A Systematic Study of the Genus Linnaemya ROBINEAU-DESVOIDY from Japan and the Oriental Region (Diptera: Tachinidae)

SHIMA, HIROSHI
Biological Laboratory, College of General Education, Kyushu University

https://doi.org/10.15017/7347420

出版情報：Sieboldia : acta biologica . 5 (1), pp.1-96, 1986-03-31. 九州大学教養部生物学教室
バージョン：
権利関係：

Sieboldia 5 (1): 1 -96. (1986)

A Systematic Study of the Genus *Linnaemya* ROBINEAU-DESVOIDY from Japan and the Oriental Region (Diptera: Tachinidae)

Hiroshi SHIMA

Biological Laboratory, College of General Education
Kyushu University, Fukuoka, 810 Japan

ABSTRACT. The Japanese and Oriental species of the genus *Linnaemya* are fully revised. Thirteen new species are described: *crosskeyi* from Indonesia, Laos and Thailand, *pullior* from Malaysia, *microchaetopsis* from Japan, China and Korea, *ambigua* from Japan, *siamensis* from Thailand, *kanoi* from Thailand, *ruficaudata* from Thailand and Laos, *atrisetosa* from Thailand, *tuberculata* from Japan and Eastern U.S.S.R., *hirtipennis* from Japan, *persimilis* from Thailand, *burmana* from Burma and *sulensis* from the Philippines. The following new synonyms are established: *Nigrobonellia* BROOK **syn. n.** of *Linnaemya* ROBINEAU-DESVOIDY, *L. rohdendorfi* CHAO **syn. n.** of *L. scutellaris* (MALLOCH), *Palpina nigrohirta* MALLOCH **syn. n.** of *L. lateralis* (TOWNSEND), and *L. montshadskyi* ZIMIN **syn. n.** of *L. atriventris* (MALLOCH). A key to forty one Japanese and Oriental species of the genus is provided. The subgeneric classification and species-grouping of the genus from the Holarctic and Oriental Regions are discussed and the following subgenera and species-groups are recognized: subgenus *Homoeonychia* (*lithosiophaga*-group, *crosskeyi*-group), subgenus *Ophina* (*haemorrhoidalis*-group, *smirnovi*-group), subgenus *Linnaemya* (*vulpina*-group, *tessellans*-group, *oralis*-group, *atriventris*-group, *takanoi*-group).

Introduction

The genus *Linnaemya* ROBINEAU-DESVOIDY is one of the largest genera of the subfamily Tachininae. The genus is widely distributed in the world; the species are most abundant in the Afrotropical Region, where sixty four species have been recorded (CROSSKEY, 1980); fifty two species are known from the Palearctic Region (HERTING, 1984); at least seven species of the Nearctic Linnaemyini sensu SABROSKY & ARNAUD (1965) seem to belong to this genus; a few species occur in the Neotropical and Australian Regions, and no species in New Zealand. CROSSKEY (1976) enumerated sixteen named, two undescribed and one undetermined species from the Oriental Region. Up to the present time nine species of the genus have been recorded from Japan (TAKANO, 1957; MESNIL & PSCHORN-WALCHER, 1968; MESNIL, 1971, 1972).

In recent years I have examined a number of the Holarctic and Oriental species of this genus. In the present revision forty one Japanese and Oriental species are treated, of which thirteen species are described as new; twenty seven species are recorded from the Oriental Region and seventeen species from Japan, of which three species are common to both areas. One species from Central Asia is included because of its close relationship to a Japanese and Oriental species. Previously poorly known Oriental species are redescribed in detail and a key to the species from these area is also provided.

The members of this genus are more strongly diversified in their genital structures than in their superficial characters. It is especially true for the Oriental species, so that to examine the male and female genitalia is indispensable not only for indentifying the species, but for the subgeneric classification and species-grouping of the genus.

In this paper sixty nine Holarctic and Oriental species of the genus are divided into three subgenera based mainly on the male and female genital structures. The species-grouping within each subgenus is also made on the basis of the genital structures. The subgeneric classifications of the genus have been mainly based on superficial characters, such as the number of the lateral scutellar setae and the presence or absence of a wart-like excrescence on the inner surface of the 2nd antennal segment. These characters are useful to some extent, but are not always reliable. They are variable even within a species and not always correlated to genital structures. The male and female genitalia provide more constant characters for the subgeneric classification of the genus than superficial characters. Some African species are also included in the above consideration. They are mainly from the Canadian National Collection, Ottawa, and identified with EMDEN's key (1960). Although I have examined only a part of the total number of African species, I think that many of the African species can as well be classified into one of the subgenera by these characters.

Material and methods

The terminology used in the descriptions hereafter mostly referrs to CROSSKEY (1973). The following modifications on the wing terminology should be noted.

1. Bend of vein M_1: CROSSKEY used the term M for the median vein from base to its curvated or angulated point and the term M_1 for that from the latter point to distal apex of the vein. In this paper I use the term M_1 for the entire 4th wing vein form its base through its angulated point to the distal apex, so that this term corresponds to CROSSKEY's bend of M.

2. Cell R_{4+5}: The wing cell distal to r-m crossvein and enclosed by vein R_{4+5} anteriorly and vein posteriorly and apically, corresponding to CROSSKEY's cell R_5.

3. Discal crossvein: The most distal wing vein connecting the wing veins M_1 and M_3. Corresponding to m-cu crossvein of CROSSKEY.

4. Last section of vein M_3: CROSSKEY called the 5th wing vein as vein Cu_1, but I adopt the term vein M_3 for the vein in this paper, so that this corresponds to last section of vein Cu_1 of CROSSKEY.

Measurements were made in a similar manner to CROSSKEY (1976), except that the gena and parafacial were measured at their widest points in their respective horizontal

positions, not in the position of head profile (SHIMA, 1984).

Material studied was from the following collections: Biological Laboratory, College of General Education, Kyushu University, Fukuoka (BLKU); Bernice P. Bishop Museum, Honolulu (BPBM); British Museum (Natural History), London (BMNH); Canadian National Collection, Ottawa (CNC); Department of Entomology, Kasetsart University, Bangkok (DEKU); Department of Entomology, University of the Philippines, Los Baños (DEUP); Department of Medical Zoology, Tokyo Medical and Dental University Tokyo (TMDU); Entomological Institute, Hokkaido University, Sapporo (EIHU); Entomological Laboratory, Kyushu University, Fukuoka (ELKU); Institut für Pflanzenschutzforschung Kleinmachnow, Eberswalde (IPSF); Institute of Zoology, Academia Sinica, Peking (PIZ); National Science Museum, Natural History, Tokyo (NSM); Osaka Museum of Natural History, Osaka (OMNH); Universitetes Zoologiske Museum, Kopenhagen (CM); U.S. National Museum, Washington, D.C. (USNM); Zoological Museum of the University, Helsinki (ZMU).

Genus *LINNAEMYA* ROBINEAU-DESVOIDY

Linnaemya ROBINEAU-DESVOIDY, 1830: 52. Type-species: *Linnaemya silvestris* ROBINEAU-DESVOIDY, 1830 (= *Tachina vulpina* FALLÉN, 1810), by subsequent designation of ROBINEAU-DESVOIDY, 1863.

Bonnetia ROBINEAU-DESVOIDY, 1830: 53. Type-species: *Bonnetia oenanthis* ROBINEAU-DESVOIDY, 1830 (= *Tachina comta* FALLÉN, 1810), by subsequent designation of TOWNSEND, 1916.

Bonellia ROBINEAU-DESVOIDY, 1830: 56. (Preoccupied name). Type-species : *Bonellia tessellans* ROBINEAU-DESVOIDY, 1830, by subsequent designation of TOWNSEND, 1916.

Micropalpus MACQUART, 1834: 316. Type-species: *Tachina vulpina* FALLÉN, 1810, by original designation.

Amphisa ROBINEAU-DESVOIDY, 1863: 129. (Preoccupied name). Type-species : *Amphisa laticornis* ROBINEAU-DESVOIDY, 1863 (= *Micropalpus lithosiophagus* RONDANI, 1859), by monotypy.

Ophina ROBINEAU-DESVOIDY, 1863: 298. Type-species: *Ophina fulvipes* ROBINEAU-DESVOIDY, 1863 (= *Tachina picta* MEIGEN, 1824), by monotypy.

Homoeonychia BRAUER et BERGENSTAMM, 1889: 133. Type-species: *Micropalpus lithosiophagus* RONDANI, 1859, by original designation.

Tachinomima BRAUER et BERGENSTAMM, 1891: 383. Type-species: *Tachina expetens* BRAUER et BERGENSTAMM, 1891 (= *Micropalpus longirostris* Macquart, 1843), by original designation.

Gymnochaetopsis TOWNSEND, 1914: 15. Type-species: *Gymnochaetopsis analis* TOWNSEND, 1914, by original designation.

Bonellimyia TOWNSEND, 1919: 177. Type-species: *Bonellia tessellans* ROBINEAU-DESVOIDY, 1830, by original designation.

Palpina MALLOCH, 1927: 423. Type-species: *Palpina scutellaris* MALLOCH, 1927, by original designation.

Xanthoerigone TOWNSEND, 1927a : 71. Type-species: *Xanthoerigone oralis* TOWNSEND, 1927a,

by original designation.

Eugymnochaetopsis TOWNSEND, 1927b: 287. Type-species: *Eugymnochaetopsis lateralis* TOWNSEND, 1927b, by original designation.

Hemilinnaemyia VILLENEUVE, 1932: 269. Type-species: *Hemilinnaemyia decorata* VILLENEUVE, 1932 (=*Eugymnochaetopsis lateralis* TOWNSEND, 1927), by original designation.

Nigrobonellia BROOKS, 1944: 202. Type-species: *Linnaemya varia* CURRAN, 1925, by original designation. **Syn. nov.**

Leptoceromyia ZIMIN, 1963: 190. Type-species: *Linnaemya stackelbergi* ZIMIN, 1954, by original designation.

Eurysurstyla CHAO et SHI, 1980: 264. Type-species: *Linnaemya* (*Eurysurstyla*) *linguicera* CHAO et SHI, 1980, by original designation. **Syn. nov.** (As subgenus of *Linnaemya*)

Linnaemyia, *Linnemya*. Incorrect subsequent spellings of *Linnaemya* ROBINEAU-DESVOIDY.

The genus *Linnaemya* in the Palearctic and Oriental Regions is characterized as follows:

♂♀. *Head*: Dichoptic; eye densely haired, vertex 1/6-1/3 of head width; face convex, well visible in profile; epistoma prominent between vibrissae; inner vertical setae strong, convergent or crossing each other; 2 fine postocellar setae; normally 1 fine postvertical seta; 1 strong reclinate orbital seta and a row of several inclinate frontal setae in ♂; proclinate orbital seta always present in ♀, sometimes present in ♂; vibrissa strong; parafacial usually bare (usually haired in *comta* and *soror*); facial ridge bare; occiput bulged, sometimes with black setulae behind postocular row; antenna large, 3rd segment 1.5-6× as long as 2nd; arista thickened at least on basal 1/3, 2nd segment usually longer than wide; palpus very slender and cylindrical, at most 2× as long as 2nd antennal segment; occipital dilation with dense or sparse hairs. *Thorax*: Metathoracic spiracle large, with anterior and posterior lappets; propleuron bare; prosternum normally bare, rarely with minute hairs; barette normally bare; mediotergite haired; 5 humeral setae, 3 basal setae arranged in a straight line; 3+3 *ac*; 3+3 *dc* (rarely 3+4, then 2nd postsutural seta weak); 0-1+3 *ia*; pteropleural seta distinct; 2+1 *stpl* (rarely 1+1); scutellum with a pair of discal and 4-5 pairs of marginal setae, lateral scutellar seta usually present (absent in *speciosissima*). *Wing*: Hyaline, usually at most slightly tinged with brown (tricolorous in *crosskeyi* sp. n.); tegula brown to black; basicosta whitish yellow or white (dark brown in *crosskeyi* sp. n.); vein R_{4+5} haired from base to at most r-m crossvein dorsally; 2nd costal sector usually bare ventrally (haired in *zimini*); bend of vein M_1 right-angled, with short or long appendage; vein Cu+A not reaching wing margin. *Legs*: Fore coxa sometimes clothed with minute recumbent hairs on inner anterior surface (not as dense as in *Nemoraea*); hind coxa bare posterodorsally; fore tibia with 2-4 *ad* and 2-3 *p* setae; mid-tibia with 2-5 *ad* (normally 3-5), 3 *pd* and 1-2 *v* (usually 1) setae, *v* seta rarely very fine or absent; hind tibia usually with 2 preapical *d* setae and apical *pv* seta; ♀ fore tarsus at least weakly widened; ♂ fore claw and pulvillus usually longer than 5th tarsomere. *Abdomen*: Ovate, more or less truncated at apex; mid-dorsal excavation of T1+2 extending to its posterior margin; T2 without median marginal seta; T4 usually with median discal setae; sterna exposed on posterior portion. ♂ *genitalia*: T6 entire, free from or fused mid-dorsally with St7+8 or absent; epandrium with some very strong setae in

addition to normal fine hairs; cerci fused medially with each other; surstylus with 1-3 strong spines at apex; dorsal arms of hypandrium fused mid-dorsally with each other; pregonite usually present (absent in *speciosissima*); postgonite sometimes elongate; epiphallus present or absent; distiphallus with dense minute spinules on ventral portion. ♀ *genitalia*: T6 and T7 each usually divided longitudinally into 2 hemitergites; 6th spiracle normally situated on ventral portion of T6, 7th spiracle on intersegmental membrane between T6 and T7 or on posteroventral portion of T7; T8 absent; T9 absent, usually 2 strong setae present on membranous area between cerci.

Remarks. This genus seems to be closely allied to the Palearctic genus *Lypha* ROBINEAU-DESVOIDY. Besides the distinguishing characters mentioned by MESNIL (1971), *Linnaemya* differs from *Lypha* in the following genital structures: ♂ St5 with large posterior lobes; ♂ distiphallus simple, without short dorsal process; ♀ 7th abdominal spiracle situated anteriorly, i.e., situated in intersegmental membrane between T6 and T7 or on T6. The Australian genus *Chaetophthalmus* BRAUER et BERGENSTAMM very closely resembles *Linnaemya* in genital structures as well as in superficial characters. It is possible that *Chaetophthalmus* is a junior synonym of *Linnaemya*, but the taxonomic and phylogenetic relationships of these two genera are left for further study.

