristrami* (6E 0851), X.65. 1♀, Chin Chup Myun, Kyunggi-do, ex *E. rutila* (6E 1370), IX.65; 1♀, *id*, *E. spodocephala* (6E 1044), IX.65; 1♀, *id*, *Acrocephalus arundinaceus* (6E 1467), VIII.65. Last 4 specimens collected by Migr. Anim. Path. Surv.

According to Dr H. Takahasi (in litt.), the type of *aobatonis* was lost after he personally carried it from Hokkaido Univ. to Dr Kishida. A neotype, ♀, is hence selected and deposited in Hokkaido Univ. from specimens collected by Matsumura ex *Accipiter nisus*.

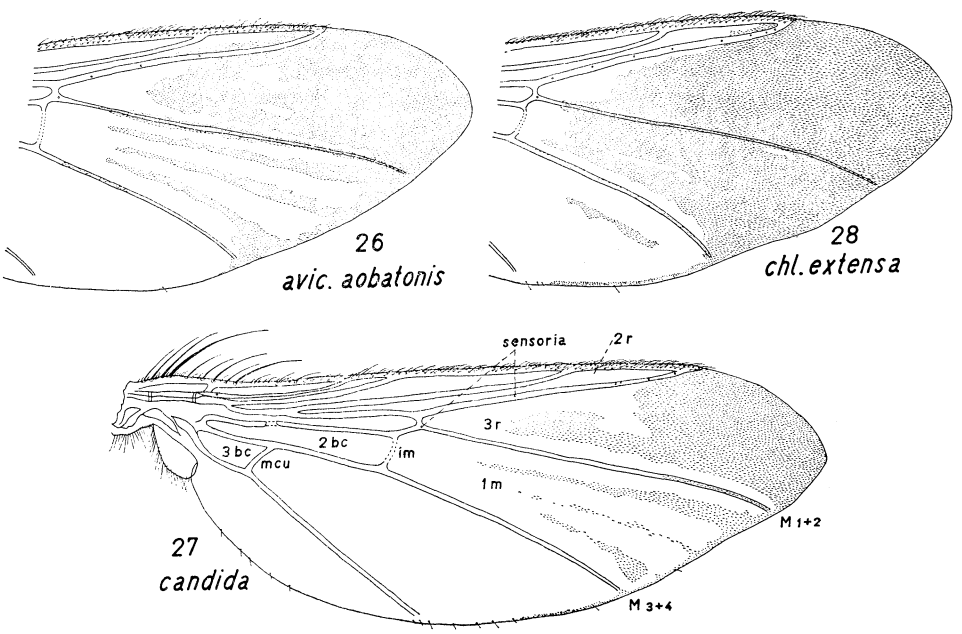
Differing from nominotypical subspecies in following points: Postgena (fig. 22) slightly wider in proportion; palpus (fig. 30) much shorter. Wing-setulae (fig. 26) more extensive, cell *3r* with very small bare area near midlength of anterior margin (in 1♀, this bare area is practically absent) and with very narrow setulose stripe along posterior margin, *1m* with 4 setulose stripes all reaching apical margin along which they merge together. Setae and spines (figs. 46, 50) near abdominal apex comparatively longer and stouter. In other respects, the Far East subspecies is inseparable from its European counterpart: 4–9 (in neotype 5; average of 10♀♀, 4.3) long vibrissal spines; 4–7 (in neotype 5, average of 10♀♀, 8.1) gular spines; postoccipital setal line complete; dark markings on postocciput usually not or hardly definable. Palpus (figs. 29–30) unevenly spinose. Scutellum with 6–10 (in neotype 8) preapical bristles, innermost ones being longest, darkest and

stoutest, outer ones successively shorter, paler and finer. Wing 5.3–6.5 (in neotype 5.4) mm long; cell *2r* setulose at apex; relative widths of cell *2bc* at levels of veins *mcu* and *im* ca 4: 10; *3bc* long, with very acute antero-apical angle; veins M_{1+2} and M_{3+4} both partly setulose, *im* usually long, situated quite close to *rm*; alula long. Femur 1 much shorter than 2 and 3, basal 1/2 of its anterior surface unevenly covered with fine setae; tarsus 3 (fig. 36) with double setal rows forming basal comb on venter of segment 1, with 5 strong spine-like setae beneath each of segments 2–4; anterior (outer) margin of segment 1 with 11± sensilla. Median plates of ♀ tergites 2–5 small, side-piece of tergite 6 large, oblique, with 2–4 long bristles and partly enclosing spiracle 6; laterite 2 posteriorly with moderately long bristles; laterite 3 (i. e., area around spiracle 3) with moderately long spines. ♂ paramere lined with small setae along apical dorsal margin.

In 1♀, which has only 6 scutellar bristles, the dark markings on postocciput are fairly distinct. Thus in these respects, it is superficially referable to *chloropus*. But the body size, leg and abdominal chaetotaxy etc. are clearly of *avicularia*. Motschulsky's *H. oculata* may belong here and take over *aobatonis* because of priority but its true identity remains uncertain from the original description "Dilatata, depressa, fusco picea fronte, scutello femoribusque testaceo subviriscentibus, oculis magis, nigris; abdomine postice bilobo. Long. 3½ l.—— lat. abd. 2¼ l."

8. Ornithomya chloropus extensa Maa, new subspecies Figs. 24, 28, 34, 38, 43, 48, 52.

HONSHU: Holotype ♀ (BISHOP 7549), Tsunoshima, Yamaguchi-ken, ex *Fringilla montifringilla* (6E 1478), X.66, Migr. Anim. Path. Surv.



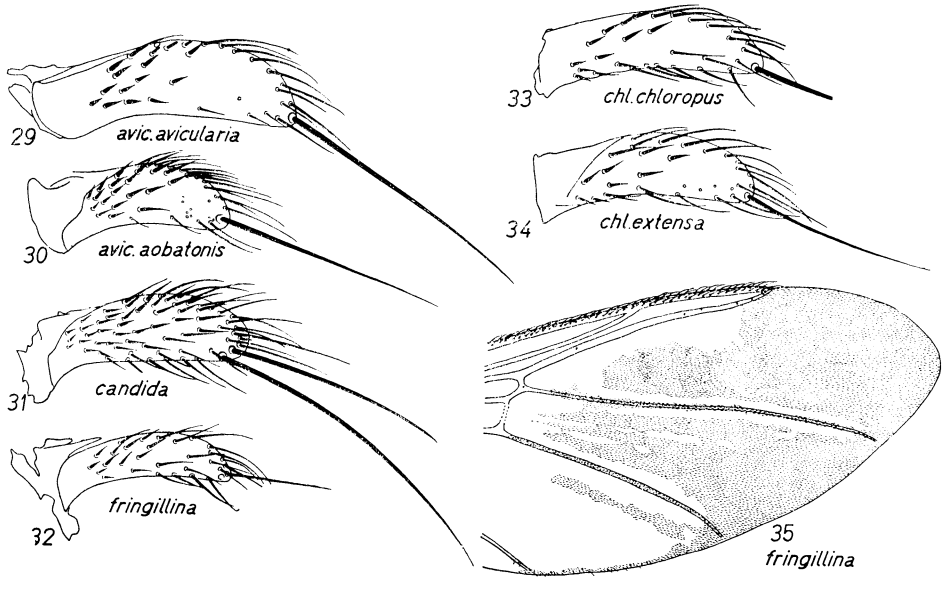
Figs. 26–28. *Ornithomya*, ♀ wings; 26–27 in same scale, 28 more enlarged.

HOKKAIDO: 1♀ (HKU), First Agric. Stn., Sapporo, ex wagtail (? *Motacilla alba lugens*) VII.04, S. Matsumura.

KOREA: 1♀, Chin Chup Myun, Kyunggi-do, ex *Emberiza rutila* (6E 1004), X.66, Migr. Anim. Path. Surv.

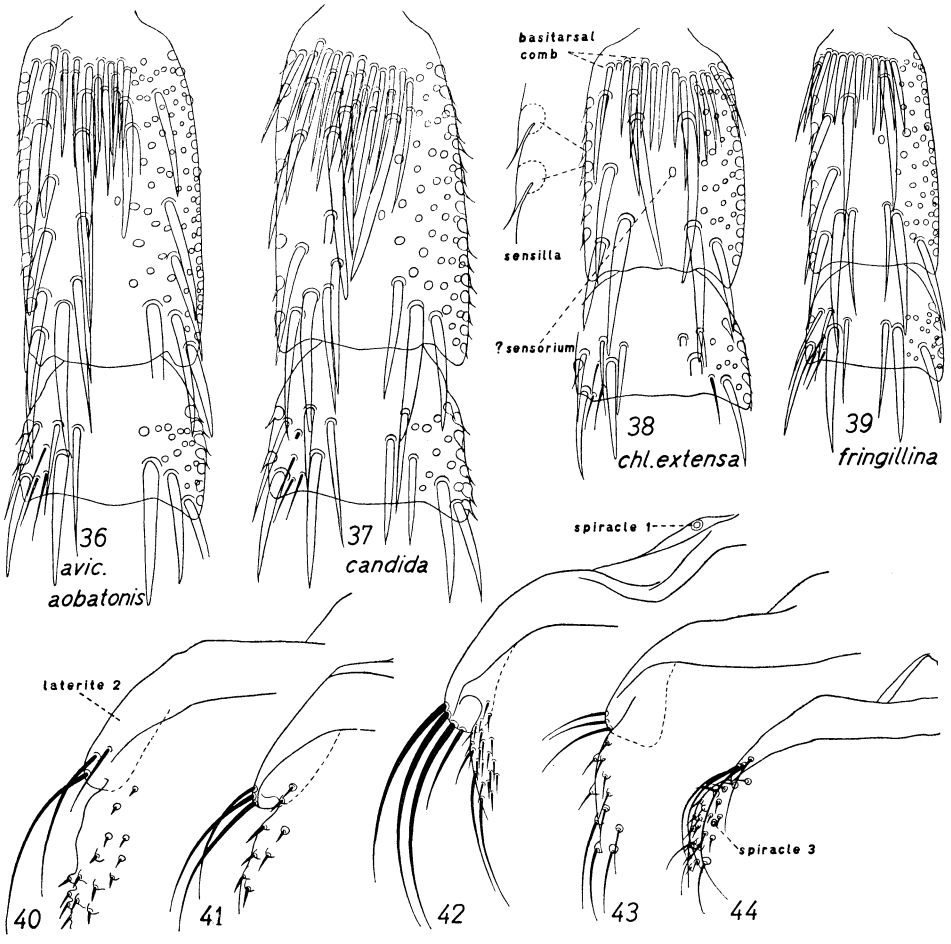
Holotype and 1 paratype in Bishop Mus., 1 paratype in Hokkaido Univ.

♀. Differing from nominotypical subspecies in the following points: Palpus (fig. 34) comparatively shorter. Thoracic dorsum with pale and dark markings exactly similar to that illustrated by Theodor et al (1964: 39, fig. 47) for *fringillina* except scutum uniformly dark. Wing-setulae (fig. 28) slightly more extensive, under surface of cell *3r* lacking bare stripe along posterior margin, *1m* with very narrow setulose stripe along anterior margin. Femur 1 with more bristles on apical 1/2 of anterior surface; setae on venter of tarsi (fig. 38) comparatively stouter. Side-piece of tergite 6 (fig. 48) smaller; setae and spines near abdominal apex slightly shorter and finer. ♂ unknown. In other respects, the new subspecies is hardly distinguishable from the typical *chloropus* of Finland: Venter of head (fig. 24) with 1–5 (in holotype 3–4) long vibrissal spines, 7–10 (in holotype 7) gular spines; postoccipital setal line complete; dark markings on postocciput distinct and extending forward to vibrissal area. Palpus (figs. 33–34) unevenly spinose. Scutellum with 4–7 (in holotype 6) preapical bristles, innermost ones being longest, darkest and stoutest, outer ones successively shorter, paler and finer. Wing 4.9–5.0 mm long; cell *2r* setulose at apex; relative widths of cell *2bc* at levels of veins *mcu* and *im* ca 2: 3; *3bc* long, with fairly acute antero-apical angle; veins M_{1+2} and M_{3+4} both partly setulose, *im* fairly long, situated quite close to *rm*; alula fairly short. Femur 1 much shorter than 2 and 3, basal 1/2



Figs. 29–35. 29–34, *Ornithomya*, ♀ palpi, drawn to same scale; *avic. avicularia* and *chl. chloropus* based on material from Sweden and Finland respectively. 35, *O. fringillina*, Japan, ♀ wing.

of its anterior surface with unevenly distributed setae; tarsus 3 (fig. 38) with single setal row to form basal comb on venter of segment 1, with 4 strong spinelike setae beneath each of segments 2–4; anterior margin of segment 1 with 7± sensilla. Tergites 2–5 each represented by comparatively large plate; side-piece of tergite 6 (fig. 48) small, slightly oblique, with 1–2 bristles, not enclosing spiracle 6; laterite 2 (fig. 43) posteriorly with moderately long bristles; laterite 3 with long slender setae, no spines. There is a slight possibility that *extensa* is referable to Kishida's *Ornithoica nipponensis* which was said to have only 6 bristles on "metanotum" [scutellum]. Since *nipponensis* was described to be as large as the same author's *O. kibitaki* and *O. diomedeae*, all 5 mm long, it is here not applied for this Far East subspecies.



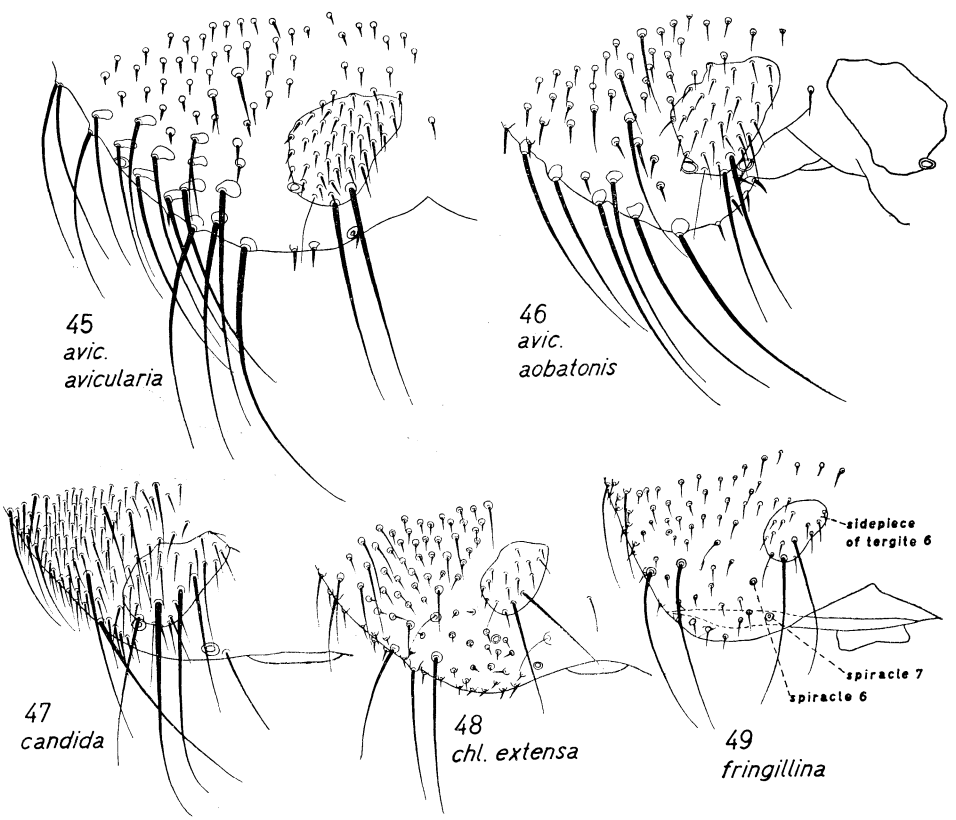
Figs. 36–44. 36–39, *Ornithomya*, ♀ hind tarsi, first 2 segments, ventral view; drawn to same scale, ordinary fine setae represented by basal punctures. 40–44, *Ornithomya*, ♀ abdomens, anterolateral part, dorsal view, showing posterior marginal bristles on laterite 2 and spines or setae around spiracle 3; drawn to same scale. 40, *avic. avicularia* (Sweden); 41, *avic. aobatonis*; 42, *candida*; 43, *chl. extensa*; 44, *fringillina* (Japan).

9. Ornithomya fringillina Curtis, 1836 Figs. 25, 32, 35, 39, 44, 49, 53.

HOKKAIDO: 1♀ (Hokkaido Univ.), Nukabira, ex *Parus atricapillus restrictus*, XI.59, M. Tonosaki; 1♀, *id*, *Prunella rubida fervida*; 1♀, *id*, *Parus major minor*, X.59

KOREA: 1♀, Seoul, ex *Coccothraustes coccothraustes japonicus* (#98), XI.65, Lee Chung Wu.

Indistinguishable from European specimens. The following notes are based on the 4 specimens listed above. Venter of head (fig. 25) with 4–7 long vibrissal spines and 6–8 gular spines; postoccipital setal line complete; dark markings on postocciput distinct, extending forward to midway to vibrissal area. Palpus (fig. 32) unevenly spinose. Scutellum with 4, occasionally 5 preapical bristles, outer ones distinctly shorter, finer and often paler than inner ones. Wing 4.1–4.9 mm long; cell *2r* (fig. 35) entirely bare; relative widths of cell *2bc* at levels of veins *mcu* and *im* ca 3 : 4; *3bc* moderately long, with fairly acute antero-apical angle; veins M_{1+2} and M_{3+4} both extensively setulose, *im* moderately long, situated quite close to *rm*; alula fairly short. Femur 1 and tarsus 3 (fig. 39) similar to that of *chloropus*. ♀ abdomen (figs. 44, 49, 53) also similar to *chloropus* but laterite 3 with



Figs. 45–49. *Ornithomya*, ♀ abdomens, posterolateral part, dorsal view, drawn to same scale.

short spines, no long slender setae, and abdominal apex with finer setae and spines.

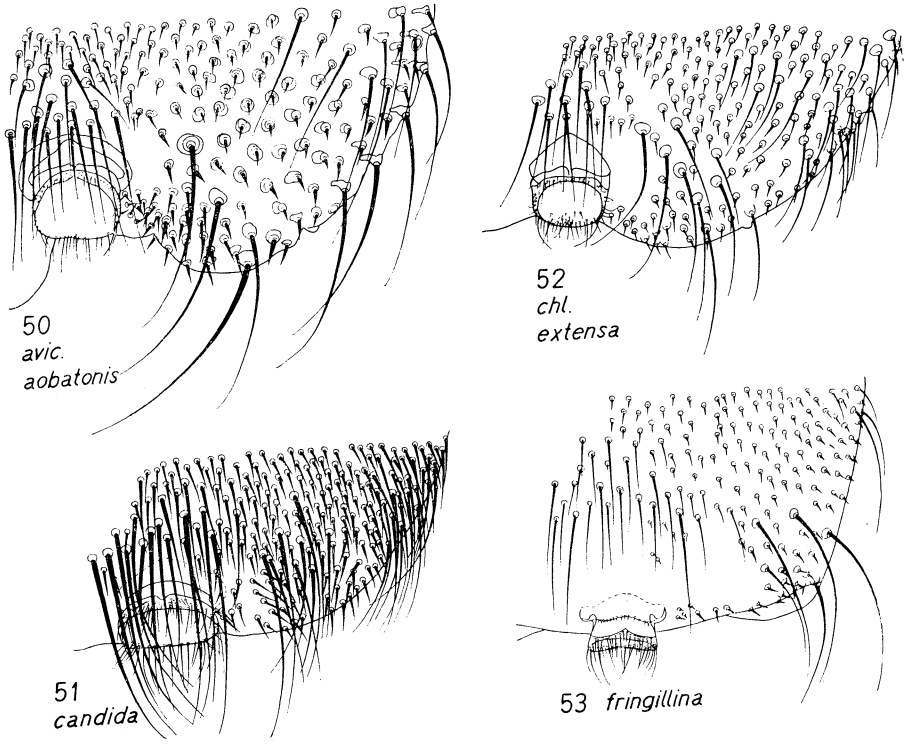
10. Ornithomya candida Maa, new species Figs. 23, 27, 31, 37, 42, 47, 51.

HONSHU: Holotype ♀ (BISHOP 7550), Yamanaka, Mt Fuji, ex *Zoothera sibirica* (5E 158), VIII.64, Migr. Anim. Path. Surv. 1♀, Toyama, ex pale thrush (FOG 23333), X.54, rec'd fr. Inst. Med. Res. Malaya.

HOKKAIDO: 4♀♀ (HKU), Rebun I., ex *Emberiza spodocephala personata*, VIII.55, K. Hattori; 2♀♀ (HKU), *id*, *Erithacus calliope*, IX. 55; 1♀, *id*, host #5011, VII.55; 1♀, *id*, no host record, X.55.

A very distinct species, immediately recognizable by evenly spinose palpus, interrupted postoccipital setal line, poorly developed vibrissal spines, very robust, equally long and closely arranged scutellar bristles, unusually long and richly setose femur 1, very long bristles on laterite 2 and long numerous bristles on tergite 6.