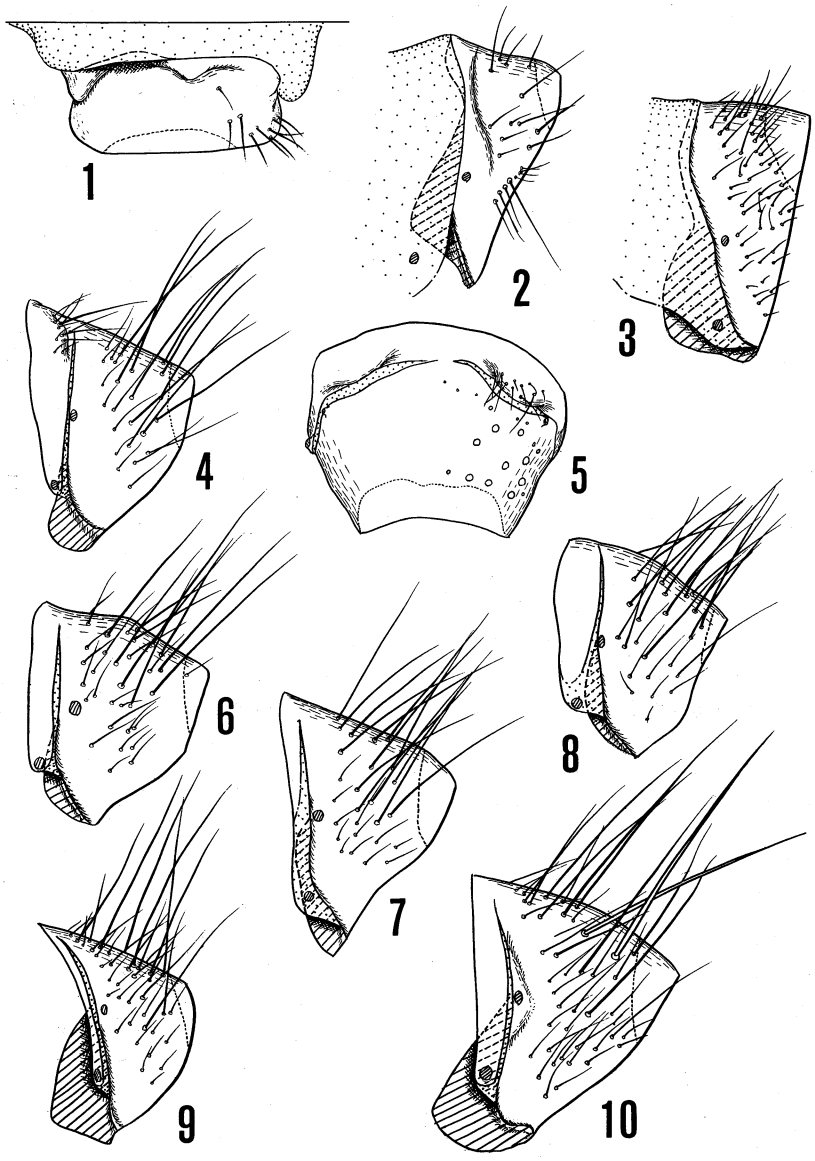
Subgeneric classification of *Linnaemya*

Subgeneric classification

It is not always reliable to use superficial characters for subgeneric classification of this genus. MESNIL (1971, 1972) used the number of lateral scutellar setae to distinguish the subgenera *Gymnochaetopsis* and *Bonellimyia*, but it is variable within a species. I have examined some specimens of *fissiglobula* having two pairs of lateral scutellar setae (*fissiglobula* is included by MESNIL in the subgenus *Gymnochaetopsis* and therefore ought to have only one pair of lateral setae), and the same is true for *setifrons*, *obscurellina* and *pentheri*. On the contrary, I have examined specimens of *rossica* having only one pair of lateral scutellar setae (*rossica* belongs to the subgenus *Bonellimyia*, and therefore should have two pairs of lateral setae). Moreover, these superficial characters are not correlated to the genital structure. The male and female genitalia of *Gymnochaetopsis analis*, the type-species of the subgenus *Gymnochaetopsis* sensu MESNIL, more closely resemble those of the subgenus *Bonellimyia* sensu MESNIL, such as *olsufjevi*, *haemorrhoidalis*, *media*, *microchaeta*, *omega*, *rossica*, *perinealis* and *zachvatkini*, than those of *takanoi*, *speciosissima* and *montshadskyi*, which are placed in the subgenus *Gymnochaetopsis* by MESNIL. Therefore, the male and female genitalia, including the male St5 and T6, provide more constant characters for subgeneric classification than superficial characters.

The Holarctic and Oriental species of *Linnaemya* can be divided into three groups by the structures of the male T6 and female T6 and T7. In one of the groups, i.e., subgenus *Homoeonychia* BRAUER et BERGENSTAMM, the male T6 is absent (so that the 6th abdominal spiracle is situated in the membrane in front of the anteroventral portion of St7+8) and the female T6 and T7 are entire (Figs. 1-3, 36-37, 79-80).

Three Palearctic and Oriental species, *lithosiophaga*, *frater* and *crosskeyi* sp. n., belong to the subgenus *Homoeonychia*. They have the following characters in common: Occiput with a regular row of black setulae behind postocular row from uppermost portion to level of lower eye margin; reclinate orbital setae on both parafrontals



FIGS. 1-10. *Linnaemya* spp., male T6 and St7+8 in lateral view (except for 1 and 5): 1, *lithosiophaga* in dorsal view; 2, same in lateral view; 3, *crosskeyi*; 4, *haemorrhoidalis*; 5, same in dorsal view; 6, *perinealis*; 7, *rossica*; 8, *media*; 9, *picta*; 10, *fissiglobula*.

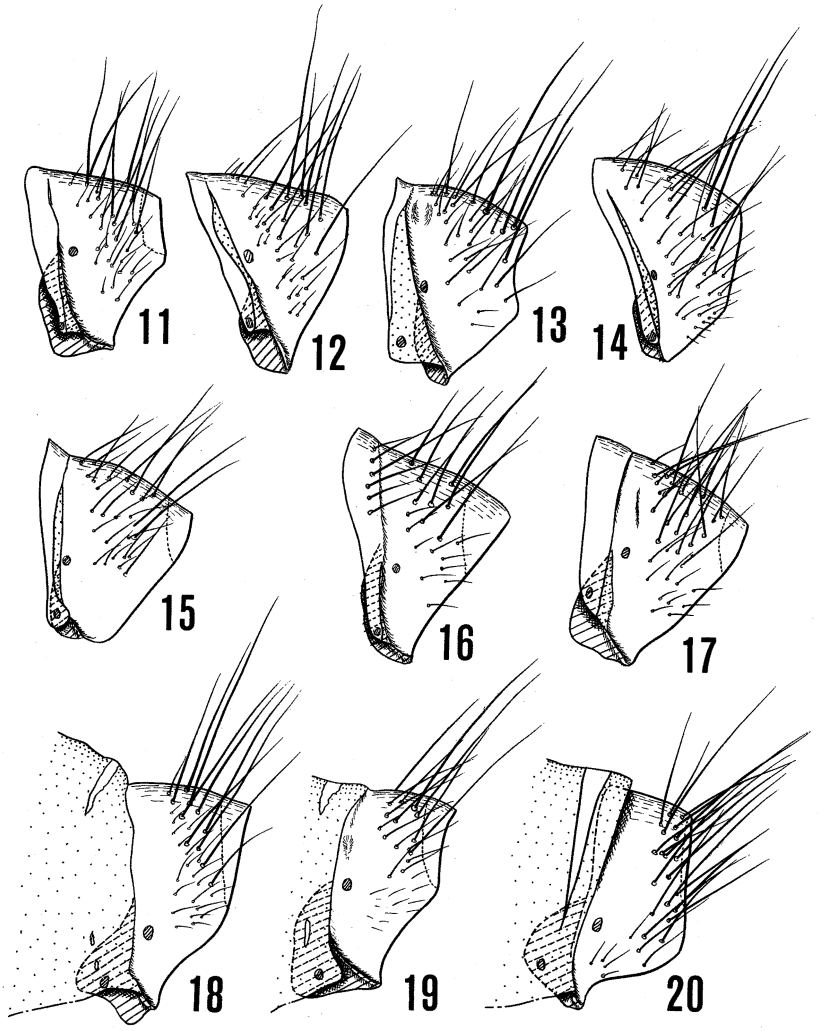
strongly crossing each other in both sexes; prevertical seta sometimes present in ♂; pteropleural seta short, not surpassing middle of lower calypter; 1-2 lateral scutellar setae; fore coxa without minute recumbent hairs on inner anterior surface; female fore tarsus strongly dilated; posterior lobe of male St5 produced on inner posterior corner; surstylus narrow, with a strong spine at apex; pregonite elongate; epiphallus absent (Figs. 48, 61, 68, 74-78); ♀ 6th abdominal spiracle on ventral portion of T6, 7th spiracle in membrane behind T6 (Figs. 36-37, 79-80). The subgenus *Homoeonychia* here defined seems to correspond to that used by HERTING (1961) and MESNIL (1971). I have not examined any African species having the above characters, but MESNIL (1971) treated *consobrina* as a member of the subgenus.

In the second group of species, i.e., subgenus *Ophina* ROBINEAU-DESVOIDY, the male T6 is fused mid-dorsally with St7+8, either or both female T6 and T7 are almost always divided longitudinally into two hemitergites, and the female T6 is always longer than the T7 (Figs. 4-17, 38-45, 93-94, 101-102). The species having the above-mentioned genital structures share the following characters : Occiput at most with 3-4 strong setulae on upper 1/3; reclinate orbital setae on both parafrontals subparallel in ♂; ocellar seta always strong; prevertical seta usually absent in ♂; hairs on thorax black; pteropleural seta reaching posterior margin of lower calypter (except for *amicula*); usually 2, rarely 1, lateral scutellar setae; wing vein R_{4+5} with setulae confined to basal 1/3-1/4; fore coxa with minute recumbent hairs on inner anterior surface (except for *amicula*); abdomen with black hairs, if with pale hairs, then the hairs confined to St1; posterior lobe of ♂ St5 usually not strongly produced posteriorly on inner posterior corner; ♂ cerci not much modified, in dorsal view broad at base and narrowed to basal 1/3-1/2, therefrom parallel-sided or evenly narrowed to apex; basiphallus not much elongate (except for *smirnovi* and *amicula*); epiphallus present (except for *smirnovi* and *amicula*); pregonite and postgonite not much elongate (except for *smirnovi* and *amicula*) (Figs. 49-57, 62-64, 69-73, 88-102). The following Palearctic and Oriental species have the above characters in common and are included in the subgenus *Ophina*: *olsufjevi*, *haemorrhoidalis*, *media*, *helvetica*, *rossica*, *claripalla*, *tuberocera*, *omega*, *pullior* sp. n., *microchaeta*, *microchaetopsis* sp. n., *picta*, *nigricornis*, *perinealis*, *fissiglobula*, *zachvatkini*, *setifrons*, *saga*, *pentheri*, *nonappendix*, *obscurellina*, *smirnovi* and *amicula*. Although I have not examined *dumonti* and *jaroschevskyi*, the descriptions of these species suggest that they are better assigned to the subgenus *Ophina*. The subgenus *Ophina* here defined corresponds to the *haemorrhoidalis*-Gruppe of the subgenus *Bonellimyia* sensu HERTING (1961) and almost to the subgenus *Ophina* sensu HERTING (1984), and includes all members of *Bonellimyia* and a part of *Gymnochaetopsis* sensu MESNIL (1971).

It should be noted that two Asiatic species, *smirnovi* and *amicula*, are fairly different from the other members of this subgenus. They differ in genital structures from the other species as follows: Basiphallus long, postgonite elongate, epiphallus absent, both T6 and T7 of ♀ entire (♀ of *smirnovi* unknown) (Figs. 72, 106, 108-109). Moreover, *amicula* has the pteropleural seta not extending beyond the middle of the lower calypter and the fore coxa bare on inner anterior surface. In spite of these differences, *smirnovi* and *amicula* are placed in the subgenus *Ophina* because of the structure of the male T6. The characters peculiar to these two species are here

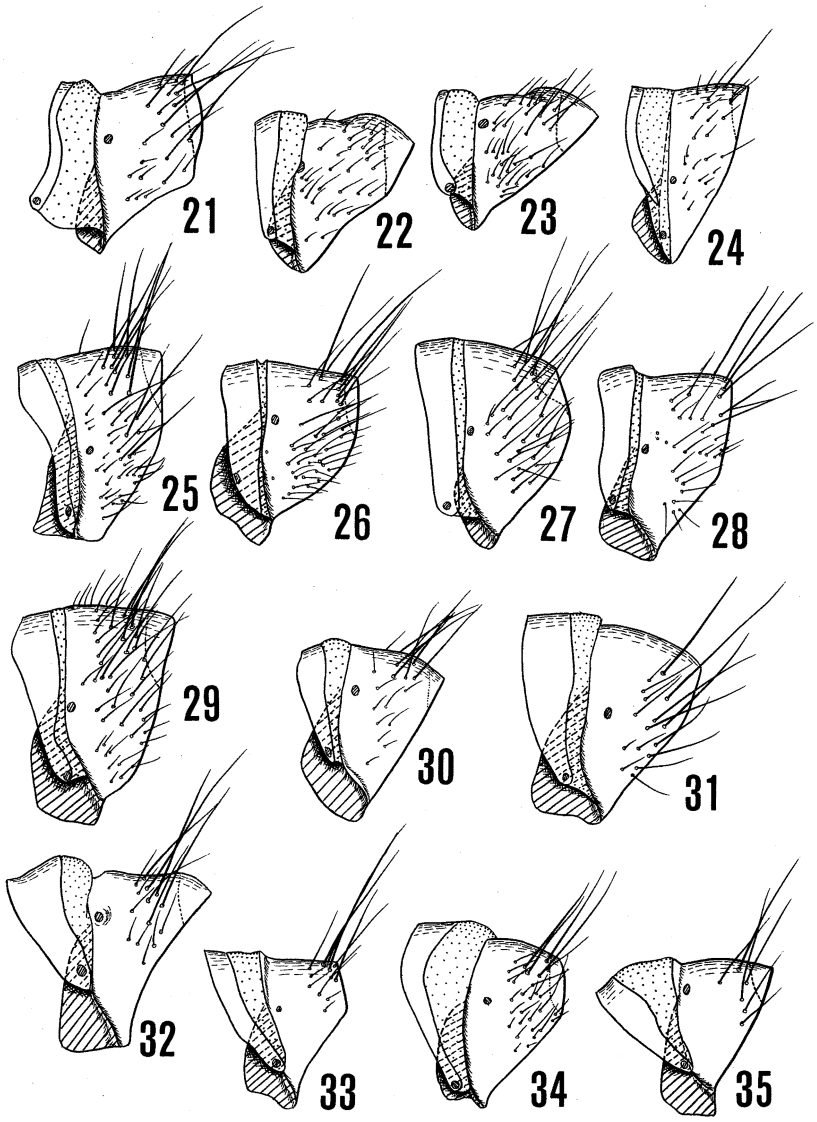
considered to be secondarily derived from the generalized structure of the subgenus. *L. smirnovi* seems to be intermediate in many characters between *amicula* and other members of this subgenus, though it has its own derived structures. In the structure of the male and female genitalia an African species, *albifrons*, most closely resembles *amicula*.