♀. Dorsum of head and thorax bright reddish brown. Venter of head (fig. 23) anteriorly paler, no well definable dark markings; 0–3 (in holotype 0–1, average 1.1) short indistinct vibrissal spines; 6–11 (in holotype 11, average 7.6) gular spines; postgena broad-



Figs. 50–53. *Ornithomya*, ♀ abdomens, posterolateral part, ventral view, drawn to same scale.

er than in other Japanese *Ornithomya*; postoccipital setal line widely interrupted. Palpus (fig. 31) evenly spinose. Face slightly wider in proportion than in *avicularia*; inner eye-margins practically straight and parallel; length of eye vs smallest width of face 24 : 19. Scutellar bristles unusually stout, closely arranged, 4 in number, virtually uniform in length and robustness, all as stout as or stouter than any other major bristles on head and thorax. Wing (fig. 27) 5.2–5.7 (in holotype 5.7) mm long; cell *2r* acute at apex, entirely bare; *3r* with similar bare area as in *fringillina*; *1m* largely bare, with 3 very narrow setulose stripes; relative widths of cell *2bc* at levels of veins *mcu* and *im* 5 : 9; *3bc* comparatively short, with moderately acute antero-apical angle; vein M_{1+2} apically setulose, M_{3+4} entirely bare, *im* moderately long, situated well apart from *rm*; alula fairly short. Femur 1 hardly shorter (54: 60) than 3, basal 1/3 of its anterior surface rather evenly setose, apical 2/3 with many bristles of varied length and robustness; femur and tibia 2 slightly longer than 3. Tarsus 3 (fig. 37) with 2–3 setal rows forming basal comb on venter of segment 1, with 5–6 strong spinelike setae underneath each of segments 2–4; anterior margin of segment 1 with 7± sensilla. Abdomen with long setae and bristles; median plates of tergites 2–5 fairly large; sidepiece of tergite 6 (fig. 47) large, oblique, with 4–6 bristles of varied length and robustness and partly enclosing spiracle 6. Laterite 2 (fig. 42) posteriorly with very long robust bristles; laterite 3 with strong setae and moderately long bristles. Urogenital area (fig. 51) fenced by many long bristles and long sharp spines; pre- and postgenital plates as in related species. ♂ unknown.

11. Crataerina hirundinis (Linnaeus, 1758) Figs. 1, 13.

Hippobosca hirundinis Linn., 1758, Syst. Nat. ed. **10**: 607. Type lost, ex *Hirundo*, Europe.

Lynchia nipponica Kishida, 1932: 248, fig. 480, ♀. Type in Kishida coll. or lost, ex *Delichon dasypus*, no precise locality.— Maa, 1962: 590, translation of orig. des., sunk as syn. of *hirundinis* Linn.

Stenopteryx nipponica: Huzimatu, 1938: 59–69, pls. 2–5, biology.

HOKKAIDO: 1♂ (HKU), Obihiro, ex *Delichon dasypus*, nest, VI.61. 1♀ (HKU), Engaru, ex swallow, VI, M. Shôji. 1♀ (HKU), Sapporo, found on human clothing, IX.65, T. Kotcha.

HONSHU: 3♀♀, Tachikawa nr Tokyo, ex *Delichon dasypus* (5E 1537), V.64. 15♂♂, 1♀, Chino-shin, Nagano-ken, same host (5E 1631–33, H 0248–50), VII.64; 4♂♂, 10♀♀, *id*, 6E 1198–1201, VI.66. 2♀♀, Otari Hotspa, Nagano-ken, same host (6E 1203–04), VIII.65. All by Migr. Anim. Path. Surv.

Widely spread over entire Palaearctic Region, monoxenous on *Delichon* (Hirundinidae, Passeriformes).

12. *Myophthiria reduvioides Rondani, 1875

Myophthiria reduvioides Rndn., 1875, Ann. Mus. Stor. Nat. Genova **7**: 464, fig. Type ♂, in Genova Mus., ex (?) bird, Sarawak.

Brachypteromyia nakamurai Kishida, 1932: 248, fig. 481, ♀. Type in Kishida coll. or lost, ex "swallow", no precise locality.—Maa, 1962: 591, translation of orig. des., sunk as syn. of *reduvioides* Rndn.

The Old World species of *Myophthiria* are all exclusively parasitic on *Collocalia* swiftlets (Apodidae, Apodiformes) which are entirely absent in Japan, Ryukyu Is. and Taiwan.

Therefore *M. reduvioides* must be deleted from the faunal list of Japan. Kishida's specimen (-s) most probably came from the Philippines or Micronesia.

13. Icosta (Ardmoeca) ardeae ardeae (Macquart, 1835)

Olfersia ardeae Mcq., 1835, Hist. Nat. Ins. Dipt. **2**: 640, pl. 24, fig. 10. Type lost, ex *Ardea* sp., Sicily.

Lynchia albipennis (pt.): Bequaert, 1955: 337, listed fr. "Japan."

Nearly everywhere in Old World; a common parasite of herons and bitterns (Ardeidae, Ciconiiformes). I have seen no material from Japan.

14. Pseudolynchia canariensis (Macquart, 1840) Fig. 11.

Olfersia canariensis Mcq., 1840, *in* Webb & Berthelot, Hist. Nat. Iles Canaries Ent. **2** (2): 119, "♀". Type ♂, in Paris Mus., ex (?) bird, Canary Is.

Pseudolynchia canariensis: Bequaert, 1955: 399, listed fr. "southern Japan (Okinawa)."

Practically cosmopolitan; a common parasite of domestic pigeons (Columbidae, Columbiformes). In the Old World, it is often found on wild pigeons and Falconi- and Cuculiformes, with stray records from other birds. I have no material from Japan and insofar as I know, there is no published record for that country.

15. *Olfersia spinifera (Leach, 1817) Figs. 8-9.

Feronia spinifera Lch., 1817, Genera & Spp. Eprobosc. Ins.: 11, pl. 26, figs. 1-3. Type lost, ex (?) bird, no precise locality.

Pantropic in the Pacific, Indian and Atlantic Oceans; monoxenous on *Fregata* (Fregatidae, Pelecaniformes). Previously unrecorded from Japan; its permanent occurrence there is quite improbable. In the Hokkaido Univ. collection, there is 1♀, lacking any data, which might have been a straggler or from the Philippines or Micronesia.

16. Hippobosca equina Linnaeus, 1758 Figs. 4, 6.

Hippobosca equina Linn., 1758, Syst. Nat. ed. **10**: 607. Type lost, ex *Equus* and *Bos*, Europe and "N. America".—Matsumura, 1931: 390, fig. 239, saying to have been introduced into Japan from Europe.—Kishida, 1932: 243, fig. 470.—Esaki, 1952: 1721, fig. 4959.

Palaearctic and western Oriental Regions, introduced into and now established in Fiji, New Caledonia and several other Pacific islands; normally breeding on domestic *Equus* (horses, asses, donkeys), often also domestic cattle. I have no material from Japan.

17. Hippobosca longipennis Fabricius, 1805 Fig. 7.

Hippobosca longipennis Fabr., 1805, Syst. Antliat.: 338. Type ♀, in Kϕbenhavn Mus., ex (?) animal, Tranquebar.

Hippobosca capensis von Olfers, 1816, De Veget. et Anim. Corporibus: 101. Type ♀, in Berlin Mus., ex (?) animal, Cape of Good Hope.—Matsumura, 1905: 120, listed fr. "Japan"; 1931: 390, fig. 238.—Bequaert, 1931: 314, recorded fr. Honshu: Kama-

gawa.

HONSHU: 1♂ (HKU), Kumamoto-ken, VIII.06. 2♀♀ (Leiden Mus.), "Japan. Siebold"; 1♀ (Leiden Mus.), "Java ? Japan? *Canis indicus*."

KOREA: 1♀ (HKU), Taiyudong, 1925. 1♀ (HKU), Seoul, V.22.

A common parasite of domestic dogs in the Old World tropics and subtropics. Although fairly common in Manchuria and China Proper, it is rather doubtful whether or not still existing in Japan. A similar case is with Taiwan where the species is non-existent nowadays notwithstanding the fact that there are many specimens in collections labeled as collected by H. Sauter in southern Taiwan in the first decade of this century.

18. *Hippobosca variegata Megerle von Mühlfeld, 1803 Fig. 5.

Hippobosca variegata Megerle, 1803, Appendix ad Cat. Ins.: 14. Type lost, ex (?) animal, Bengal.

Hippobosca maculata Leach, 1817, Genera & Spp. Eprobosc. Ins.: 7, pl. 26, figs. 11-16. Type ♀, in Brit. Mus. Nat. Hist., ex (?) animal, India orientali.—Kishida 1932: 243, fig. 471, listed fr. "warm countries."

Common on domestic *Equus* and cattle in India, Ceylon, tropical Africa; introduced into and now established in certain parts of Indonesia. It certainly does not occur in Japan.

19. *Lipoptena japonica Bequaert, 1942

Lipoptena (*Lipoptena*) *japonica* Beq., 1942: 84, figs. 6 D-E, ♀. Type de-alate ♀, in Mus. Comp. Zool. Harvard, ex "*Capricornis c. crispus*, Honshu" (no further detail).

Known from the unique type said to have been ex *Capricornis* (Bovidae: Caprinae: Rupicaprini). The species is very closely related to *cervi* Linn. which is a common parasite of deer (Cervidae: Cervinae) in Europe. By implying the theory of host-parasite evolutionary parallelism, the true host of *japonica* is apparently a certain Cervinae instead. While the only Japanese cervine, *Cervus nippon* Temm., is a breeding host of *L. fortisetosa*, it is quite unlikely that *L. japonica* breeds on it too. Most probably *japonica* is a misnomer and occurs somewhere else.

20. Lipoptena fortisetosa Maa, 1965 Fig. 10.

Lipoptena fortisetosa Maa, 1965: 236, figs. 6-10, 26, 27, 34, ♂♀. Type ♂ in Bishop Mus., ex *Cervus nippon*, Honshu: Nara.

Lipoptena rusaecola (nec Beq. 1942): Beq., 1953: 288, recorded fr. Honshu: Nara ex *C. nippon*.

Obviously a common parasite of the sacred deer, *C.* (*Sika*) *nippon* Temm. at Nara. The alate form is unknown and is only for convenience included in the key.

21. Melophagus ovinus ovinus Linnaeus, 1758 Fig. 12.

Hippobosca ovina Linn., 1758, Syst. Nat. ed. **10**: 607. Type lost, ex sheep, no precise locality.

Melophagus ovinus: Matsumura, 1931: 390, fig. 240, said to have been introduced from the U. S. and since then multiplying enormously in Japan.—Kishida, 1932: 249, fig. 482.
HOKKAIDO: 1♂, 1♀ (HKU), Sapporo, no date, Okumura.

Palaearctic Region; a common parasite of domestic sheep; now established in most temperate countries over the world.