In the New World species of Linnaemyini, *Gymnochaetopsis analis* has entirely same character states as mentioned above and should be included in the subgenus *Ophina* (Figs. 15, 44-45, 57, 87). *Bonellimyia tessellata, B. glauca* (*B. subpolita* and *B.*



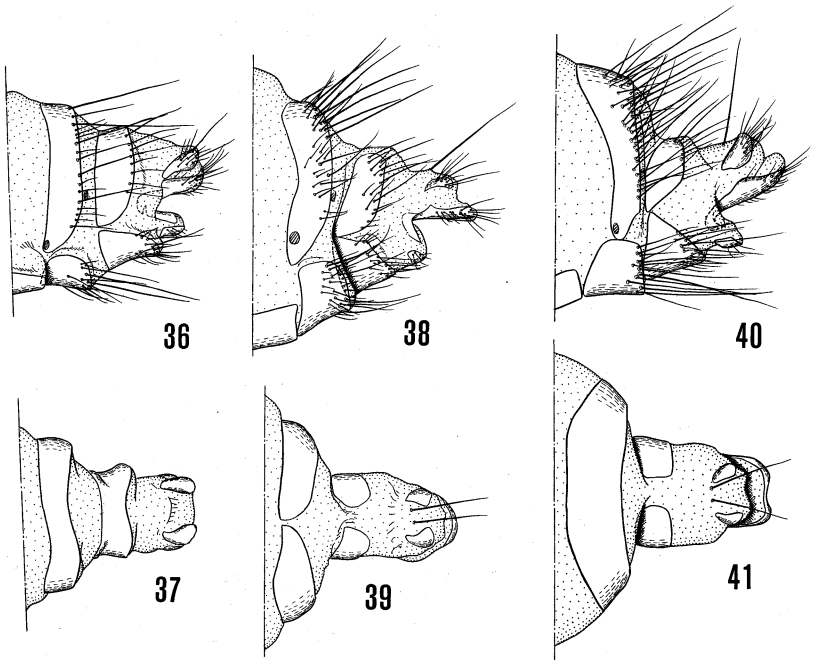
FIGS. 11-20. *Linnaemya* spp., male T6 and St7+8 in lateral view: 11, *microchaetopsis*; 12, *zachvatkini*; 13, *omega*; 14, *pullior*; 15, "*Gymnochaetopsis*" *analis*; 16, *amicula*; 17, *smirnovi*; 18, *vulpinoides*; 19, *vulpina*; 20, *comta*.

fulvicauda, too?), *Nigrobonellia varia* and *N. nigrescens* should be placed in this subgenus because of the structure of the male genitalia. An African species, *pictipennis*, has the entirely same character states as those of the Holarctic species of *Ophina* and should also be included.

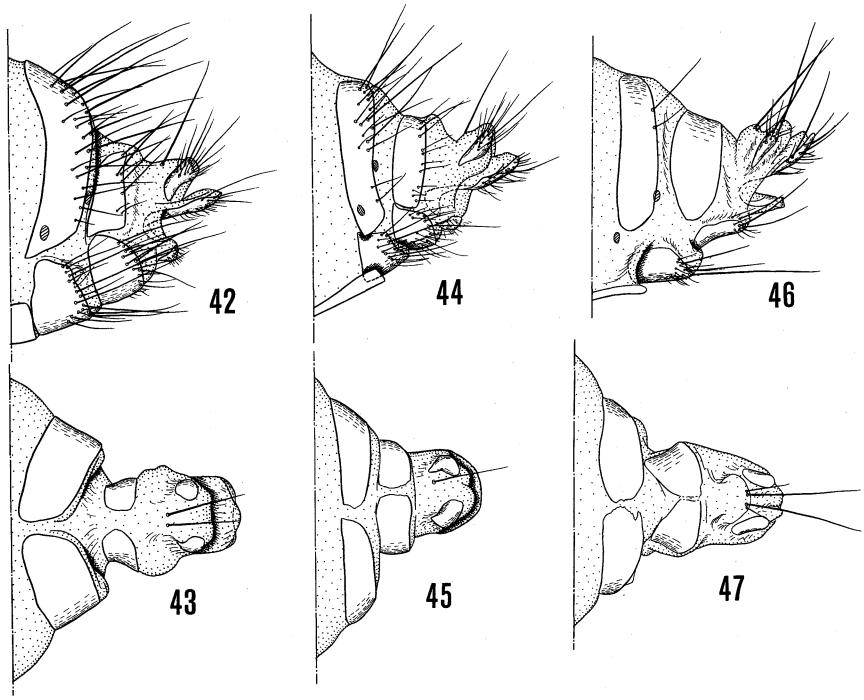


FIGS. 21-35. *Linnaemya* spp., male T6 and St7+8 in lateral view: 21, *speciosissima*; 22, *pallidohirta*; 23, *oralis*; 24, *linguicera*; 25, *atriventris*; 26, *tuberculata*; 27, *hirtipennis*; 28, *persimilis*; 29, *burmana*; 30, *sulensis*; 31, *tessellans*; 32, *ambigua*; 33, *kanoi*; 34, *siamensis*; 35, *ruficaudata*.

In the third group, subgenus *Linnaemya* ROBINEAU-DESVOIDY, the male T6 is free from St7+8 and almost always entire, either or both of female T6 and T7 are almost always divided longitudinally into 2 hemitergites and the female T6 is shorter than, or at most subequal in length to, T7 (Figs. 18-35, 46-47). The species having the genital structures mentioned above also have the following characters in common: Occiput almost always without black setulae; reclinate orbital setae subparallel to each other; prevertical seta absent in ♂; at least lower portion of sternopleuron, St1 and venter of T1+2 simultaneously with pale yellowish hairs; only 1 lateral scutellar seta (absent in *speciosissima*); fore coxa without minute recumbent hairs on inner anterior surface; ♂ St5 sometimes modified, i.e., inner posterior corner of posterior lobe sometimes strongly produced; ♂cerci sometimes modified, i.e., modified into large basal and slender apical portions or into large cerntral portion with a pair of secondary processes; pregonite and postgonite not much elongate; epiphallus present or absent. Species included in the subgenus *Linnaemya* are: *comta, soror, vulpina, vulpinoides, tessellans, impudica, ambigua* sp. n., *siamensis* sp. n., *kanoi* sp. n., *ruficaudata* sp. n., *hybrida, zimini, speciosissima, pallidohirta, oralis, melancholica, pellex, bella, amicorum, felis, lateralis (=nigrohirta), atrisetosa* sp. n., *scutellaris (=rohdendorfi), linguicera, steini, atriventris (=montshadskyi), tuberculata* sp. n., *hirtipennis* sp. n., *persimilis* sp. n., *burmana* sp. n., *hirtiradia, sulensis* sp. n., *takanoi* and *paralongipalpis*. Although I have not examined the following species, they may belong to this subgenus: *neavei, latigena*



FIGS. 36-41. *Linnaemya* spp., female genitalia in lateral view (36, 38, 40) and in dorsal view (37, 39, 41): 36-37, *lithosiophaga*; 38-39, *haemorrhoidalis*; 40-41, *media*.



FIGS. 42-47. *Linnaemya* spp., female genitalia in lateral view (42, 44, 46) and in dorsal view (43, 45, 47): 42-43, *zachvatkini*; 44-45, "*Gymnochaetopsis*" *analis*; 46-47, *soror*.

and *ochracea*. The subgenus *Linnaemya* and the *pudica*-Gruppe of the subgenus *Bonellimyia* sensu HERTING (1961), subgenus *Linnaemya* and a part of *Gymnochaetopsis* sensu MESNIL (1971) and the subgenera *Linnaemya, Bonellimyia* and part of *Homoeonychia* sensu HERTING (1984) seem to correspond to this subgenus.

I have examined the following African species having the same character states as above and they should be included in this subgenus: *aculeata, alboscutellata, angulicornis, alopecina, gowdeyi, hirtifrons, ingrami, longirostris, keiberi* and *parcesetosa*. According to the descriptions and figures of the male genitalia, the following African species may be placed in this subgenus: *andrewesi, angustifrons, variegata,* and *nigritarsis*.

I was unable to see the following species, and therefore did not assign them to a subgenus: *nigrifacies, majae, polychaeta, stackelbergi, ruficornis* and *petiolata*.

Species-grouping within each subgenus

The subgenus *Homoeonychia* can be divided into two groups. In one of the groups the male cerci are strongly modified and the female genitalia are normal (Figs. 36-37, 48, 61): *lithosiophaga* and *frater* belong to this group (*lithosiophaga*-group). In another group, *crosskeyi*-group, the male cerci are normal, but the female T7 is rather flattened and long (Figs. 74-80): *crosskeyi* sp. n. *L. lithosiophaga* and *frater* are distributed in southern Europe, and *crosskeyi* sp. n. is in the mountainous areas of Southeast Asia.

As mentioned in the preceding section *smirnovi* and *amicula* resemble each other

and are fairly different from the other members of the subgenus *Ophina* (Figs. 58, 72, 84, 103-109). The fact that the male and female genitalia of these two species very closely resemble those of *albifrons* from Africa seems to suggest close relationships of these three species. They may comprise a distinct species-group within the subgenus *Ophina (smirnovi*-group). The other members of this subgenus cannot be divided into distinct species-groups, because their male and female genitalia are not much diversified, and the male genitalia only provide the specific characters (*haemorrhoidalis*-group) (Figs. 49-57, 62-64, 69-71, 73, 81-83, 85-92, 95-100). The *haemorrhoidalis*-Gruppe of HERTING (1961) is almost same as this group.

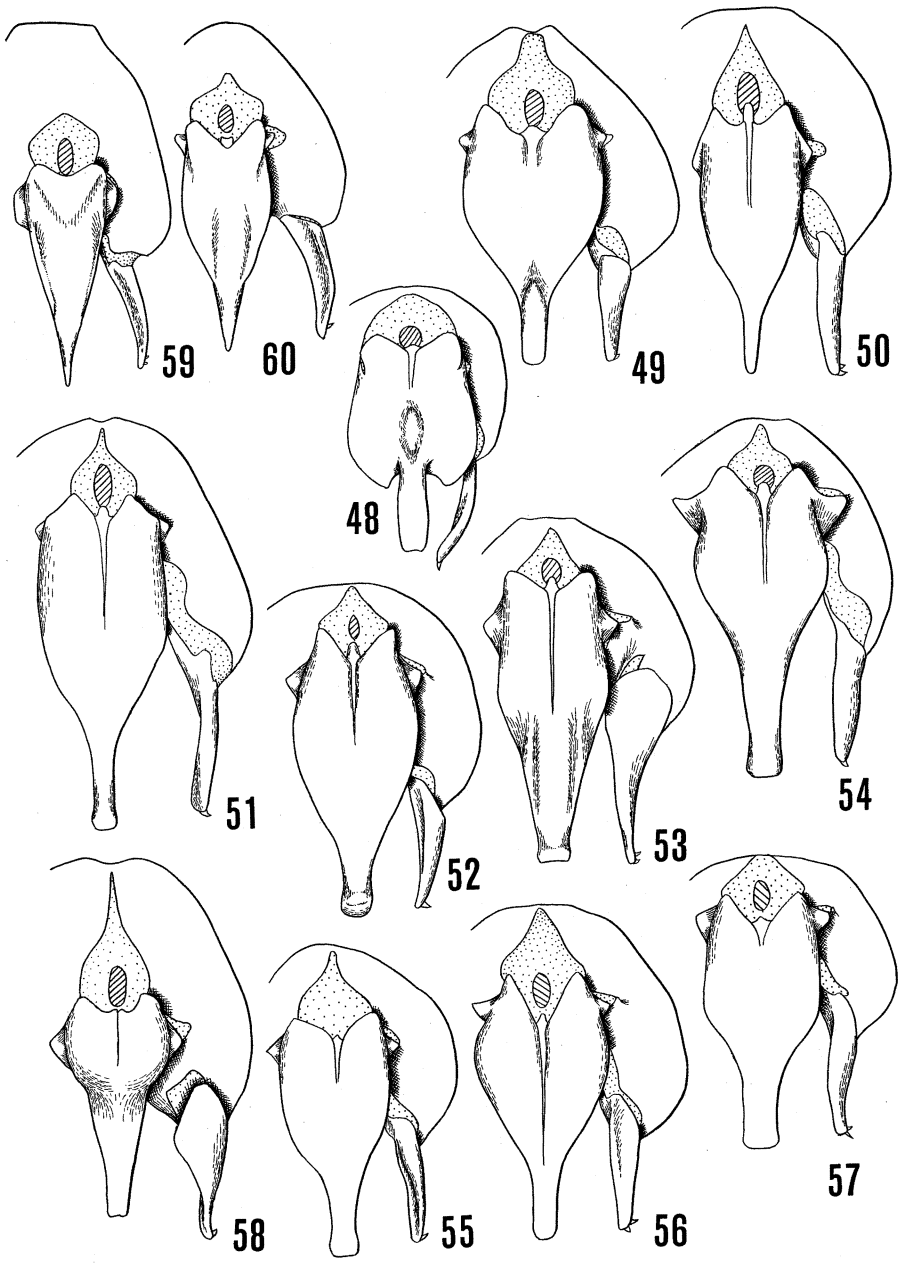
This subgenus is dominant in the Holarctic Region, with a few species extending into South America *("Gymnochaetopsis" analis)* and into the Oriental Region as far as the Philippines (*amicula*). Some members apparently invade Africa, where they seem to be much more modified in the color of body and hairs than those members from northern areas. In the tropical areas the members of this subgenus seem to be montane. Noctuid and lymantriid larvae serve as hosts for the members of this subgenus. It is probable that this subgenus was adapted well to the open lands of the Holarctic Region and radiated extensively there.

In contrast with the subgenus *Ophina* the members of the subgenus *Linnaemya* are more diverse and can be divided into at least five species-groups. In one of the groups (the *vulpina*-group) the male T6 tends to be reduced, so that the 6th abdominal spiracle is situated in the membrane in front of anteroventral portion of the St7+8, and the female 6th abdominal spiracle is situated on anteroventral portion of T6 or in the membrane just anterior to the tergum (Figs. 18-20, 46-47). The members of this species-group closely resemble each other in the male genitalia. The following species belong to this group: *comta, soror, vulpina* and *vulpinoides,* and probably also *latigena* and *neavei*.

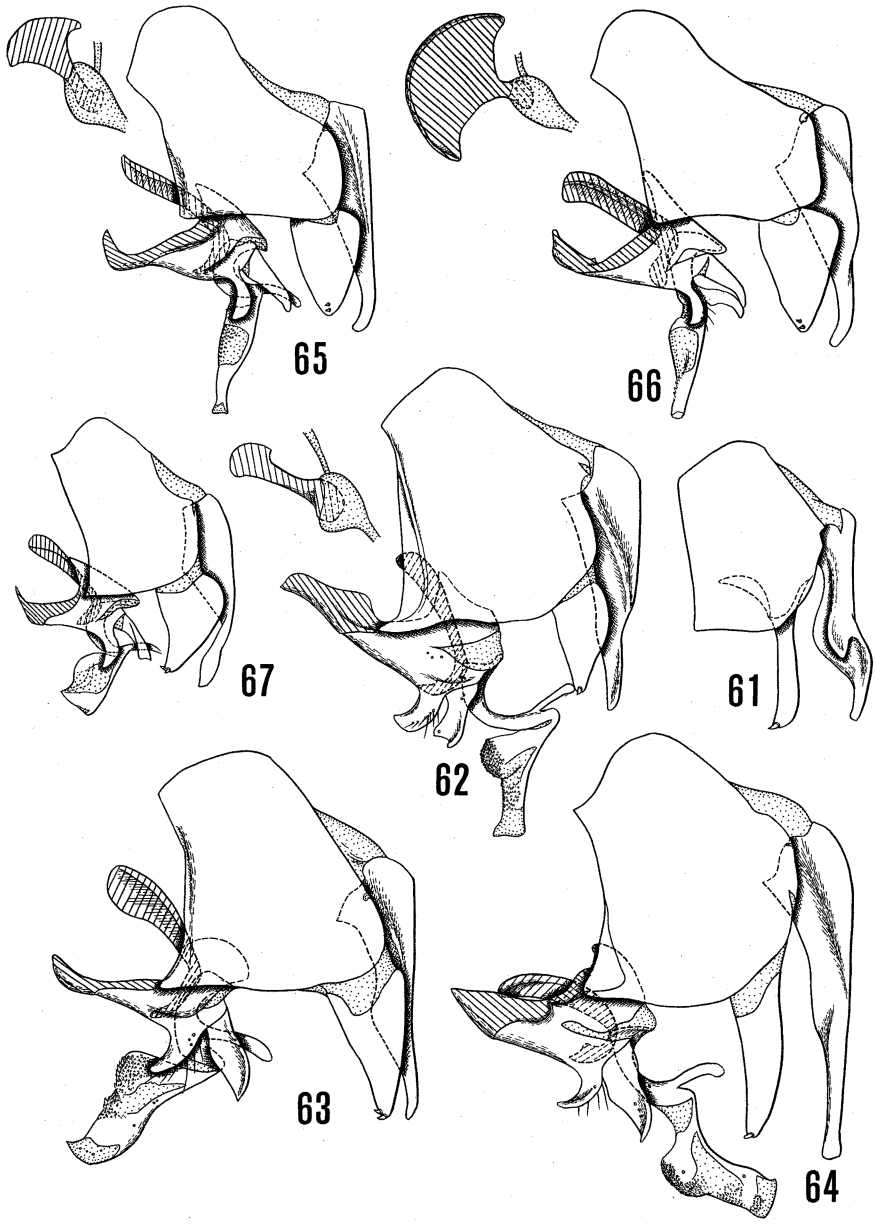
Among the African species, *angulicornis* and *keiberi* show the same genital structure and should be included in this group. Judging from the description made by EMDEN (1960), an African species, *variegata,* also seems to belong to this group.

The *vulpina*-group is characterized superficially as follows: Ocellar seta strong; 2nd antennal segment with long wart-like excrescence; arista strongly compressed laterally; thorax extensively clothed with long fine pale hairs; *pra* very fine; pteropleural seta long, reaching posterior margin of lower calypter; wing without microtrichia on basal portion or very sparsely covered with them, at least costal cell, bases of discal and 1st basal cells, 2nd basal cell and anal cell bare; wing vein M_1 from discal crossvein to its bend very short, M_1 appendage long, last section of vein M_3 longer than discal crossvein; vein R_{4+5} with setulae confined to its basal 1/3-1/4; male St5 roundly produced on inner posterior portion of posterior lobe; female T6 at most with a few hairs, T7 without hair.

The *vulpina*-group is widely distributed in the Holarctic, Oriental and Afrotropical Regions. At least one species, *keiberi,* occurs in Madagascar and one species, *vulpinoides,* in New Guinea. HERTING (1983) proposed the *pallida*-Komplex which contains *angulicornis, pallida, vulpinoides* and *neavei*. It is probable that this is the same as the *vulpina*-group, although I have not seen *pallida* and *neavei*. The subgenus *Linnaemya* sensu HERTING (1984) corresponds to this group.



FIGS. 48–60. *Linnaemya* spp., epandrium, cerci and surstylus of male genitalia in dorsal view: 48, *lithosiophaga*; 49, *haemorrhoidalis*; 50, *media*; 51, *perinealis*; 52, *picta*; 53, *fissiglobula*; 54, *rossica*; 55, *omega*; 56, *zachvatkini*; 57, "*Gymnochaetopsis*" *analis*; 58, *smirnovi*; 59, *comta*; 60, *vulpina*.



FIGS. 61-67. *Linnaemya* spp., male genitalia in lateral view: 61, *lithosiophaga*; 62, *haemorrhoidalis*; 63, *media*; 64, *perinealis*; 65, *comta*; 66, *vulpina*; 67, *siamensis*.

In the second group (the *tessellans*-group) some superficial characters resemble those of the *vulpina*-group, i.e., a wart-like excrescence is present on 2nd antennal segment (but it is smaller than in the *vulpina*-group) and the basal portion of the wing lacks microtrichia. However, as in the other species-groups of this subfamily, the male T6 of this group is not reduced and the 6th abdominal spiracle is situated on the ventral portion of T6. Other charactes common to the members of the *tessellans*-group are as follows: Ocellar seta rather strong; thorax with pale hairs at most on sternopleuron and mesopleuron; pteropleural seta shorter than in the *vulpina*-group, not surpassing posterior margin of lower calypter; wing vein M_1 from discal crossvein to its bend longer than in the *vulpina*-group, last section of vein M_3 shorter than, or subequal in length to, discal crossvein; vein R_{4+5} with setulae extending 1/2 way or more from base to r-m crossvein; posterior lobe of male St5 roundly produced on inner posterior portion; male T6 rather long; female T6 only slightly shorter than T7 (Figs. 31-35, 121-122).

So far as I have examined, the members of this group closely resemble each other in the male and female genitalia and specific differences are more clearly exhibited in the superficial characters, such as head structure, color of pollinosity on the body and color of legs.

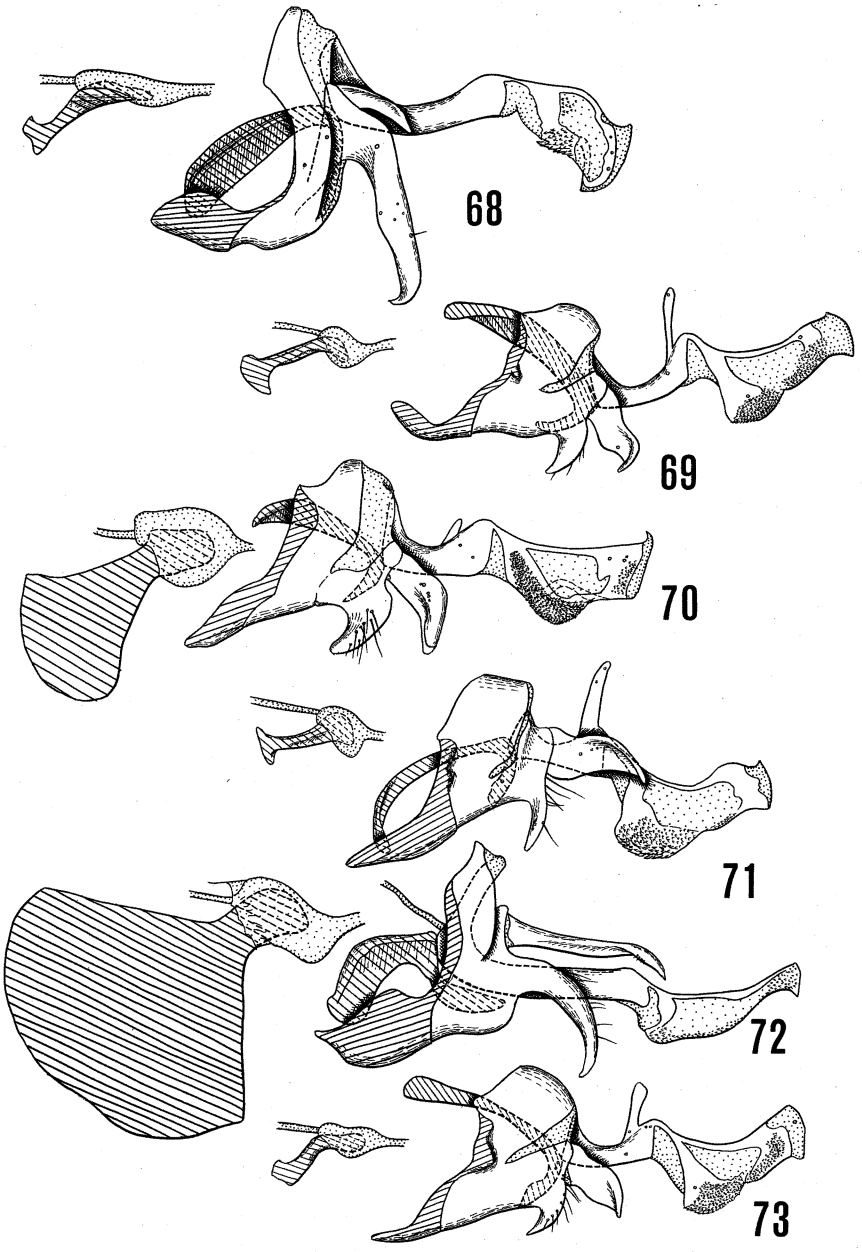
The following species are included in this group: *tessellans, impudica, ambigua* sp. n., *siamensis* sp. n., *kanoi* sp. n., *ruficaudata* sp. n., *hybrida* and *zimini*. The original description of *ochracea* suggests that it also belongs to this group. Although *zimini* is peculiar in having the haired ventral surface of the 2nd costal sector of the wing, this species may be easily assigned to this group because of the characteristics of the antenna and wing. Two species of the *pudica*-Gruppe of HERTING (1961) are included in this group and the subgenus *Bonellimyia* sensu HERTING (1984) corresponds to this group.

These species are mainly distributed in southern part of Eurasia, but one African species, *parcesetosa*, belongs to this group and one undescribed species occurs in New Guinea.

It is obvious that *speciosissima, pallidohirta, oralis, melancholica, lateralis, atrisetosa* sp. n., *scutellaris*, and *linguicera* comprise a distinct species-group (the *oralis*-group), because they share a secondarily developed sclerite below the male cerci (Figs. 134-135, 144-145, 151, 158, 166, 168, 176, 185, 195, 202, 204). These species are strongly diversified in the structures of the male genitalia in contrast with the members of the *vulpina*- and *tessellans*-groups. In the *oralis*-group the male T6 is very short, but the 6th abdominal spiracle is situated in the usual place in T6 (Figs. 21-24).

It should be noted that in *melancholica* and *linguicera* the male T6 is reduced and the 6th abdominal spiracle is situated in the membrane below the T6 as in the *vulpina*-group (Figs. 24, 160). This condition is, however, deduced to be developed independently in these species and in the *vulpina*-group, because these two species share almost the same character states as those of the other members of the *oralis*-group except for this structure. *L. speciosissima* seems to be highly specialized because of the absence of the lateral scutellar seta and undeveloped pregonite (Fig. 138).

The *oralis*-group is also characterized by having the ocellar seta very weak or



FIGS. 68–73. *Linnaemya* spp., hypandrium, pre- and postgonites and aedeagus of male genitalia in lateral view: 68, *lithosiophaga*; 69, *picta*; 70, *fissiglobula*; 71, *rossica*; 72, *smirnovi*; 73, *zachvatkini*.

absent, the pteropleural seta never extending beyond the middle of the lower calypter, the 2nd antennal segment without a wart-like excrescence, the T3 usually without median discal setae and the male cerci strongly modified.