Family NYCTERIBIIDAE Samouelle 1819

Key to Japanese Nycteribiidae (not incl. Nycteribia tarsalis)

1. Body 4–5 mm long, generally dark brown; coxa 1 *ca* 2/3 as long as femur 1; head capsule dorsally subtriangular, somewhat flattened, eye 2-faceted and encircled by black ring; tibiae each with 3 complete pale rings, haltere entirely concealed under membranous flap; ♀ abdomen entirely membranous between basal and anal sclerites except pregenital plate (fig. 59) which is very large, strongly sclerotized, posteriorly fringed with 20± heavy blunt teeth; ♂ synsternite 5+6 (i. e., visible sternite immediately before anal segment) posteromedially lined with single row of 10± closely, very orderly arranged peg-like spines. On fruitbats or Megachiroptera..... 22. ***Cyclopodia horsfieldi**

   Body at most 3.5 mm long, usually reddish or yellowish brown; coxa 1 not more than 1/2 as long as femur 1; head capsule either cylindrical or bilaterally compressed, eye (except in *Basilia*) either absent or not encircled by black ring; either tibiae lacking 3 pale rings or haltere exposed; ♀ abdomen with 1 or more tergal and several sternal plates between basal and anal sclerites, pregenital plate absent or not as above described; spines of ♂ synternite 5+6, when present, either more than 25 in number and arranged in several rows, or pointed and loosely arranged. On insectivorous bats or Microchiroptera.....2

2. Head capsule (fig. 56) cylindrical, with numerous setae between eyes and near anterodorsal margin; body very robust, abdomen not or hardly longer than wide; eye 1-faceted, not encircled by black ring; thoracic ctenidium not wider than coxa 2; tibiae ventrally each with 4–5 rows of very strong bristles near apex; haltere entirely concealed under membranous flap..... 3

   Head capsule bilaterally compressed, often narrowed behind, virtually bare on dorsum; body slender, abdomen in normal specimens much longer than wide; eye not as above; thoracic ctenidium much wider than coxa 2; tibiae ventrally each with 3 rows of moderately strong bristles near apex; haltere exposed..... 4

3. Teeth of abdominal ctenidium tightly arranged, each about as long as and somewhat stouter than that of thoracic ctenidium; posterior margin of ♀ tergite 2 (fig. 58) with 2–3 very strong short black spines at each side, lacking setal fringe; ♂ synsternite 5+6 posteriorly broadly concave, its posterolateral lobe bearing large roundish cluster of exceedingly dense blunt spines ..... 31. **Penicillidia dufourii tainani**

   Teeth of abdominal ctenidium loosely arranged, each distinctly shorter than that of thoracic ctenidium; posterior margin of ♀ tergite 2 (fig. 57) with complete fringe of long strong setae, no spines; posterior margin of ♂ synsternite 5+6 distinctly convex, its lateral section lined with single series of well spaced spines .....30. **Penicillidia jenynsii**

4. Eye 2-faceted, encircled by black ring; tibiae each with 3 pale rings; ♀ abdomen with tergite 2 much longer than remaining parts of abdomen together; ♀ synsternite 1+2 nearly as long as wide; ♂ tergites 3–6 and dorsum of anal segment entirely bare besides posterior marginal fringes ..... 29. ***Basilia roylii***

Eye absent; tibiae lacking pale rings, at most with 3 pale spots on venter; ♀ tergite 2 much shorter than remaining parts of abdomen together; ♀ synsternite 1+2 only *ca* 1/2 as long as wide; ♂ tergites 3–6 and dorsum of anal segment more or less setose besides posterior marginal fringes 5

5. Tibia 1 (figs. 54, 62–63) in profile semicircular, *ca* 2× as long as wide (tibiae 2 and 3 slightly longer in proportion); ♀ median tergal plate, i. e., tergite 6 (figs. 60–61, 64–65) 2× or more as wide as long, largely bare; only with few bristles and some short spines on or near posterior margin, and except in *parvula*, no ordinary setae; ♀ postgenital plate transverse, with either many spines or pair of strong setae; posterior margin of ♂ synsternite 5+6 straight or almost straight, either bearing no spines or with single row of slender, loosely arranged spines; ♂ clasper slender, pale, at most black at apex 6

Tibiae (fig. 55) in profile scalpel-shaped, 4–5× as long as wide; ♀ median tergal plate slightly shorter than wide, extensively setose; ♀ postgenital plate roundish, with 3–4 setulae; posterior margin of ♂ synsternite 5+6 angularly produced at middle, bearing 2 rows of 30± short, blunt, tightly arranged spines; ♂ clasper very robust, almost entirely black ..... 28. **Phthiridium hindlei**

6. ♀ abdomen (figs. 60–61, 64): Dorsodiscal setal patch on membrane posterolaterally extending to about level of posterior margin of median tergal plate; setae on tergite 1 all short, never longer than 1/4 width of that tergite. ♂ abdomen (figs. 70–71, 73): Clasper black at apex, distinctly longer than apical width of anal segment; posterior margin of synsternite 5+6 with setae as well as venter of spines; anal segment with pair of setal patches near base 7

♀ abdomen (fig. 65): Dorsodiscal setal patch on membrane roundish, not extending posterolaterally; setae on posterior part of tergite 1 *ca* 1/2 as long as width of that tergite. ♂ abdomen (fig. 72): Clasper uniformly pale, not or hardly longer than apical width of anal segment; posterior margin of synsternite 5+6 with only setae, no spines; venter of anal segment with pair of setal patches near apex. (Bristles on ♀ median tergal plate in alignment with row of spines on posterior margin; ♀ postgenital plate with pair of setae). Body *ca* 1.5 mm long ..... 26. **Nycteribia parvula**

7. ♀ (figs. 60, 64): Bristles of median tergal plate in alignment with row of short spines on posterior margin; postgenital plate with single row of setae or spines. ♂ (figs. 70, 73): Clasper in ventral view straight, not curved inward at apex; posterior margin of synsternite 5+6 with 10± spines 8

♀ (fig. 61): Bristles of median tergal plate clearly preapical, not in alignment with row of short spines on posterior margin; postgenital plate with 2 rows of spines. ♂ (fig. 71): Clasper in ventral view distinctly curved inward at apex; posterior margin of synsternite 5+6 with 5± spines. Body *ca* 2.0 mm long ..... 24. **Nycteribia allotopa mikado**

8. ♀ (figs. 60, 68): Posterior margin of tergite 2 with 20± spines and 30± moderately long fine setae; postgenital plate well sclerotized, with 10± black stout

spines. ♂ (fig. 70): Surface of tergite 4 setose only on disc, that of 5 entire bare besides posterior marginal fringe; basal setal patch on venter of anal segment largely of short setae; clasper in ventral view acute at apex: Body *ca* 2.0 mm long..... 23. **Nycteribia formosana**

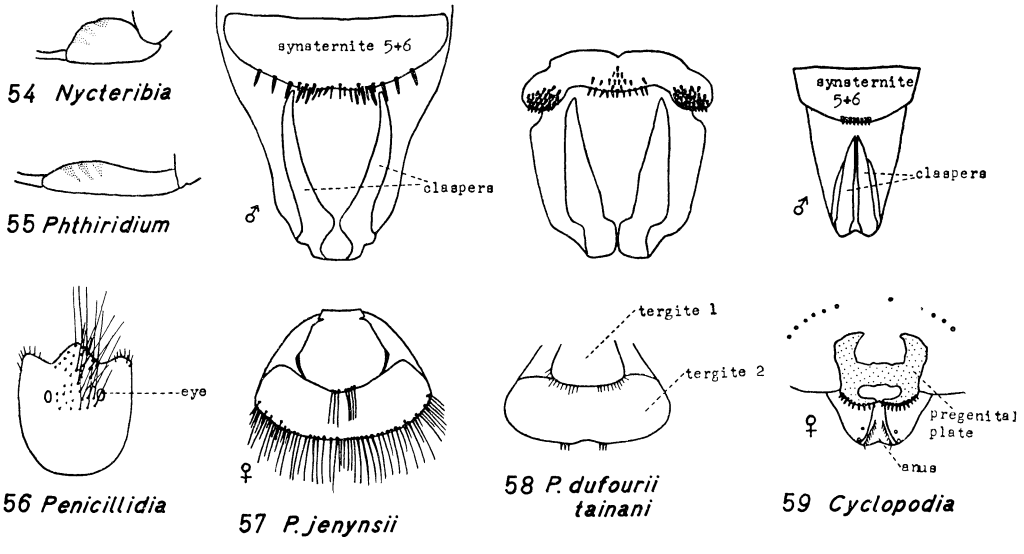
♀ (figs. 64, 69): Posterior margin of tergite 2 with 3–10 spines plus 15± long stout setae; postgenital plate hardly discernible, with 5± pale microsetae. ♂ (fig. 73): Surface of tergite 4 setose all-over, 5 extensively setose; basal setal patch on venter of anal segment largely of long setae; clasper in ventral view blunt at apex. Body *ca* 1.5 mm long..... 25. **Nycteribia pygmaea**

22. *Cyclopodia horsfieldi de Meijere, 1899 Fig. 59.

Cyclopodia horsfieldi Meij., 1899, Tijds. v. Ent. **42**: 153, ♂♀. Type ♀, in Amsterdam Mus., ex *Pteropus edulis*, Java.

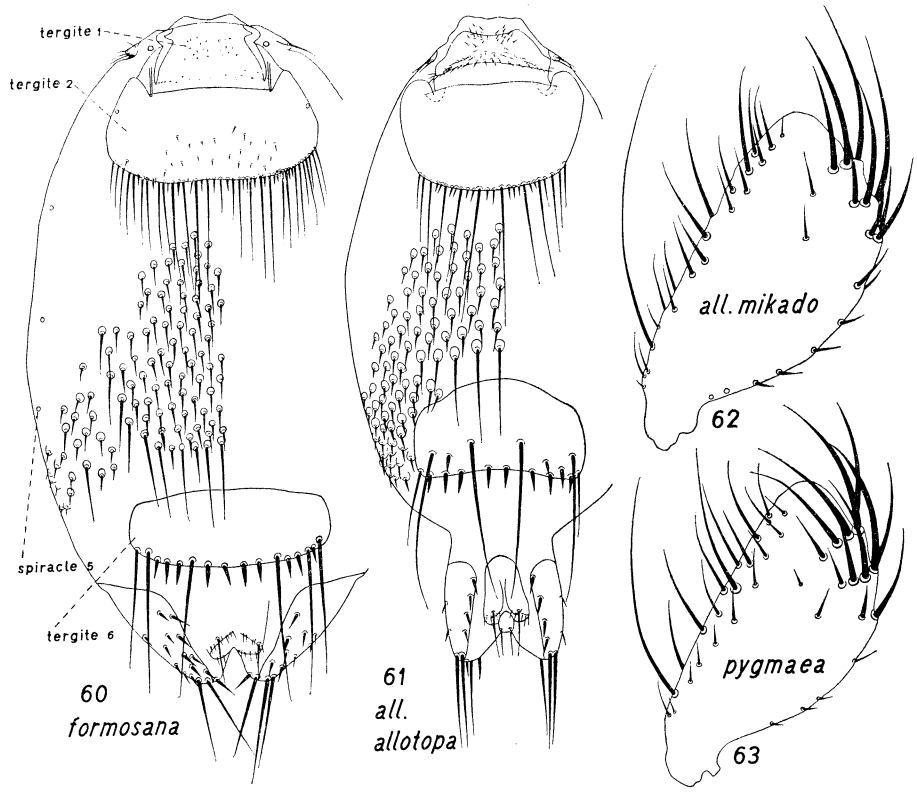
Cyclopodia magna Kishida, 1932: 242, fig. 468, ♂♀. Types in Kishida coll. or lost, ex *Pteropus* spp., southern [former] Japanese Empire to Philippines.—Theodor, 1959: 252, suggesting possible syn. with *horsfieldi* Meij.—Maa, 1965: 649, sunk as syn. of *horsfieldi*.