It is most probable that *felis, bella, pellex*, and *amicorum* belong to this group, although I have not examined the males of the former three species and the specimen of the last species.

The *oralis*-group is mainly distributed in mountainous areas of the Oriental Region, some species extending northwards as far as Japan or Ussuri and some undescribed species occur in New Guinea.

Some African species, such as *alopecina, ingrami, aculeata, gowdeyi, alboscutellata* and *longirostris*, seem to comprise a distinct species-group allied to the *oralis*-group, because they have the same structure of the secondary sclerite below the male cerci as that of the *oralis*-group. In these African species the wart-like excrescence is sometimes developed on the 2nd antennal segment and the pteropleural seta is sometimes strong.

L. atriventris and its allied species apparently comprise the fourth species-group (the *atriventris*-group) in the subgenus *Linnaemya*: *atriventris, steini, tuberculata* sp. n., *hirtipennis* sp. n., *persimilis* sp. n., *burmana* sp. n., *hirtiradia* and *sulensis* sp. n. It is characteristic in this group that the female 6th and 7th abdominal spiracles are situated in the T6 (Figs. 211, 220, 228, 251). The members of this group have the following characters in common: Male St5 sharply produced posteriorly on inner posterior portion; male T6 rather short, 6th abdominal spiracle on ventral portion of T6; pregonite tube-like; surstylus enlarged; epiphallus absent (Figs. 253–258); ocellar seta very weak; 2nd antennal segment without wart-like excrescence; pteropleural seta short, not extending beyond middle of lower calypter; bend of vein M_1 about equidistant between wing margin and discal crossvein; vein R_{4+5} with setulae extending 1/2 way or more from base to r-m crossvein; T3 sometimes without median discal setae and abdomen shining black in ground color.

The *atriventris*-group is mainly distributed in the Eastern Palearctic and Oriental Region: Only one species extends to Europe *(steini)*, at least two undetermined species occur in Papua New Guinea and one undescribed species in Fiji.

It is clear that *takanoi* very closely resembles *paralongipalpis*, judging from the description and illustration made by CHAO (1962a). These two species cannot be assigned to any of the above species-groups, and seem to comprise the fifth species-group (the *takanoi*-group). This group is characterized by strongly ventrally curved apex of the male cerci, rather long male T6 and short pteropleural seta (Fig. 259). At present this group is known from Szechwan, Khabarovsk, Sakhalin and Japan.

Key to subgenera and species-groups of *Linnaemya*

1 ♂ T6 present, sometimes very short, free from St7+8 or fused mid-dorsally with it; ♀ either T6 or T7 divided longitudinally into hemitergites, rarely entire; reclinate orbital setae on both parafrontals subparallel to each other at least in ♂; occiput usually without regular row of black setulae 3

— ♂ T6 absent; ♀ T6 and T7 entire; reclinate orbital setae on both parafrontals crossed

each other in both sexes; occiput always with regular rows of black setulae ····· Subgenus *Homoeonychia* BRAUER et BERGENSTAMM ·····2

2 ♂ cerci with basal rectangular and apical slender portion; ♀ T7 subequal in length to T6 or slightly shorter than the latter, not flattened ····· *lithosiophaga*-group

— ♂ cerci normal, gradually narrowed to apex; ♀ T7 elongate and flattened, distinctly longer than T 6 ····· *crosskeyi*-group

3 ♂ T6 fused mid-dorsally with St7+8; ♀ T6 always longer than T7; hairs on thorax and abdomen black, rarely pale yellowish on St1; pteropleural seta usually reaching posterior margin of lower calypter ····· Subgenus *Ophina* ROBINEAU-DESVOIDY ·····4

— ♂ T6 entire and free from St7+8; ♀ T6 shorter than T7 or at most subequal in length to the latter; lower portion of sternopleuron, St1 and venter of T1+2 simultaneously with whitish hairs; pteropleural seta long or short ····· Subgenus *Linnaemya* ROBINEAU-DESVOIDY ·····5

4 ♂ basiphallus short, with distinct epiphallus, postgonite short; ♀ either or both T6 and T7 longitudinally divided into two hemitergites; pteropleural seta long, reaching posterior margin of lower calypter; fore coxa with dense, minute recumbent hairs on anterior surface ····· *haemorrhoidalis*-group

— ♂ basiphallus long, without epiphallus, postgonite elongate; ♀ both T6 and T7 entire; pteropleural seta short or long; fore coxa with or without minute recumbent hairs on anterior surface ····· *smirnovi*-group

5 2nd antennal segment with wart-like excrescence on inner surface; basal portion of wing without microtrichia; pteropleural seta sometimes reaching posterior margin of lower calypter ····· 6

— 2nd antennal segment without wart-like excrescence; wing evenly clothed with microtrichia; pteropleural seta alwalys short, not extending beyond middle of lower calypter ····· 7

6 ♂ T6 very small, 6th abdominal spiracle in membrane below the tergum; wart-like excrescence long; *pra* very fine; arista strongly compressed laterally ····· *vulpina*-group

— ♂ T6 longer, 6th spiracle on ventral portion of T6; wart-like excrescence small; *pra* rather strong; arista not much compressed laterally ····· *tessellans*-group

7 Ventral membranous portion of epandrium without secondary sclerite; ♂ cerci not strongly modified ····· 8

— Ventral membranous portion of epandrium with a pair of small or a single elongate sclerite; ♂ cerci strongly modified into rectangular plate with slender apex or large median plate with small secondary processes at base ····· *oralis*-group

8 Posterior lobe of ♂ St5 sharply produced on inner posterior portion; ♂ epiphallus absent, pregonite tube-like; ♂ cerci not curved ventrally at apex; ♀ 6th and 7th abdominal spiracles both on T6 ····· *atriventris*-group

— Posterior lobe of ♂ St5 not sharply produced; ♂ epiphallus present, pregonite normal, rather flattened; ♂ cerci abruptly curved ventrally at apex; ♀ 7th abdominal spiracle on intersegmental membrane between T6 and T7 ····· *takanoi*-group

Key to Japanese and Oriental species of *Linnaemya*

1 Scutellum with only 1 lateral scutellar seta on each side, or without it, and at the same time at least St1 with yellowish white or pale brownish yellow hairs ····· 2

— Scutellum with 2 lateral scutellar setae on each side, if with only 1 seta, then St1 with black or dark brown hairs ····· 31

2 2nd antennal segment with wart-like excrescence on inner surface; wing without microtrichia on basal portion, i.e., costal cell, base of discal cell, 2nd basal cell and anal cell bare; pteropleural seta usually extending beyond middle of lower calypter ····· 3

— 2nd antennal segment without such excrescence; wing fully clothed with microtrichia; pteropleural seta at most reaching middle of lower calypter ····· 11

3 Pleural regions of thorax with all hairs pale yellow or yellowish white; wart-like excrescence on 2nd antennal segment elongate; last section of vein M_3 longer than discal crossvein; *pra* seta very fine ····· 4

— Pleural regions of thorax with hairs dark brown or black, at most with some pale yellow or yellowish white hairs on lower portion of sternopleuron and anterior portion of mesopleuron; last section of vein M_3 shorter than discal crossvein; wart-like excrescence of 2nd antennal segment small; *pra* ratger strong ····· 7

4 Femora reddish yellow; parafacial bare, narrower than 3rd antennal segment ····· 5

— Femora dark brown to black; parafacial haired on upper 1/2, wider than 3rd antennal segment ····· 6

5 Abdomen with discal setae; palpus about 2/3 as long as wide; vein R_{2+3} and R_{4+5} convergent distally, so that 4th costal sector shorter than 6th ····· *vulpina*

— Abdomen without discal setae; palpus very short, at most as long as wide; vein R_{2+3} and R_{4+5} nearly parallel, 4th costal sector slightly longer than 6th ····· *vulpinoides*

6 ♂ with proclinate orbital setae; hairs of ♀ scutum mostly black and very fine ····· *comta*

— ♂ without proclinate orbital setae; ♀ scutum with mostly pale yellowish hairs ····· *scoror*

7 Gena 0.33-0.42 of eye-height; largest hair on 2nd antennal segment at most as long as 2nd antennal segment ····· 8

— Gena wide, 0.45-0.50 of eye-height; largest hair on 2nd antennal segment about 1.5× as long as second antennal segment; tibiae reddish yellow, at least on middle portions ····· *ambigua*

8 T3 without median discal setae; gena mostly with pale yellowish or white hairs, several black hairs confined to upper portion ····· 9

— T3 almost always with median discal setae; gena mainly with black hairs, pale hairs confined to lower 1/2 or less ····· *tessellans*

9 Legs black, at most hind tibia reddish yellow ····· 10

— Basal 1/2 of hind femur and at least hind tibia reddish yellow ····· *kanoi*

10 Abdomen entirely black in ground color, T5 grayish yellow pollinose, the pollinosity contrasting with grayish white pollinosity on preceding terga; parafrontal grayish yellow pollinose; outer longitudinal vitta of thoracic dorsum appearing to be fused with inner one at low magnifications; pteropleural seta at most reaching bassal

1/2 of lower calypter; T4 with median discal setae ..... *siamensis*

— Apical 1/3-1/4 of T5 reddish yellow in ground color; abdomen entirely grayish white pollinose; head densely whitish pollinose; longitudinal vittae on thoracic dorsum without such appearance; pteropleural seta extending beyond middle of lower calypter; T4 without median discal seta ..... *ruficaudata*

11 Wing tricolorous, creamy white basally, extensively dark brown medially and hyaline apically; basicosta black; ♀ fore tarsus strongly flattened and dilated; occipupt with a regular row of black setulae behind postocular row ..... *crosskeyi*

— Wing almost uniformly hyaline; basicosta white or yellowish white; ♀ fore tarsus not much dilated; occiput usually without such a regular row of setulae (except for *bella*) 12

12 Pleural regions of thorax with hairing all pale yellow or yellowish white; thoracic dorsum with fine pale yellowish hairs mixed with black hairs on median portion 13

— Thoracic pleura with pale hairs at most on lower portion of sternopleuron and anterior portion of mesopleuron, dorsum extensively with black hairs 16

13 Bend of wing vein M_1 nearer to wing margin than to discal crossvein; vein M_1 appendage represented by a dark fold; gena with only fine hairs; *pv* apical seta on hind tibia weak or absent 14

— Bend of vein M_1 nearer to discal crossvein than to wing margin; M_1 appendage in the form of genuine vein; gena with several strong bristle-like hairs on its anterior portion; *pv* apical seta on hind tibia strong ..... *felis*

14 Palpus moderately long, 1.5-2× as long as 2nd antennal segment 15

— Palpus small, shorter than 2nd antennal segment ..... *pellex*

15 3rd antennal segment about 2× as long as wide in ♂ and ♀; femora dark brown to black, at most distal portion very narrowly reddish ..... *pallidohirta*

— 3rd antennal segment about 2.5× as long as wide in ♂ and ♀; femora reddish yellow in ♀, brown with posteroventral 1/2 reddish yellow in ♂ ..... *oralis*

16 Femora reddish yellow, at most dark brownish at apices 17

— Femora black or blackish brown, at most reddish on narrow distal portions 22

17 Abdomen entirely black; M_1 appendage very short, at most 1/5 length of vein M_1 from discal crossvein to its bend; hind tibia without *pv* apical seta 18

— Abdomen more or less reddish on basal 1/2 except for median vitta; M_1 appendage longer, more than 1/2 length of vein M_1 from discal crossvein to its bend; hind tibia with *pv* apical seta 19

18 Occiput with a regular row of black setulae behind postocular row; bend of vein M_1 much closer to wing margin than to discal crossvein; vein R_{4+5} with setulae extending 1/2 way to r-m crossvein; M_1 appendage represented by a dark fold; abdomen thinly whitish pollinose on anterior portion of each tergum ..... *bella*

— Occiput without such setulae, at most with several irregular setulae on upper portion; bend of vein M_1 about equidistant between wing margin and discal crossvein; vein R_{4+5} with setulae confined to its basal node; M_1 appendage in the form of a genuine vein; abdomen entirely bluish gray pollinose ..... *melancholica*

19 Wing vein M_1 from discal crossvein to its bend about 1/3 as long as distance between the bend and wing margin; sternopleuron with black hairs ..... *amicula*

— Vein M_1 from discal crossvein to its bend longer, at least 1/2 as long as distance between the bend and wing margin; sternopleuron extensiverly with whitish hairs 20

20 Parafacial only slightly narrower than 3rd antennal segment in ♀, about 2/3 in ♂; wing vein M_1 from discal crossvein to its bend about 1/2 as long as distance between the bend and wing margin ..... *atrisetosa*

— Parafacial about 1/2 as wide as 3rd antennal segment at middle height; wing vein M_1 from discal crossvein to its bend longer, at least 2/3 as long as distance between the bend and wing margin 21

21 Vertex 0.18-0.19 of head width in ♂, about 0.21 in ♀; T3 with median marginal setae; epistoma strongly prominent; posterodorsal seta of 3 preapical *d* setae on hind tibia short, at most 1/2 as long as mid-dorsal one; abdomen rather densely pollinose on T5; vein R_{4+5} with setulae extending only 1/2 way to r-m crossvein ..... *lateralis*

— Vertex 0.22-0.24 of head width in ♂, 0.23-0.25 in ♀; T3 without median marginal setae; epistoma weakly prominent; posterodorsal seta of preapical *d* setae on hind tibia at least 2/3 as long as mid-dorsal one; T5 thinly pollinose; vein R_{4+5} setulose from base to r-m crossvein ..... *scutellaris*

22 Lateral scutellar seta present; scutellum and postalar callus pale brownish yellow 23

— Lateral scutellar seta absent; scutellum and postalar callus creamy white ..... *speciosissima*

23 M_1 appendage subequal in length to vein M_1 from discal crossvein to its bend, or slightly longer; bend of vein M_1 much closer to discal crossvein than to wing margin; abdomen broadly reddish on side of T1+2 and T3 at least in ♂ ... 24

— M_1 appendage distinctly shorter than vein M_1 from discal crossvein to its bend; bend of vein M_1 about equidistant between discal crossvein and wing margin; abdomen entirely shining black in ground color 26

24 Wing vein R_{4+5} with setulae confined to its basal node; parafacial wider than 3rd antennal segment at middle height; T3 and T4 each with strong median discal setae; medium-sized species 25

— Vein R_{4+5} with setulae extending 1/2-2/3 way to r-m crossvein; parafacial narrower than 3rd antennal segment at middle height; T3 without median discal setae, T4 at most with fine median discal setae; small species ..... *linguicera*

25 Palpus subequal in length to 2nd antennal segment; vertex about 0.23 of head width in ♂ ..... *takanoi*

— Palpus 3/4 as long as 2nd antennal segment; vertex 0.26-0.28 of head width in ♂ ..... *paralongipalpis*

26 Wing vein R_1 bare 27

— Wing vein R_1 setulose dorsally 28

27 3rd antennal segment about 3× as long as 2nd in ♂, 2.2-2.3× in ♀; gena 0.44-0.48 of eye-height ..... *atriventris*

— 3rd antennal segment 2-2.4× as long as 2nd in ♂, 1.8-2× in ♀; gena 0.35-0.4 of eye-height ..... *tuberculata*

28 Setulae on wing vein R_1 confined to basal portion from base to level of bifurcation of

veins R_{2+3} and R_{4+5}; ♂ T3 with median marginal setae; ♂ St3 and St4 each with dense comb-like hair fascicle on posterior portion 29

— Vein R_1 with setulae extending beyond level of bifurcation of veins R_{2+3} and R_{4+5}; ♂ T3 without median marginal setae; ♂ St3 and St4 without such hair fascicle ..... *persimilis*

29 Vertex about 0.20 of head width in ♂ 30

— Vertex 0.16-0.17 of head width in ♂, 0.19-0.21 in ♀ ..... *sulensis*

30 Parafacial only slightly narrower than 3rd antennal segment at middle height; 3rd antennal segment about 2.5× as long as 2nd in ♂ ..... *burmana*

— Parafacial about 1/2 as wide as 3rd antennal segment at middle height; 3rd antennal segment about 3× as long as 2nd in ♂, 2-2.2× in ♀ ..... *hirtipennis*

31 Wing vein R_1 bare, if with minute hairs on its base, then ♂ head without proclinate orbital setae and fore claw and pulvillus elongate 33

— Wing vein R_1 with very minute hairs on its base dorsally; ♂ with 2 proclinate orbital setae; ♂ fore claw and pulvillus shorter than 5th tarsomere 32

32 Gena 0.36-0.37 of eye-height; abdomen evenly and densely whitish pollinose; St1 with black hairs ..... *microchaeta*

— Gena 0.25-0.28 of eye-height; T5 shining black on apical 1/2-2/3; St1 with whitish hairs ..... *microchaetopsis*

33 Interfrontal area widened anteriorly; ♂ outer vertical seta absent or fine; ♂ fore claw and pulvillus at least subequal in length to 5th tarsomere; epistoma prominent, if not so, then gena with dense hairs 34

— Interfrontal area very wide, about 2× as wide as parafrontal, widened posteriorly; ♂ with strong outer vertical seta, that is about 1/2 length of inner one; ♂ fore claw and pulvillus shorter than 5th tarsomere; epistoma rather weakly prominent, gena with sparse strong hairs ..... *zachvatkini*

34 Upper occiput with a row of 3-5 strong black hairs, which are 1/2 as long as setulae of upper postocular row 35

— Upper occiput without such hairs, at most with fine black hairs just behind vertical setae 36

35 Legs black or dark brown; T3 and T4 each with lateral discal setae; inner longitudinal vitta of thoracic dorsum narrower than pollinose portion between 2 inner vittae ..... *rossica*

— Tibiae reddish yellow; T3 and T4 without lateral discal setae; thoracic dorsum with broader vittae, inner vitta broader than pollinose portion between 2 vittae ..... *haemorrhoidalis*

36 3rd antennal segment with anterior margin straight; scutellum always with 2 lateral setae 37

— 3rd antennal segment peculiar in shape, rounded on anterior margin, straight on posterior margin; lateral scutellar seta usually single; gena with sparse bristle-like hairs ..... *fissiglobula*

37 Intermediate abdominal terga each with 1 pair of median discal setae; abdomen darkened; ♂ cerci distinctly shorter than T5 38

— Intermediate abdominal terga each with 2 pairs of median discal setae; abdomen broadly reddish on side and on venter; ♂ cerci subequal in length to T5 .....

..... *perinealis*

38 St1 mainly with brownish black hairs; gena about 1/2 of eye-height 39

— St1 extensively with pale brownish yellow or yellowish white hairs; gena about 2/5 of eye-height ..... *omega*

39 Epistoma strongly prominent; vertex 0.22-0.24 of head width in ♂, 0.24-0.27 in ♀; gena with several bristle-like hairs mixed with fine hairs; ♀ T6 divided longitudinally into 2 hemitergites 40

— Epistoma weakly prominent; vertex wider, 0.28-0.31 of head width in ♂, 0.33 in ♀; gena with dense bristle-like hairs; ♀ T6 broad and entire ..... *media*

40 Head densely brownish yellow pollinose; calypter brownish yellow; ♂ cerci not strongly flexed anteriorly at apex ..... *pullior*

— Face, parafacial and gena whitish pollinose; calypter white; ♂ cerci strongly flexed anteriorly at apex ..... *picta*

Subgenus ***Homoeonychia*** BRAUER et BERGENSTAMM

The ***crosskeyi***-group

***Linnaemya crosskeyi* sp. nov.** (Figs. 3, 74-80)

♂. Head pale yellowish white in ground color, parafrontal, postorbit and occiput black; interfrontal area brown-black; parafrontal densely grayish white or grayish yellow pollinose; parafacial and face densely pale yellowish white pollinose; gena and occiput densely white pollinose; antenna brown-black, base of 3rd segment reddish; arista brown-black; palpus yellow. Vertex 0.18-0.20 of head width; interfrontal area strongly widened anteriorly, subequal in width to parafrontal at middle; parafacial narrowed below, slightly less than 1/2 width of 3rd antennal segment at middle height; gena 0.32-0.36 of eye-height; epistoma prominent. Parafrontal with fine black hairs; inner vertical seta subequal in length to eye-height; outer vertical seta absent; ocellar seta very fine, subequal in length to setulae of upper postocular row; 1 reclinate and inclinate orbital seta; 7-9 frontal setae; gena with rather fine and long black hairs, without brislte-like hairs or white pile; occiput with a regular row of black setulae from uppermost portion to level of lower margin of eye; vibrissa inserted slightly above level of lower margin of face by about 1/3 length of 2nd antennal segment. Inner surface of 2nd antennal segment without wart-like excrescence; 2nd segment 2/5 -1/3 as long as 3rd; 3rd segment rounded apically, about 1/2 as wide as long, falling short of lower margin of face by about 1/2 length of 2nd antennal segment. Arista subequal in length to 2nd and 3rd antennal segments combined; 2nd segment about 4× as long as wide. Proboscis about 5/8 length of eye-height; labella rather small; palpus subequal in length to 2nd antennal segment.

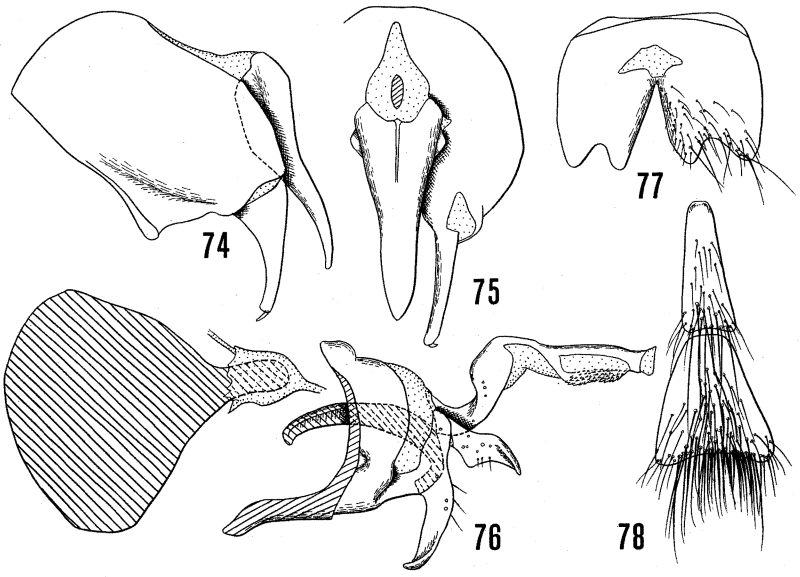
Thorax shining black in ground color, except for white postalar callus and scutellum; prescutum, humeral callus and pleural region thinly grayish white pollinose; 4 longitudinal vittae visible on prescutum. Hairs black, except on sternopleuron that bears pale yellowish hairs; 0+3 *ia*; 2+1 *stpl*; pteropleural seta not surpassing middle of lower calypter; subapical scutellar seta slightly longer than basal one, and about

2.5× as long as scutellum; lateral scutellar seta rather fine, about 1.5× as long as scutellum; apical scutellar seta fine, rarely absent; distance between bases of 2 subapical scutellar setae slightly more than that between basal and subapical setae of same side.

Wing tricolorous, pale yellowish white at base, extensively brownish at middle and hyaline apically; whitish area extending from wing base to level of basal crossvein and to whole costal cell; basicosta brown-black; calypter pale yellowish white. 2nd costal sector 0.44-0.47× as long as 3rd and slightly longer than 4th; vein R_{4+5} with setulae dorsally extending 1/2-2/3 way from base to r-m crossvein; vein M_1 from discal crossvein to its bend about 5/7 as long as distance between the bend and wing margin, and slightly longer than M_1 appendage.

Legs black, trochanters and tibiae sometimes reddish yellow, pulvilli pale brownish yellow. Fore coxa without minute recumbent hairs on inner anterior surface; hairs black, except on hind trochanter that bears yellowish hairs; mid-tibia with 2-3 *ad* and 1*v* setae; hind tibia with 2 preapical *d* setae and without *pv* apical seta; fore claw and pulvillus longer than 5th tarsomere.

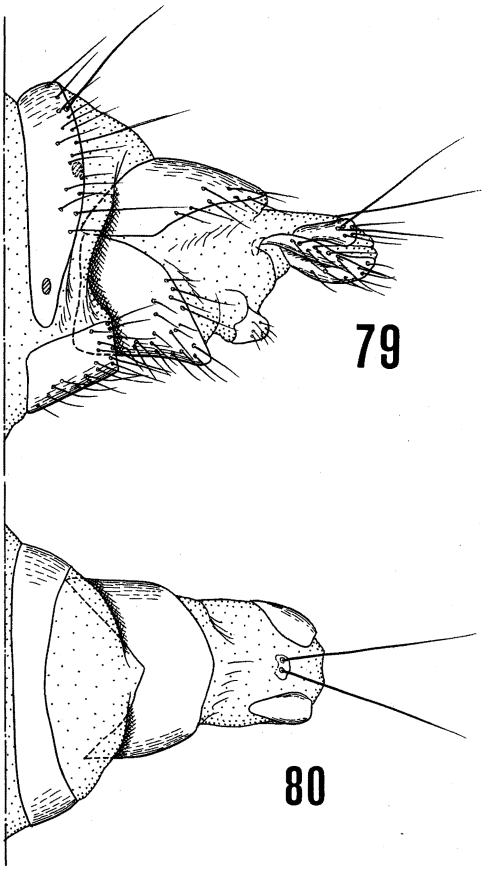
Abdomen shining black in ground color, dorsum without pollinosity, venter thinly grayish white pollinose. Hairs on dorsum dense, fine and recumbent, longer and sparser on venter; St1 with pale yellowish hairs; T3 with 2 rather short median marginal setae and 1 strong lateral marginal seta; T4 with 2 strong median marginal



FIGS. 74-78. *Linnaemya crosskeyi*, male St3 to St5 and male genitalia: 74, epandrium, cerci and suyrstylus in lateral view; 75, same in dorsal view; 76, hypandrium, pre- and postgonites and aedeagus in lateral view; 77, St5 in ventral view; 78, St3 and St4 in ventral view.

and 2 lateral marginal setae; T5 with rows of discal and marginal setae; median discal setae absent on intermediate terga. T3, T4 and T5 subequal in length to each other; T5 about 1.5× as wide as long at base, and as long as wide at apex; sutures between T3 and T4 and between T4 and T5 almost obliterated; St4 with very dense hairs on posterior portion. ♂ genitalia: St5 with posterior lobes on posterior 3/5, inner margin of posterior lobe produced posteriorly; T6 absent, 6th spiracle in membrane just before St7+8; cerci in dorsal view evenly narrowed posteriorly, in lateral view weakly angulated at middle; surstylus narrow, longer than cerci, apex with 1 strong spine; pregonite rather narrow and long, with several hairs on posterior margin; postgonite shorter than pregonite; epiphallus absent; distiphallus narrow; ejaculatory apodeme very large, fan-shaped.

♀. Differing from ♂ as follows: Vertex 0.19-0.22 of head width; parafacial only slightly narrower than 3rd antennal segment at middle height (5 : 6); inner vertical seta slightly shorter than eye-height; outer vertical seta indistinct; 2 strong proclinate orbital setae; 2nd antennal segment about 1/2 as long as 3rd, 3rd segment 2/5 as wide



FIGS. 79-80. *Linnaemya crosskeyi*, female genitalia: 79, lateral view; 80, dorsal view (hairs omitted).

as long; 2nd segment of arista shorter, at most 2× as long as wide; vein M_1 appendage subequal in length to vein M_1 from discal crossvein to its bend; fore tarsus strongly widened, 3rd tarsomere only slightly longer than wide, 5th tarsomere shorter than 4th; fore claw and pulvillus shorter than 5th tarsomere; T5 more strongly narrowed posteriorly than in ♂. ♀ genitalia: T6 entire, short, about 1/3 as long as T7, with a row of hairs on posterior portion; St6 slightly shorter than St7; 6th spiracle on ventral portion of T6; T7 entire, rather long, with several hairs on posterior portion; St8 very weakly sclerotized, with fine hairs; supra-anal region weakly sclerotized; cercus slightly shorter than T7.