Widely spread over Malaysian and Philippine Subregions, extending to Thailand in the north, Celebes and neighboring islands in east; found on several species of *Pteropus* (*alecto, hypomelanus, philippinensis, speciosus, tablasi, vampyrus*). According to Dr Kishida (in litt.),the type of his *magna* was from the Ryukyus. If this was the case, the host should be *Pteropus dasymallus* Temm. which is the only fruitbat known from S. Kyushu (Kago-



Figs. 54–59. 54–55, *Nycteribia* and *Phthiridium*, fore tarsi, lateral view; 56, *Penicillidia*, head, dorsal view; 57–58, *P. jenynsii* and *P. dufourii tainani*, ♂ abdominal apex, ventral view and ♀ abdominal base, dorsal view; 59, *Cyclopodia horsfieldi*, ♂ and ♀ abdominal apices, ventral view.

shima etc.), Ryukyus, Borodino Is. and Taiwan. This bat is so rare in S. Kyushu that it is quite doubtful if any fly could have been able to exist thereupon. I have examined several preserved specimens of *dasymallus* from several countries but failed to find any ectoparasites.



Figs. 60–63. *Nycteribia*, ♀♀; 60–61, abdomens, dorsal view; 62–63, fore tarsi, lateral view. *N. formosana* based on material from Taiwan.

23. Nycteribia formosana (Karaman, 1939) Fig. 60, 68, 70.

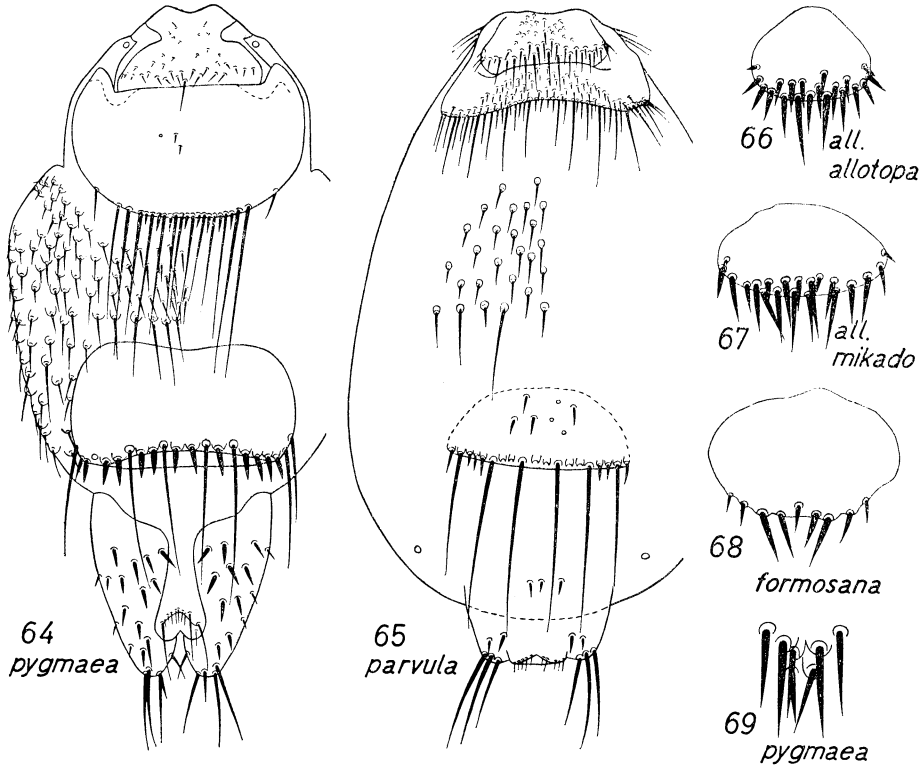
Listropodia formosana Karam., 1939, Ann. Mus. Serbiae Merid. **1**: 35, ♂♀. Type ♀, in Deutsch. Ent. Inst., ex (?) bat, Taiwan.

(?) *Listropodia pedicularia* (nec Latr.): Kishida, 1932: 239, fig. 463, ♀, saying to be found in Palaearctic Region ex *Miniopterus, Eptesicus, Rhinolophus.*

Rather common in Taiwan and China Proper, on *Miniopterus* and *Myotis.* Not included in Sasakawa's (1960) key to Japanese *Nycteribia.* I have seen no material from Japan. Kishida's description and illustration might have been based upon European specimens of true *pedicularia* or its relatives.

24. Nycteribia allotopa mikado Maa, new subspecies Figs. 62, 67, 71, 74–75.

Listropodia allotopa: Kishida, 1932: 238, fig. 460, ♀♂, listed fr. Taiwan ex *Miniopterus.*



Figs. 64–69. *Nycteribia*, ♀♀; 64–65, abdomens, dorsal view; 66–68, postgenital plates; 66–68 in same scale; 69 much more enlarged. *N. parvula* based on material from Taiwan.

Nycteribia (*Listropodia*) *allotopa*: Scott, 1936: 487, listed fr. Japan teste Kishida.

Nycteribia (*Nycteribia*) *allotopa*: Theodor, 1954: 15, listed fr. Japan.—Sasakawa, 1960: 42, included in key to Jap. *Nycteribia*.

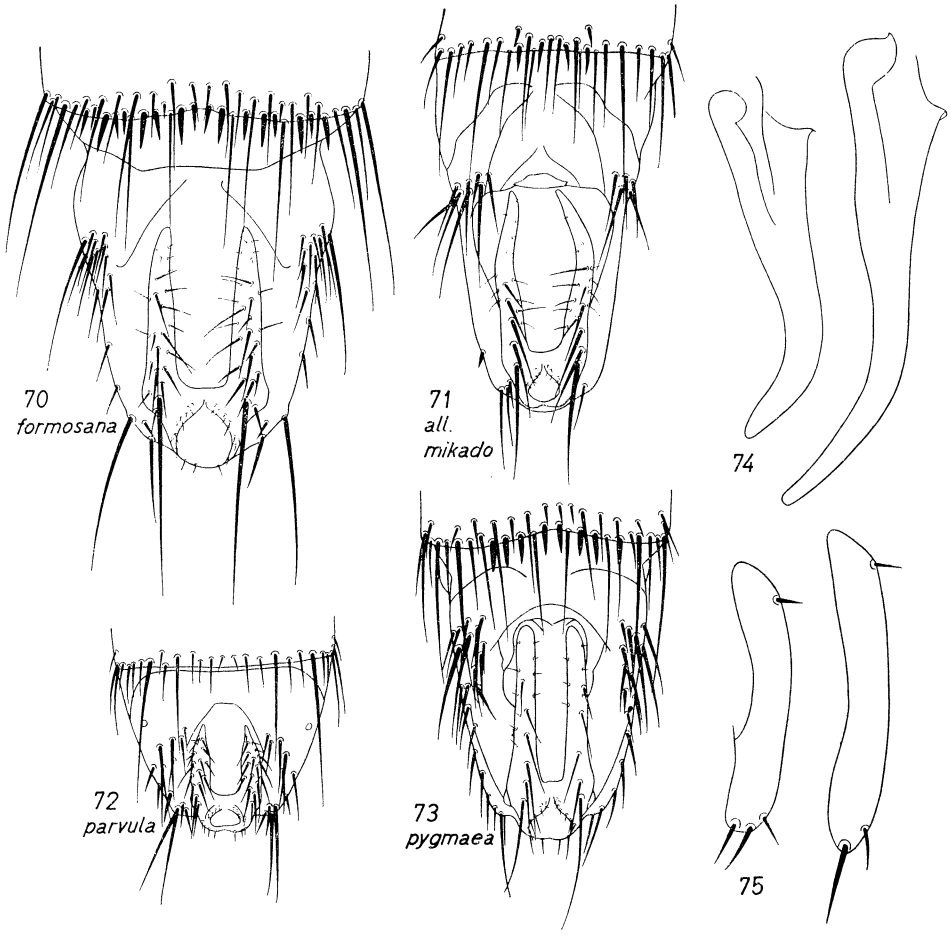
HONSHU: 6♂♂, 4♀♀, incl. holotype ♀ (BISHOP 7551), Syozyodo Cave, Niigata-ken, ex *Myotis* sp., VII.59, N. Ueshima. 1♂, 3♀♀, Kawachi-no-Kaza-Ana Cave, Suzuka Mt, ex *Miniopterus schreibersi*, II.58, S. Ueno & N. Mizuno. 3♂♂ (GNV), "Giappone", same host, X.1888, E. Gerrard. 1♂ (AMNH), Mt Hakone, same host (#148563), VIII.49. Last 5♂♂, 3♀♀ removed by T. C. Maa off preserved bats.

RYUKYU IS.: 1♀, Banna, 50 m, Ishigaki I., ex *Miniopterus schreibersi*, V.64, J. L. Gressitt; 11♂♂, 10♀♀, *id*, VIII.54, R. Kano.

Differing from topotypes from Sumatra in being slightly smaller in size and having much broader ♀ postgenital plate and more slender and more gently curved aedeagus and paramere. Compare figs. 66–67 and 74–75. This species is a common parasite of *Miniopterus* bats in the Orient and is often found in association with *N. parvula*.

25. Nycteribia pygmaea (Kishida, 1932) Fig. 63–64, 69, 73.

Listropodia pygmaea Kishida, 1932: 239, fig. 462, ♀. Type in Kishida, coll. or lost, ex



Figs. 70–75. *Nycteribia*, ♂♂; 70–73, abdominal apices, ventral view, in same scale; 74–75, aedeagi and parameres of *N. all. allotypa* (topotype) (left-side figures) and *N. all. mikado* (right-side figures), more enlarged and in same scale. Both *N. formosana* and *N. parvula* based on material from Taiwan.

Miniopterus and *Nyctalus*, Honshu.

HOKKAIDO: 2♂♂, 2♀♀ (coll. Peterson), Nukabira, ex *Myotis macrodactylus*, IX.66, A. W. F. Banfield.

HONSHU: 4♂♂, 4♀♀, Senjogahara, Nikko, ex *M. macrodactylus*, VIII.53, R. Kano. 1♀, Syozodo Cave, Niigata-ken, ex *Myotis*, VII.59, N. Ueshima.

On comparing my specimens with the type series of Prof. Theodor's manuscript new species from Japan (Rothschild coll.), they were found to be identical. Although Kishida's description and illustration are inadequate, his type is unavailable, and the host records are different, the species seems referable to *pygmaea* particularly when descriptions of ♀♀ of the "*pedicularia*" and *pygmaea* by Kishida are compared against specimens

of *formosana* and that listed above as *pygmaea*. In "*pedicularia*", the 1st abdominal tergite was described as having long spines on posterolateral areas (in *pygmaea* in Kishida's sense, 2 rows of spines), anal segment narrowed posteriorly (in *pygmaea*, equally wide at both anterior and posterior ends), body length *ca* 2.0 mm (in *pygmaea*, 1.5 mm). On the other hand, the abdominal venter of "*pedicularia*" was said to be of 6, and in *pygmaea*, of 4 sternal plates. Obviously the latter was due to shriveling of the specimen in question since the 1st plate of *pygmaea* was described as having 8 pairs of marginal spines in addition to the ctenidium! The abdominal ctenidium of the "*pedicularia*" was said to be noticeably large and composed of 50 long teeth whereas that of *pygmaea*, of 33 strong teeth (here Kishida did not mention the size of the ctenidium). I can offer no explanation for this disparity since my specimens of both forms have 50± long teeth. A brief description of ♀ and ♂ abdomens of the species follows.

♀ *Abdomen* (figs. 64, 69). Tergite 1 anterodiscally with patch of 20 ± uniformly short fine setulae, posteriorly with 2 preapical rows of similar setulae. Tergite 2 also with discal patch of 20± setulae, posteriorly fringed with fine, moderately long setae mixed with 3–10 very short spines. Membrane between tergites 2 and 6 with large patch of short fine setae spreading to areas laterad to tergite 6; setae of that patch largely uniform in length and fineness but 5–8 setae of hindmost row more than 3× as long as remainder. Tergite 6 largely bare, posteriorly with 4–8 long bristles in line with 1–2 rows of short spines. Anal segment not narrowed behind, dorsally with 15–20 short, irregularly arranged spines; anal ring dorsally with 6–8, ventrally with 2 fine setae. Postgenital plate very small, practically undefinable, with 5± pale microsetae.

♂ *Abdomen* (fig. 73). Anal segment dorsodiscally with 20± rather evenly distributed spines, ventrally with 2(1+1) small patches of strong setae. Clasper long, uniformly brownish, almost straight and evenly slender in ventral view, not curved inward but gently recurved at apex.

26. Nycteribia parvula Speiser, 1901 Figs. 65, 72

Nycteribia (*Listropodia*) *parvula* Speis., 1901, Archiv Naturg. **67** (1): 48, ♀. Type in Genova Mus., ex (?) bat, Sumatra.—Scott, 1936: 488, listed fr. Japan teste Kishida.

Listropodia parvula: Kishida, 1932: 238, fig. 461, ♀♂, recorded fr. Honshu, Shikoku, Kyushu and Korea ex *Miniopterus*.

Nycteribia (*Nycteribia*) *parvula*: Theodor, 1954: 18, listed fr. Japan.—Sasakawa, 1960: 42, included in key to Jap. *Nycteribia*.

HONSU: 1♀, Shimogamo, Shizuoka-ken, ex *Miniopterus schreibersi*, VII.65, Y. Wada. 1♀, Kawachi-no-Kaza-Ana Cave, Suzuka Mt, same host, II.58, S. Ueno & N. Mizuno, removed fr. preserved bats by T. C. Maa. 1♀ (AMNH), Mt Hakone, removed fr. preserved specim. of *M. schreibersi* (# 148563), VIII.49.

Common in the Oriental Region on *Miniopterus*. Recently fully redescribed by Theodor (l. c.). Comparisons of Japanese specimens (♀♀) against topotypes failed to reveal any noticeable difference.

27. Nycteribia tarsalis (Kishida, 1932)

Stylidia tarsalis Kishida, 1932: 241, fig. 466, ♀. Type ♀, in Kishida coll. or lost, ex *Nyc-*

talus noctula and *Myotis mystacinus*, Honshu, Shikoku, Kyushu.

Phthiridium tarsale: Maa, 1965: 381, list.

The identity of this species is quite doubtful. At first I guessed it as a *Phthiridium* (=*Stylidia*). On re-checking Kishida's paper and taking into consideration the host records, I am now inclining to presume it a species related to *N. vexata* Wwd. of Europe. A free translation of Kishida's description follows.

"Body-length *ca* 3.0 mm. Readily recognizable from other species by its long narrow abdomen. Eyes absent. Thoracic venter broadly oval, widest at level of [bases of] hindlegs, covered with short setae all-over; median longitudinal line narrow, only its central section widened and spindle-shaped; oblique sutures running straightly anteromesad from behind bases of midlegs and forming acute angle to meet median longitudinal line. Legs long, narrow; femora cylindrical, with pale ring at a point of basal 2/5; tibiae flattened but not expanded, with 4 (sic) rows of spines on hind interior angle, no pale rings; tarsi as long as or slightly longer than tibiae; basitarsi 2× as long as remaining tarsal segments together. ♀ abdomen dorsomedially with impressions of 3 plates, all setose; posterior margin of 2nd plate with 15 pairs of long setae, that of 3rd plate with *ca* 4 pairs of spines. Venter with 6 sternal plates; ctenidium of 1st plate composed of *ca* 60 strong teeth; posterior plates with few setae-spines; 6th plate widened posteriorly, with 3 rows of "scanty" setae. Anal segment nearly as long as wide, slightly narrowed posteriorly and produced lateroposteriorly; apex with 3 long spines; dorsum with many, venter with only 1–3 pairs of spinules. Found in Honshu, Shikoku and Kyushu, on *Nyctalus noctula* and *Myotis mystacinus*."

28. Phthiridium hindlei (Scott, 1936) Fig. 55.

Nycteribia (*Acrocholidia*) *hindlei* Scott, 1936: 489, figs. 6–8, ♂♀. Type ♂, in Brit. Mus. Nat. Hist., ex *Rhinolophus ferrumequinum nippon*, Shantung, N. China.

Nycteribia (*Stylidia*) *hindlei*: Sasakawa, 1960, 42, figs. A–E, ♂, included in key to Jap. *Nycteribia*, recorded from Honshu: Fukui-ken ex *Myotis macrodactylus*.

(?) *Acrocholidia nipponensis* Kishida, 1932: 240, fig. 464, ♂♀. Types in Kishida coll. or lost, ex *Rhinolophus ferrumequinum nippon*, "Japan".—Scott, 1936: 489, suggesting to be a possible syn. of *hindlei*.

At present known from China Proper (Shantung) and Japan (Honshu), on *Rhinolophus ferrumequinum nippon* Temm. Sasakawa's record from *Myotis* is obviously a stray or contamination, since *Phthiridium* (=*Stylidia*) is confined to Rhinolophid and Hipposiderid bats, while *Myotis* harbors *Nycteribia*, *Basilia* etc. rather than *Phthiridium*.

I have no material of this species from Japan, nor have I seen Kishida's type. From Sasakawa's figures as well as Kishida's host record, it seems highly possible that *hindlei* and *nipponensis* are synonymous. Since Kishida's description and illustration are inadequate, the question must remain open.

29. *Basilia (Paracyclopodia) roylii (Westwood, 1834)

Nycteribia roylii Wwd., 1834, Proc. Zool. Soc. Lond. **1834**: 138, ♂; 1835, Trans. Zool. Soc. Lond. **1**: 290, figs. 35–36, ♂. Type in Oxford Univ., ex (?) bat, India Orientali.

(?) *Paracyclopodia roylei*: Kishida, 1932: 242, fig. 469, ♀♂, recorded fr. Honshu and Ryukyu Is. ex *Miniopterus*.

Paracyclopodia roylii: Theodor, 1954: 32, listed fr. Japan, probably teste Kishida.

B. roylii is a common parasite of *Scotophilus* (*temminckii, heathi*) in Ceylon, Indo-China, S. China and Malaysia. Certainly it does not occur on *Miniopterus* and not in Japan and Ryukyu Is. which are far out of the range of *Scotophilus*. Kishida's record and description might have been based on an undescribed species of the *Basilia nattererii* group.

30. Penicillidia jenynsii (Westwood, 1834) Fig. 57.

Nycteribia jenynsii Wwd., 1834, Proc. Zool. Soc. Lond. 1834: 139, ♂; 1835, Trans. Zool. Lond. **1**: 291, figs. 29–34, ♂. Type in Oxford Univ., ex (?) bat, China.

Penicillidia jenynsi: Marumo, 1927: 532, fig. 1024, recorded fr. "Japan".—Kishida, 1932: 241, fig. 467, ♀♂, recorded fr. Honshu, Shikoku, Kyushu, Korea and Taiwan ex *Miniopterus*.—Scott, 1936: 487, listed fr. Japan teste Kishida.—Esaki, 1952: 1721, fig. 4961, listed fr. Honshu, Shikoku and Kyushu ex *Miniopterus*.

Nycteribia oitaensis Miyake 1919: 388, fig. 250. Type ♀ in Kishida coll. or lost, ex (?) bat, Kyushu: Oita-ken.—Kishida, 1928: 92, sunk as syn. of *Basilia nattereri*.

Acrocholidia bechsteini (nec Klnt.): Kishida, 1932: 240, fig. 465, ♀, listed fr. Kyushu, with *oitaensis* as syn.

HONSHU: 1♂, 2♀♀, Kawachi-no-Kaza-Ana Cave, Suzuka Mt., ex *Miniopterus schreibersi*, II.58, S. Ueno & N. Mizuno, removed fr. preserved bats by T. C. Maa. 1♂, 3♀♀, Syozyodo Cave, Niigata-ken, same host, VII.59, N. Ueshima. 1♀, Kozu, Shizuoka-ken, ex *Myotis*, III.64, R. Kano.

I have no doubt that the *jenynsi* and "*bechsteini*" of Kishida are identical although they were placed by him under 2 different genera. As it can be gathered from his descriptions and illustrations, only differences of the 2 forms are profile shape of head (head of *bechsteini* was placed upperside down), relative lengths and widths of abdominal tergal plates, number of posterior marginal setae of 1st plate and number of abdominal sternal plates. Apparently none of these are reliable. It is also highly probable that the "*bechsteini*" was drawn and described from the type *oitaensis* since only the ♀ sex was involved and only Kyushu was given as its habitat in Japan.

Oitaensis was originally published by Miyake with very brief description and crude drawing. The type was later transferred to Kishida who at first (1928) considered it a synonym of *nattererii*, and later (1932) as that of *bechsteinii*. *Nattererii* Klnt. is a very distinct *Basilia* species of Europe whereas *bechsteini* Klnt., a synonym of *Nycteribia vexata* Wwd. of the Mediterranean Basin. Their occurrence in the Far East is least probable and their confusion with *Penicillidia* by Kishida is most puzzling.

31. Penicillidia dufourii tainani Karaman, 1939 Figs. 56, 58.

Penicillidia dufouri tainani Karam., 1939, Bull. Soc. Sci. Skoplje **20**: 133, ♂♀. Type ♀, in Deutsch. Ent. Inst., ex (?) bat, Taiwan.

Penicillidia tainani: Theodor, 1954: 40, listed fr. "Japan."

Rather common in Taiwan and China Proper on *Myotis* and *Miniopterus*, occasionally

on *Rhinolophus* too. I have no material from Japan.