Body length, 7.3-10.9 mm; wing length, 5.8-8.9 mm.

Distribution. Indonesia (Java), Laos, Thailand.

Holotype ♂, INDONESIA, West Java, Djampang Mts, Radjaandala, 1200 ft, xi. 1937 (BMNH).

Paratypes, INDONESIA: *West Java*, 1♀, Djampang Mts, Malang, 4000 ft, i.1938 (BMNH); 1♀, Djampang Mts, G. Bessar, ix.1938 (BMNH); 1♂, Djampang Mts, G. Mimerang, ix.1938 (BMNH); 1♂, Mt Gade, Labak Sive, 5000 ft, ix.1937 (BMNH); 2♂, Djampang Tenggah, Preanger, iv.1935 (BMNH): *North Java*, 2♀, Moeria, 2000-4000ft, xii.1935 (BMNH). LAOS: 1♂, 1♀, Vientiane Prov., Ban Van Eue, 29.iii.1966 (BPBM); 1♀, Sayaboury Prov., Sayaboury, 13.iv.1966 (BPBM). THAILAND: 1♂, 1♀, NW Chiangmai, Fang (500m), 12-19.iv.1958 (T.C. MAA) (BPBM).

Other specimens examined (all in poor condition): THAILAND: 1♀, NW Chiangmai, Fang (500m), 15.iv.1958 (MAA) (BPBM); 1♀, Chiangdao, 5-11.iv.1958 (MAA) (BPBM).

Remarks. This species was mentioned by CROSSKEY (1976) as an "undescribed sp. (near *speciosissima* MESNIL, 1957)". In spite of its close superficial resemblance to *L. speciosissima* and *bella*, the genital structures of this species are fairly different from those of the latter two species as follows; ♂ T6 absent, basiphallus elongate, epiphallus absent, pregonite elongate, bearing only a few minute hairs; ♀ T6 and T7 entire. All these characters seem to show a close relationship to *L. lithosiophaga* and *frater* than to the species-group to which *speciosissima* and *bella* belong. *L. crosskeyi* is easily distinguished from all other species of this genus by the black basicosta of the wing, by the white postalar callus and scutelum which contrast with shining black scutum and abdomen, and by the tricolorous wing pattern.

Subgenus ***Ophina*** ROBINEAU-DESVOIDY

The ***haemorrhoidalis***-group

Linnaemya haemorrhoidalis (FALLÉN) (Figs. 4-5, 38-39, 43, 62)

Tachina haemorrhoidalis FALLÉN, 1810: 284.

TAKANO (1957) recorded this species from Japan, but the specimens used by him are in reality *L. zachvatkini*. I was able to examine eight specimens of this species obtained in Hokkaido and Honshu. This species is distinguished from the other species by the presence of a row of black setulae on upper occiput, broad longitudinal vittae

on thoracic dorsum and the absence of lateral discal setae on the T3 and T4. The ♂ T6 of this species is very narrowly fused with the St7+8 on mid-dorsal portion and sometimes bears several short hairs on each side.

Distribution. Japan (Hokkaido, Honshu); Europe, China, Mongolia, USSR.

Material examined. JAPAN: *Hokkaido*, 1♀, Mt Rausu (200-900m), 3.viii.1967 (NAKANISHI); 1♀, Ashoro, Berabonai, 22.vii.1967 (SAIGUSA); 1♀, Shibecha, Shiraruto-ro, 1.viii.1967 (SHIMA): *Honshu*, 1♀, Yamagate Pref., Mt Chokai, 26.vii.1975 (YATA); 2♂, Yamanashi Pref., Kanayama, 24.vii.1970 (HONDA); 2♂, Nagano Pref., Mt Asama, 13-14.vii.1974 (NISHIDA)(all in BLKU).

Linnaemya media ZIMIN (Figs. 8, 40-41, 50, 63)

Linnemya (sic) *haemorrhoidalis*: PANDELLÉ, 1895 (nec FALLÉN,1810): 350.
Linnaemyia (sic) *media* ZIMIN, 1954: 274.

This species was originally described from Primorsky, eastern USSR, and later recorded from China and Europe (CHAO, 1962a ; HERTING, 1961). According to MESNIL (1972) this species is very rare in Europe, but it is rather common in Hokkaido, northern Japan. This species was recorded to be reared from *Leucoma salicis* and *L. candida* (Lepidoptera, Lymantriidae) in Hokkaido (SCHAEFER & SHIMA, 1981).

There are several individual variations within this species. Some specimens examined bear a few hairs on the parafacial and some have the wing vein R_1 very minutely haired on its base. But the male and female genitalia of these are entirely the same as those of the typical form.

The female of this species is peculiar in having T6 broad and entire.

Distribution. Japan (Hokkaido); USSR (Primorsky), China, Europe.

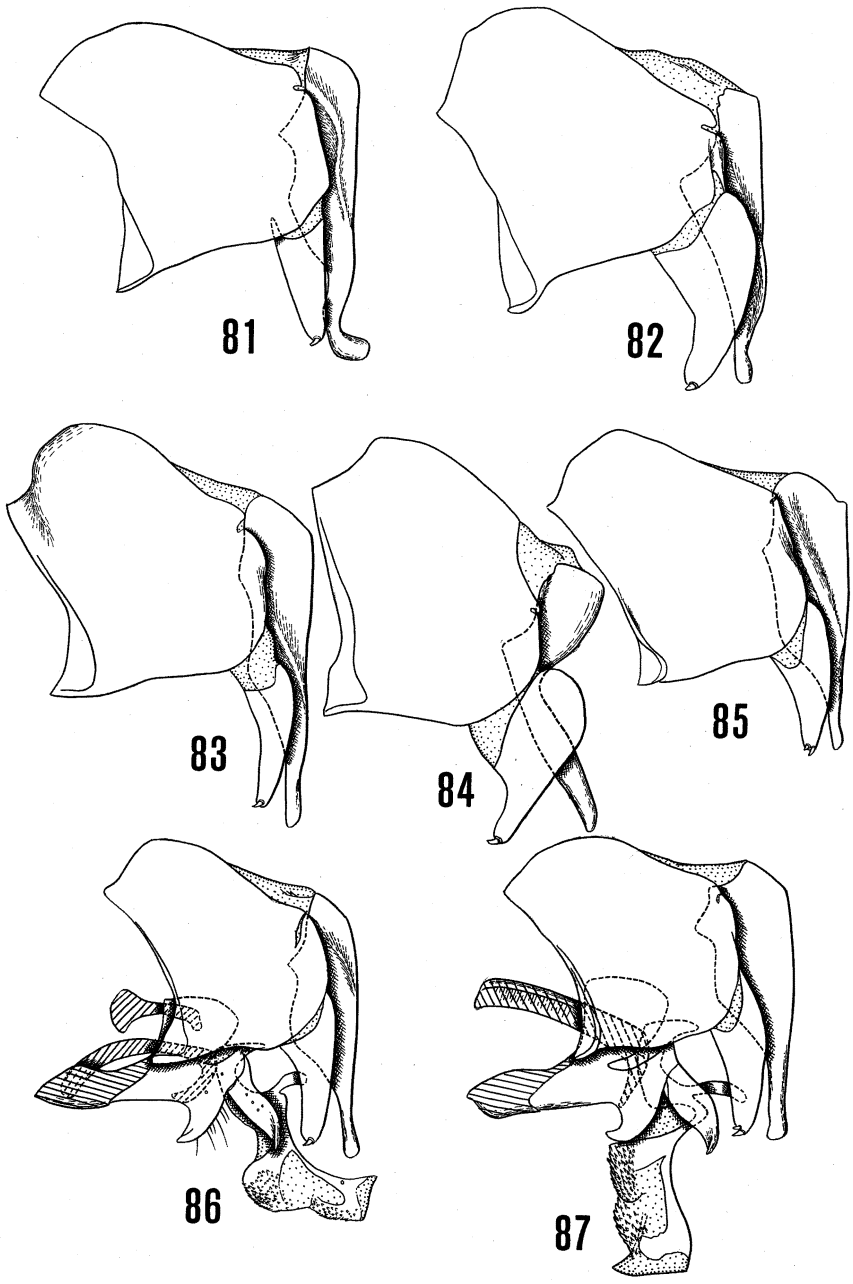
Hosts. *Leucoma salicis* (LINNÉ),L. *candida* (STAUDINGER) (Lepidoptera, Lymantriidae) (Japan, SHAEFER & SHIMA, 1981).

Material examined. JAPAN: *Hokkaido*, 195♂, *Mt Rausu*(200−900*m*), 3−4.viii. 1967 (SHIMA, NAKANISHI & HONDA); 7♂, Mts Daisetsu, Aizankei, 10.viii.1967 (SHIMA); 1♂, Kushiro, Akanmachi, 31.vii. 1967 (NAKANISHI); 12♂, 2♀, Ashoro, Kiyokawa, (SHIMA & NAKANISHI); 6♂,2♀, Ashoro, Berabonai (SHIMA, SAIGUSA & HONDA); 3♂, Ashoro, Ashorobuto, 29. vii. 1967 (HONDA); 2♂, Shinono, vii. 1976, ex *Leucoma candida* (SCHAEFER); 2♀, Ishikari, 23.vi.1975, ex *Leucoma salicis* (SCHAEFER); 1♂, Kamifurano, 2. vii. 1975, ex *Leucoma salicis*(SCHAEFER); Sapporo, Shimamatsu, 19.viii. 1967 (NAKANISHI)(all in BLKU).

Linnaemya rossica ZIMIN (Figs. 7, 54, 71, 83)

Linnaemya (sic) *rossica* ZIMIN,1954: 278.

This species may be recognized by the blackish thorax and abdomen, which are only thinly grayish pollinose, by the brownish black tibiae and by the occiput bearing black setulae on upper portion. I have examined some specimens which have single lateral scurtellar seta. Although MESNIL (1972) classified this species into a group having 2 lateral scutellar setae, the number of the setae appears to be rather variable within this species.



FIGS. 81-87. *Linnaemya* spp., male genitalia in lateral view: 81, *picta*; 82, *fissiglobula*; 83, *rossica*; 84, *smirnovi*; 85, *zachvatkini*; 86, *omega*; 87, "*Gymnochaetopsis*" *analis*.

Distributioin. Japan (Hokkaido); USSR, Europe, Mongolia.

Material examined. JAPAN: *Hokkaido*, 1♂, Shiretoko, Iwaobetsu, 30.viii.1960 (TAKANO) (EIHU); 1♂, Iwaobetsu, 19.vii.1961 (TAKANO) (EIHU); 1♂, Mt Rausu (1100 -1300 m), 4.viii.1967 (NAKANISHI) (BLKU); 1♂, Mts Daisetsu, Mt Kurodake, 13.viii. 1967 (SHIMA) (BLKU); 1♀, Mt Daisetsu, 5-6.viii.1942 (NISHIJIMA); 1♀, Nukabira, 14. ix.1964 (TAKANO); 1♂, Kamihorakamettoku-yama, 9-10.vii.1972 (SUWA *et al.*); 1♂, Mt Muine, 8.viii.1972 (TAKAGI); 1♂, 1♀, Huranodake, 9-10.vii.1975 (SUWA *et al.*) (all in EIHU).

Linnaemya omega ZIMIN (Figs. 13, 55, 86)

Linnaemyia (sic) *omega* ZIMIN, 1954: 280.

This species was originally described from Szechwan, China, and later recorded from Chekian (Tienmushan) (CHAO, 1962a). CROSSKEY (1976) added Burma and India to the localities of this species. In addition to seventeen specimens from southern China I have examined five males of this species from Nepal, Taiwan and northern Thailand. This species is here recorded for the first time from these areas.

This species seems to be related to *rossica* because of the close resemblance in the male genitalia of the two species.

Distribution. China, Taiwan, Thailand, Burma, India, Nepal.

Material examined. CHINA: *Fukien*, 1♂, 1♀, Shaow, Tachulan (1000 m), 24-28.iv. 1941 (MAA); 4♂, Tachulan (1000 m), 3-7.v.1942 (MAA); 1♂ Tachulan (1000 m), 16-20. v.1943 (MAA); 5♂, Tachulan (1000 m), 13-20.viii.1945 (MAA); 1♀, Tachulan, 16.xi.1940 (MAA); 1♂, Chungan, Bohea Hills, 20.iv.1940 (MAA); 1♂, Chungan, Upper Kuatun, 20. iv.1940 (MAA); 1♀, Chungan, Tsilichiao to Sanchiang, 8.vi.1942 (MAA) (all in BPBM). TAIWAN: 1♂, Nantou Hsien, Juhyetan, 23.vi.1970 (KURAHASHI) (BLKU). NEPAL: 1♂. Dunche, 28 km N Trisuli (Nawakot) (1950 m), 7-12.xi.1965 (QUATE) (BPBM). THAILAND: 3♂, Chiangmai, Doi Pui (1685 m), 16.ix.1975 (KURAHASHI & TUMRASVIN) (BLKU).

***Linnaemya pullior* sp. nov.** (Figs. 14, 88-94)

♂. Head reddish yellow in groud color, parafrontal and occiput black, epistoma pale yellow; parafrontal grayish yellow pollinose; parafacial, face, gena and occiput densely brownish yellow pollinose; interfrontal area dark brown; antenna, arista and palpus brown-black. Vertex about 0.22 of head width; interfrontal area widened anteriorly, slightly narrower than parafrontal at middle; parafacial nearly parallel-sided, only slightly narrower than 3rd antennal segment; gena about 1/2 of eye-height; epistoma strongly prominent. Inner vertical seta about 4/5 of eye-height; outer vertical seta indistinct; 2 reclinate orbital setae, posterior one fine and 1/3-1/2 length of inner vertical seta, anterior one strong, about 3/4 length of inner vertical seta; ocellar seta rather short, about 1/2 as long as inner vertical seta; 10-13 frontal setae, setae on upper portion weakly reclinate; parafrontal densely clothed with fine black hairs, several strong bristle-like hairs present on anterior portion; vibrissa inserted above level of lower margin of face by about length of 2nd antennal segment; occiput

without black hairs behind postocular row, with brownish yellow pile. 2nd antennal segment without wart on inner surface, about 0.4× as long as 3rd segment; 3rd segment falling short of lower margin of face by about 1/3 length of 2nd antennal segment, about 2.5× as long as wide, rounded apically. Arista subequal in length to 2nd and 3rd antennal segments combined; 2nd segment 2-3× as long as wide. Proboscis about 3/4 of eye-height; labella large; palpus slightly longer than 2nd antennal segment.