Family STREBLIDAE Kolenati 1863

Key to Japanese Streblidae

1. Wings of both sexes non-caducous, with 6 well sclerotized longitudinal veins and 2 crossveins; wing membrane with numerous setulae near margins; alula well developed; thorax not bilaterally compressed; head and mouthparts of both sexes similar; both sexes ectoparasitic 2

   Wing of ♂ non-caducous, of ♀ caducous, with 3 weakly sclerotized longitudinal veins and 1 crossvein; wing membrane lacking any setulae; alula not definable; thorax bilaterally compressed; head of ♂ shorter than and that of ♀ much longer than thorax; mouthparts of ♂ normal (for the family), of ♀ with enormously enlarged labial theca bearing strong spines; ♂ ectoparasitic; ♀ endoparasitic, and when encysted in tissues of host, maggot-like, with wings and legs represented by very short stubs, with head and thorax entirely enclosed in sac formed by abdominal membrane ..... **Ascodipteron speiserianum**

2. Thoracic venter anteriorly not notched at middle, length of setae on its surface subequal to interspaces of their basal punctures; postvertex with 10± setae; major setae on dorso-apical end of tarsi uniformly fine; setae on ♀ ventral abdominal membrane quite uneven, those of 3-4 hindmost rows much stouter than and 3× or more as long as remainder ..... 32. **Brachytarsina amboinensis**

   Thoracic venter (fig. 82) anteriorly angularly notched at middle, setae on its surface about 1/2 as long as interspaces of their basal punctures; postvertex (fig. 80) with 2-3 setae; outer pair (fig. 77) of major setae on dorso-apical end of tarsi fine, in strong contrast to inner pair which is modified into heavy spines; setae on ♀ abdominal ventral membrane uniform in length and fineness ..... 33. **Brachytarsina kanoi**

32. Brachytarsina amboinensis Rondani, 1878

Brachytarsina amboinensis Rndn., 1878, Ann. Mus. Stor. Nat. Genova **12**: 166. Type ♀, in Genova Mus., ex (?) bat, Amboina.

Nycteribosca amboinensis: Jobling, 1951: 233, recorded fr. Ishigaki ex *Miniopterus schreibersi.*

Trichobius molossus (nec Giglioli): Kishida, 1932 (part): 236, fig. 659, ♀♂, recorded fr. "Japan" ex *Rhinolophus, Miniopterus, Tadarida.*

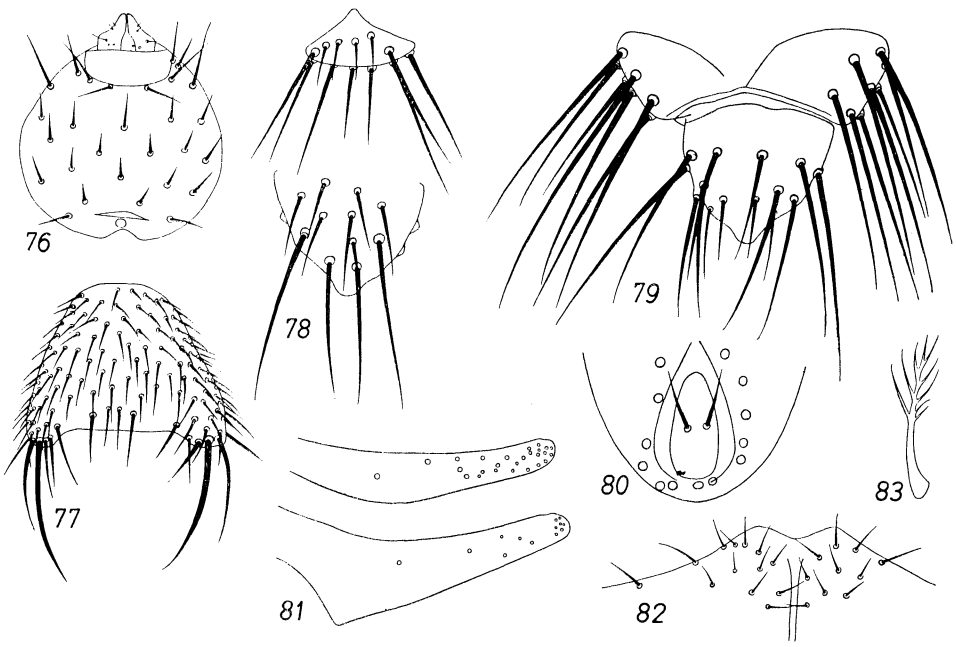
Nycteribosca kollari (nec Frfld.): Esaki, 1952: 1721, fig. 4960. Recorded fr. Honshu, Shikoku and Kyushu ex *M. schreibersi.*

RYUKYU IS.: 1♀ (HKU), Ishigaki I., no host record, IX.10, S. Matsumura.

A common parasite of *Miniopterus* in the Orient.

33. Brachytarsina kanoi Maa, new species Figs. 76-83.

HONSHU: 1♂, 2♀♀ incl. holotype ♀ (Bishop 7552), Kozu, Shizuoka-ken, ex *Myotis macrodactylus*, III.64, R. Kano. Type series in Bishop Mus.



Figs. 76-83. *Brachytarsina kanoi*. 76, ♀ labial theca; 77, ♀ hind tarsus, 5th segment, dorsal view; 78, ♀ abdominal apex, ventral view; 79, ditto, dorsal view; 80, ♀ head, hind part, dorsal view; 81, ♂ right and left parameres, lateral view; 82, ♀ thorax, anterior part, ventral view; 83, ♀ arista. Figs. 78-80 and 82 same scale, others more enlarged in varied magnifications.

Body length 2.7 mm in ♂, 2.8-3.1 mm in ♀ (in alcohol). *Head* not darker than other parts of body, dorsally strongly convex, in profile highest at level of postvertex where upper and hind cephalic margins almost forming 90° angle. Eye small, circular. Laterovertex evenly setose, setae of upper row longer than that of lower row, longest setae on upper anterior end; mediovertex narrow; postvertex (fig. 80) elongate-ovoid, separated from laterovertex by colorless membrane, posteriorly meeting occipital margin, bearing 2, less often 3 setae. Arista as in fig. 83. Postgena with setae of varied length; occiput with row of 4-5 setae which are paler, shorter than those on postgena. Labial theca(fig. 76) hardly longer than wide, widest behind midlength, with fine setulae; labella very small, also hardly longer than wide. *Thorax* about as long as wide, uniformly setose all-over; setae on prescutum (anterior part) and scutellum longer than on elsewhere of dorsum, those on lateral surface (lower part) and venter much finer and shorter than on dorsum, those on ventral disc less than 1/2 as long as interspaces of setiferous punctures; 2 of scutal and 4 of scutellar setae lying near centers of those sclerites significantly longer and slightly stouter than neighboring setae. Relative lengths of prescutum, scutum and scutellum 22: 16: 9. Posterior scutellar margin evenly curved; thoracic squama posteriorly conical. Anterior margin of thoracic venter (fig. 82) angularly notched at middle. *Wing* length 3.1 mm in ♂, 3.1-3.2 mm in ♀; vein R_{2+3} gently curved at apex; R_{4+5} and M_{1+2} apically weakly divergent to each other. *Legs* fairly robust; femora with long dense setae on dorsum, shorter ones on outer surfaces; inner (anterior) surface of femur 1 largely

bare, with 20± long setae near apex; tibiae uniformly setose, dorsal setae slightly longer. Tarsal segment 5 (fig. 77) dorso-apically lined with 2 long setae interspaced by pair of strong curved spines. *Abdomen* dorsally similarly setose as in *amboinensis*. Tergites 1 and 2 well definable though not heavily sclerotized; tergite 1 transverse, *ca* 1/2 as long as tergite 2 which is squarish. Posterior lobe of laterite 2 very strongly convex, almost hemispherical, in lateral view slightly higher than long, in dorsal view slanting posteromesad, with bare inner margin and subacute inner posterior corner; setae on that hemispherical lobe, particularly those on its inner posterior margin, longer, stouter and basally darker than setae on scutellum. Lateral fence of abdominal dorsum composed of 4–5 columns of long shining brown setae. Laterite 7 weakly raised, weakly sclerotized. Sternite 2 with anterior 1/2 almost entirely bare and medially weakly interrupted, with lateral setae longer, stouter than median setae; membrane laterad to sternite 2 entirely bare; membrane caudad to sternite 2 uniformly setose. ♀ sternite 7 small, triangular, with 10± setae; ♀ proctiger (figs. 78–79) short, wider than sternite 7, strongly narrowed apicad, dorsally with 2, ventrally with 4–5 transverse series of setae. Right and left parameres (fig. 81) similar, nearly straight.

Named in honor of Prof. Rokuro Kano of Tokyo Medical and Dental University as a humble token of my appreciation for his cooperation and my admiration of his studies in muscoid flies. Superficially *kanoi*, *kollari* and *amboinensis* are similar in size and general chaetotaxy. In *kollari*, the head is less convex, prescutal setae uneven in density (anterior ones much sparser than posterior), thoracic squama rather broadly rounded, anterior margin of thoracic venter not notched at middle, tarsi dorso-apically lacked modified setae, ♀ sternite 7 much wider than pygidium and with 30–40 setae, ♀ pygidium much elongate, right paramere strongly curved at apex. Therefore *kanoi* can hardly be mistaken for that European species. In Jobling's (1951: 227–228) key to Oriental and Australian *Brachytarsina* (= *Nycteribosca*), the new species runs to *amboinensis* but can easily be recognized by differences given in my key. It may be added that Jobling (l. c., fig. 31), probably by oversight, illustrated the anterior margin of thoracic venter of *amboinensis* as distinctly bilobed. This is not true. For convenience, *kanoi* can also be separated from that species by sparser setae on body and legs and by less strongly convex head.

34. Ascodipteron speiserianum Muir, 1912

Ascodipteron speiserianum Muir, 1912, Bull. Mus. Comp. Zool. Harvard **54**: 352, figs. 1–5, 11–18, 30–32, ♀♂. Type ♀, in U. S. Nat. Mus., ex *Miniopterus schreibersi*, Amboina.

Ascodipteron sp.: Tokunaga, 1932: 90, fig. 1, ♀, recorded fr. Honshu: Kisyu Setakaigan ex *Miniopterus*.

HONSHU: 1 encysted ♀, Shimogamo, Shizuoka-ken, ex *M. schreibersi*, VII.65, Y. Wada.

Common on *Miniopterus* in the Orient but often overlooked by collectors. The ♀ is embedded in cyst at base of ear of the host.

Faunistic Features

The Japanese fauna of Diptera Pupipara is surprisingly rich among the temperate countries. In land area, Japan is only about 1/27 as large as Europe, and in intensiveness of collecting of these flies, it is entirely incomparable to that Continent. For instance, in

the British Isles (which are slightly smaller than Japan), 90 species of birds have been recorded as hosts of *Ornithomya* (teste Hill, 1962, Proc. Ent. Soc. Lond. A **37**: 41) while in Japan, only 16 species have been such; and in Czechoslovakia (which is *ca* 1/3 as large as Japan), 11 species of bats are known to harbor nycteribiids (teste Hurka, 1964, Acta Univ. Carolinae (Praha) Biol. **1964**: 169) while in Japan, only 3 species (not including those recorded by Kishida) are definitely known. Even so, the number of recorded Pupipara of Japan is nearly the same as that of entire Europe. In Table 1, counterparts belonging to same species-groups or having similar host prefernce are arranged side-by-side; the long dash—indicates an expected absence of a counterpart; the question marks ?? an expected presence of a counterpart; and the exclamation mark in parenthesis, (!) doubts regarding the occurrence or establishment of a species in that country. Thus the establishment of *Hippobosca longipennis* in Japan is to be questioned, and the counterpart of *Ornithomya candida* is not expected to occur in Europe; while the counterpart of *Ornithomya biloba* is expected to occur in Japan.

Table 1. Comparison of European and Japanese faunae of Dipt. Pupipara

Genera	European Counterparts	Japanese Counterparts	Preferred Hosts
Ornithoica Rndn.	*turdi* Latr.	*momiyamai* Kishida	Passeriformes
Ornithophila Rndn.	*metallica* Schin.	*metallica* Schin.	varia
〃	*gestroi* Rndn.	——	*Falco*
Ornithoctona Speis.	——	*australasiae* Fabr.	varia
〃	——	*plicata* Olf.	varia
Ornithomya Latr.	*avic. avicularia* Linn.	*avic. aobatonis* Matsum.	varia
〃	*ch. chloropus* Bergr.	*ch. extensa* Maa	varia
〃	*fringillina* Curt.	*fringillina* Curt.	Passeriformes
〃	——	*candida* Maa	Passeriformes
〃	*biloba* Duf.	? ?	*Hirundo*
Crataerina Olf.	*pallida* Latr.	? ?	*Apus*
〃	*melbae* Rndn.	——	*Apus*
〃	*hirundinis* Linn.	*hirundinis* Linn.	*Delichon*
Icosta Speis.	*minor* Bigot	? ?	Passeriformes
〃	*ard. ardeae* Mcq.	*ard. ardeae* Mcq.	Ardeidae
〃	(!) *massonnati* Falc.	——	uncertain
Pseudolynchia Beq.	*canariensis* Mcq.	*canariensis* Mcq.	Columbidae
	garzettae Rndn.	? ?	Caprimulgidae
Olfersia Lch.	*fumipennis* Sahlb.	? ?	*Pandion*
	spinifera Lch.	(!) *spinifera* Lch.	*Fregata*
Hippobosca Linn.	*equina* Linn.	*equina* Linn.	*Equus*
	longipennis Fabr.	(!) *longipennis* Fabr.	*Canis*
Lipoptena Ntzs.	*cervi* Linn.	*fortisetosa* Maa	*Cervus*
	——	(!) *japonica* Beq.	uncertain
	capreoli Rndn.	——	*Capra*
	couturieri Seguy	——	*Rupicapra*
Melophagus Latr.	*o. ovinus* Linn.	*o. ovinus* Linn.	*Ovis*
	rupicaprinus Rndn.	——	*Rupicapra*
Nycteribia Latr.	*pedicularia* Latr.	(!) *formosana* Karam.	*Myotis*
〃	*kolenatii* Theod. & Mosc.	*pygmaea* Kishida	*Myotis*
〃	*latreillii* Lch.	? ?	*Myotis*

Genera	European Counterparts	Japanese Counterparts	Preferred Hosts
Nycteribia	*schmidlii* Schin.	*allotopa mikado* Maa	*Miniopterus*
〃	——	*parvula* Speis.	*Miniopterus*
〃	*vexata* Wwd.	*tarsalis* Kishida	*Myotis*
Phthiridium Herm.	*biarticulatum* Herm.	*hindlei* Scott	*Rhinolophus*
Basilia Mir. Rib.	*italica* Theod.	? ?	*Myotis*
〃	*nana* Theod. & Mosc.	? ?	*Myotis*
〃	*nattererii* Klnt.	? ?	*Myotis*
Penicillidia Klnt.	*conspicua* Speis.	*jenynsii* Wwd.	*Miniopterus*
〃	*d. dufourii* Wwd.	(!) *d. tainani* Karam.	*Myotis*
〃	*d. monoceras* Speis.	——	*Myotis*
Brachytarsina Mcq.	*kollari* Frfld.	? ?	*Rhinolophus*
〃	——	*kanoi* Maa	*Myotis*
〃	——	*amboinensis* Rndn.	*Miniopterus*
Ascodipteron Adens.	——	*speiserianum* Muir	*Miniopterus*

Note: Stray records of the following species in Europe are not included: *Hippobosca camelina* Lch. (France, Crete), *H. variegata* Megerle (Czechoslovakia).

Even under the present state of our knowledge, the similarity of the European and Japanese faunae of Diptera Pupipara is strongly significant. Several species are common to both countries while in some others, each country is represented by closely related counterparts. The only difference in their faunal compositions is that Europe has received far less tropical elements from the Ethiopian Region than has Japan from the Oriental Region. The occurrence in Japan of the genera *Ornithoctona* and *Ascodipteron* as well as *Nycteribia parvula*, and *Brachytarsina amboinensis* clearly indicates the penetration of Oriental elements.

The endemism of the Pupipara fauna of Europe is at present somewhat higher than that of Japan. When the latter is adequately explored, the percentage of endemism will probably be about the same as the former. Provisionally, the following species may be considered endemic to Japan: *Ornithoica momiyamai, Ornithomya candida, Lipoptena fortisetosa, Nycteribia pygmaea, N. tarsalis, Brachytarsina kanoi.*

The Pupipara fauna of the Palaearctic part of Mainland China is so little known that a comparison with that of Japan is impossible at present. They are expected to be closely similar to each other.

Notwithstanding its geographical proximity and very small land area (less than 1/10 as large), the Pupipara fauna of Taiwan is significantly richer than and dissimilar to that of Japan. It is evidently Oriental and has 3 *Ornithoica*, 5 *Icosta* and 2 *Pseudolynchia*. The Palaearctic elements are poorly represented. There are no representatives of *Basilia nattererii* group which are chiefly Palaearctic and are expected to be found in Japan. The only Taiwanese species of *Ornithomya* has Oriental affinity. The remaining genera are represented in Taiwan and Japan by nearly equal number of species (*Hippobosca* and *Melophagus*, once found in Taiwan, since then wiped out). The coexistence in both countries of *Ornithophila metallica, Ornithoctona plicata, Nycteribia allotopa, N. parvula, Brachytarsina amboinensis, Ascodipteron speiserianum* and several other species is clearly a phenomenon of northward penetrations of tropical elements. Most of these species spread over entire or almost entire Oriental Region (few even entire Palaeotropics) and have markedly high population density in the tropics.

Host-Parasite Index

(Records given by Kishida and those from Korea and Ryukyu Is. are not included)

Hosts	Parasites
Accipiter nisus nisosimilis Tickell (Accipitridae)	*Ornithomya avicularia aobatonis*
A. virgatus gularis Temm. & Schl.	*Ornithomya avic. aobatonis*
Capricornis c. crispis Temm. (Bovidae)	(?) *Lipoptena japonica*
Cervus n. nippon Temm. (Cervidae)	*Lipoptena fortisetosa*
Cinclus p. pallasii Temm. (Cinclidae)	*Ornithomya avic. aobatonis*
Corvus macrorhynchos japonensis Bonap. (Corvidae)	*Ornithomya avic. aobatonis*
Delichon d. dasypus Bonap. (Hirundinidae)	*Crataerina hirundinis*
Emberiza aureola ornata Shulpin (Muscicapidae)	*Ornithomya avic. aobatonis*
E. cioides Bonap.	*Ornithomya avic. aobatonis* *Ornithophila metallica*
E. fuscata Pallas	*Ornithomya avic. aobatonis*
E. spodocephala personata Temm.	*Ornithoica momiyamai* *Ornithomya avic. aobatonis* *Ornithomya candida*
Erithacus calliope Pallas (Muscicapidae)	*Ornithomya avic. aobatonis* *Ornithomya candida*
Garrulus glandarius brandtii Evers. (Corvidae)	*Ornithoica momiyamai*
Hypsipetes a. amaurotis Temm. (Pycnonotidae)	*Ornithomya avic. aobatonis*
Miniopterus schreibersii fuliginosus Hodgs. (Vespertilionidae)	*Ascodipteron speiserianum* *Brachytarsina amboinensis* *Nycteribia allotopa mikado* *Nycteribia parvula* *Penicillidia jenynsii*
Motacilla alba lugens Gloger (Motacillidae)	(?) *Ornithomya chloropus extensa*
M. grandis Sharpe	*Ornithomya avic. aobatonis*
Myotis macrodactylus Temm. (Vespertilionidae)	*Brachytarsina kanoi* *Nycteribia pygmaea* (?) *Phthiridium hindlei*
Ninox scutulata japonica Temm. & Schl. (Strigidae)	*Ornithoctona plicata*
Otus scops Linn. (Strigidae)	*Ornithomya avic. aobatonis*
Parus atricapillus restrictus Hellmayr (Paridae)	*Ornithomya fringillina*
P. major minor Temm. & Schl.	*Ornithoctona australasiae* *Ornithomya fringillina*
Prunella rubida fervida Sharpe (Prunellidae)	*Ornithomya fringillina*
Rhinolophus ferrumequinum nippon Temm. (Rhinolophidae)	*Phthiridium hindlei*
Sphenocercus s. sieboldii Temm. (Columbidae)	*Ornithomya avic. aobatonis*
Turdus naumanni eunomus Temm. (Muscicapidae)	(?) *Ornithoica unicolor*
T. cardis Temm.	*Ornithoica momiyamai*
Zoothera sibirica davidsoni Hume (Muscicapidae)	*Ornithoica momiyamai* *Ornithomya avic. aobatonis* *Ornithomya candida*
"hawk"	*Ornithoctona plicata*
domestic dog	(?) *Hippobosca longipennis*
domestic horse	*Hippobosca equina*
domestic sheep	*Melophagus ovinus ovinus*

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Postscript. After the manuscript of this paper was sent to press, there appeared O. Theodor's (1967) "An illustrated catalogue of the Rothschild collection of Nycteribiidae in the British Museum (Natural History)" (506 p., London). In that important work, 5 species were definitely recorded from Japan: *Nycteribia allotopa*, Miyazaki, p. 55; *N. japonica* n. sp. [=*pygmaea*, as interpreted in this paper], Miyagi, p. 65, fig. 87-90; *N. parvula*, Wakayama, p. 73; *Stylidia hindlei* Miyagi, p. 146; *Penicillidia jenynsii*, Miyazaki, p. 382. In addition, "Japan" was vaguely included within the distributional range of *Basilia roylii roylii*, p. 296; and the possible synonymy of Kishida's species was suggested: *Cyclopodia magna* (?=*horsfieldi*), p. 452; *Acrocholidia nipponensis* ♂ plus *Stylidia tarsalis* ♀ (?=*hindlei*), p. 495; *Listropodia pygmaea* (?=*parvula*), p. 495.