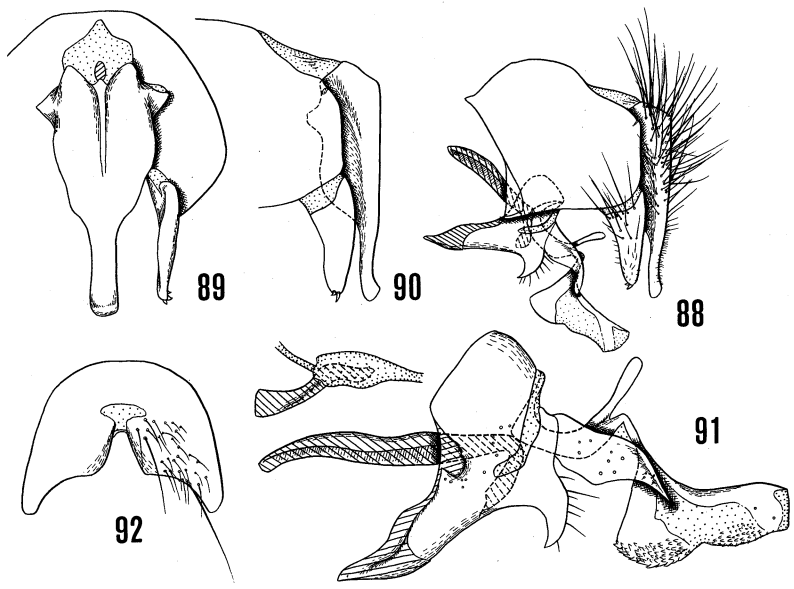
Thorax black in ground color, humeral callus, postalar callus and scutellum pale brownish yellow; dorsum and pleura thinly grayish pollinose; 4 rather broad longitudinal vittae present on prescutum and scutum. Hairs black; mediotergite with black hairs; 0+3 *ia*; 2+1 *stpl*; pteropleural seta slightly longer than hind *stpl* seta; basal scutellar seta subequal in length to subapical seta, and about 2× as long as scutellum; 2 lateral scutellar setae present, posterior seta stronger than anterior one, and subequal in length to subapical scutellar seta; apical scutellar seta 1.3-1.4× as long as scutellum, and subequal in length to preapical seta; mid-dorsal portion of scutellum with several suberect bristle-like hairs; distance between bases of 2 subapical scutellar setae subequal to that between basal and subapical setae of same side.

Wing hyaline, distinctly tinged with pale brownish yellow from base to level of basal crossvein, slightly tinged with brown along veins; basicosta white; calypter pale brownish yellow. 2nd costal sector subequal in length to 4th and about 1/2 as long as 3rd; vein R_{4+5} with several fine hairs on basal node dorsally and ventrally; vein M_1 from discal crossvein to its bend about 1/2 as long as distance between the bend and wing margin, and about 1.5× as long as its appendage.

Legs black, tibiae reddish yellow; pulvilli pale brownish yellow. Fore coxa rather sparsely clothed with fine recumbent hairs on inner anterior surface; mid-tibia with 4 *ad*, 3 *pd* and 1 *v* setae; hind tibia with 2 strong preapical *d* setae, and with a strong apical *pv* seta; claws and pulvilli long, about 1.5× as long as 5th tarsomere in fore leg.

Abdomen broadly dark reddish brown; mid-dorsal portion of T1+2 to T4 and entire T5 black, posterior margin of T5 narrowly reddish brown; venter mostly reddish yellow, blackish on St1, St4 and St5, on anterior margin of T1+2 and on posterolateral portion of T5; dorsum and venter whitish pollinose; the pollinosity shifting in appearance with direction of light. T3 subequal in length to T4, about 0.8× as long as T5, suture between T3 and T4 obliterated on mid-dorsal portion; T5 2.5× as wide as long at base and as long as wide at apex; sterna broadly exposed. Hairs on abdomen entirely black, dense, fine and suberect on dorsum, sparser and longer on venter; T3 with 2 strong median discal and 2 median marginal setae and 1 lateral marginal seta; T4 with a pair of strong median discal and a row of marginal setae; T5 with rows of discal and marginal setae; lateral discal seta absent on T3 and T4.

♂ genitalia: T6, St7+8 and epandrium reddish yellow; cerci and surstylus shining brown-black. St5 with posterior lobe occupying 1/2 length of sternum; T6 very short, without hair, fused with St7+8 mid-dorsally; cerci in dorsal view broad at base and evenly narrowed to basal 5/8, apical 3/8 portion parallel-sided, densely clothed with short and fine hairs dorsally, weakly curved dorsally at apex; surstylus in lateral view straight, evenly narrowed to rounded apex that bears 2-3 strong spines; pregonite short, curved ventrally, pointed at apex, bearing a row of fine hairs on posterior



FIGS. 88-92. *Linnaemya pullior* (holotype), male genitalia: 88, lateral view; 89, epandrium, cerci and surstylus in dorsal view; 90, same in lateral view; 91, hypandrium, pre- and postgonites and aedeagus in lateral view; 92, St5 in ventral view.

portion; postgonite broad, longer than pregonite; epiphallus slender and straight; ejaculatory apodeme small.

♀. Differing from ♂ as follows: Vertex 0.25-0.26 of head width; inner vertical seta only slightly shorter than eye-height; outer vertical seta about 1/2 length of inner one; prevertical seta present or absent, when present about 2/3 length of outer vertical seta; 2 strong proclinate orbital setae, anterior one slightly longer than posterior one, and about 3/4 length of inner vertical seta; 6-7 frontal setae, upper one reclinate; 3rd antennal segment slightly shorter and narrower than in ♂, 2.2-2.3× as long as 2nd segment, 2× as long as wide; claws and pulvilli of legs short, fore claw and pulvillus about 1/2 as long as 5th tarsomere; abdominal dorsum broadly blackish brown, posterolateral portion of T1+2, anterolateral portion of T3 and posterior margin of T5 reddish brown; abdominal venter broadly reddish brown, black on St1 to St5, on posterolateral portion of T4 and on almost entire T5; 1 weak lateral discal seta on right side of T4 in 1 specimen from Borneo. ♀genitalia; T6 and T7 reddish brown; St6 brownish; St7 reddish brown. T6 narrowly divided into 2 hemitergites, about 2× as long as T7; 6th and 7th spiracles on ventral portion of T6; St6 bearing strong hairs on posterior 1/3, about 1.5× as long as St7; T7 short and wide, divided longitudinally into 2 hemitergites, with several hairs on posterior portion; St7 weakly rounded on posterior margin, with dense hairs on posterior 1/3; St8 small, rather rounded, about 1.5× as wide as long, with several fine hairs; cercus short, weakly sclerotized, subequal in

length to T7.

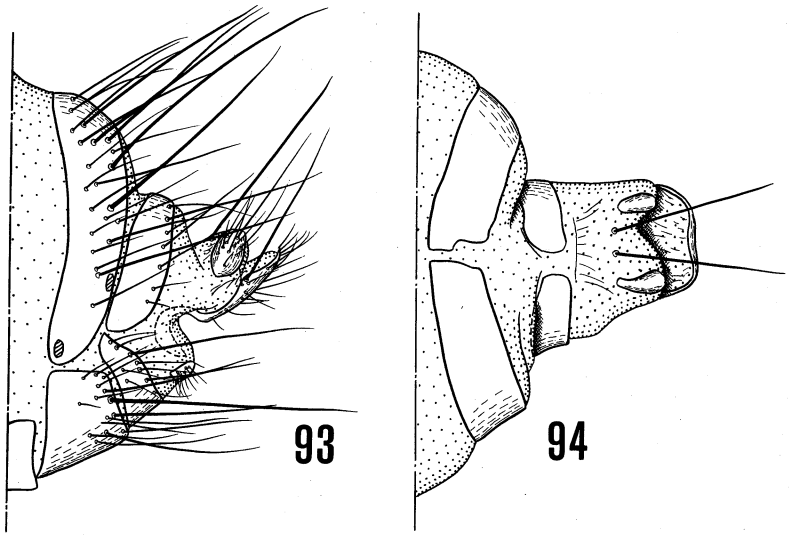
Body length, 9.8-10.4 mm; wing length, 8.9-9.4 mm.

Distribution. Malaysia (Malaya, Sabah).

Holotype, ♂, MALAYSIA, Sabah, Mt Kinabalu (1300 m), 9-11.xi.1975 (SHIMA) (NSM).

Paratypes, MALAYSIA: *Sabah*, 1♀, Mt Kinabalu, Kambaranga (2100 m), 22-30.x. 1958 (MAA) (BPBM); 1♀, Mt Kinabalu (1300 m), 6-7.xi.1975 (SHIMA) (BLKU); 1♀, Jesselton 30 mi E, Tanompok (1460 m), 17-21.x.1958 (MAA) (BPBM): *Malaya*, 1♀, Cameron Highlands, Mt Brinchang (2300 m), 25.x.1975 (SHIMA) (BLKU).

Remarks. Among the Oriental species of *Linnaemya* this species is peculiar in having two lateral scutellar setae. *L. omega* and *picta* from the Oriental Region are also known to have the same character, but *pullior* may be easily recognized in superficial appearance by the dense brownish yellow pollinosity on the head, the pale brownish yellow calypter and the black hairs on the St1. In the structure of the male genitalia *pullior* seems to be closely related to *omega*, but is different from it as follows: Cerci weaklty curved dorsally at apex and bearing dense and fine hairs; surstylus nearly straight.



FIGS. 93-94. *Linnaemya pullior*, female genitalia: 93, lateral view; 94, dorsal view (hairs omitted).

Linnaemya fissiglobula PANDELLÉ (Figs. 10, 53, 70, 82)

Linnemya (sic) *fissiglobula* PANDELLÉ, 1895: 350.

This species may be recognized by the shape of the 3rd antennal segment; the 3rd antennal segment is strongly rounded on anterior margin and nearly straight on

posterior margin. This species is placed in the subgenus *Gymnochaetopsis* by MESNIL (1971) because of the single lateral scutellar seta. I have examined some specimens which have 1-2 additional weak setae on either side of the scutellum beside the normal strong lateral scutellar seta. This character appears to be variable from one individual to another.

The male cerci of this species resemble those of *L. rossica*, but are narrower and smaller. The surstylus of the male genitalia of *fissiglobula* is wide at base and narrowed apically, and is different from slender surstylus of *rossica*.

Distribution. Japan (Hokkaido); Europe, China, Mongolia, USSR (Kazakhstan, Siberia).

Material examined. JAPAN: *Hokkaido*, 2♂, Shibecha, Shirarutoro, 1-2.viii.1967 (SHIMA); 1♂, Ashoro, Berabonai, 24.vii.1967 (NAKANISHI) (all in BLKU).

Linnaemya perinealis PANDELLÉ (Figs. 6, 51, 64)

Linnemya (sic) *perinealis* PANDELLÉ, 1895: 350.

This species is peculiar in its large size, broadly reddish abdomen, 2 pairs of median discal setae on both T3 and T4, sparsely haired gena, strongly produced epistoma and very long male cerci. I have examined 1♂ and 1♀ from Japan and China. This species is here recorded for the first time from China.

Distribution. Japan (Honshu); Europe, China, Mongolia, USSR.

Material examined. JAPAN: *Honshu*, 1♂, Yamanashi Pref., Kanayama, 26.vii. 1976, malaise trap (EMOTO) (BLKU). CHINA: 1♀. Chientao Orientalis, Mutanchian, v -vii.1944 (GOTO) (ELKU).

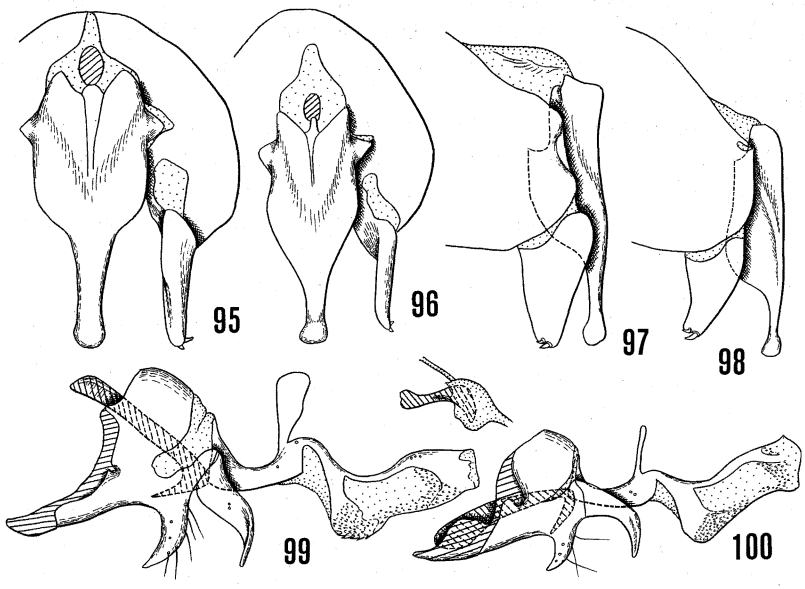
Linnaemya microchaeta ZIMIN (Figs. 95, 97, 99)

Linnaemyia (sic) *microchaeta* ZIMIN, 1954: 277.

This species was originally described from Tadzhikistan, USSR. CHAO (1962a) recorded *L. microchaeta* from China, but it is probable that his identification is incorrect, because I have examined a species from Japan, Korea and China, which very closely resembles *microchaeta* but differs in some important characters, such as width of the gena, length of the male fore claw and pulvillus and the male genitalia. The latter species seems to be identical with CHAO's *microchaeta* and is distinct from *microchaeta* ZIMIN (1954).

The description of male *microchaeta* based on a male from Tazhikistan is given below.

♂. Head pale yellowish in ground color, parafrontal and occiput black, interfrontal area brown; parafrontal, parafacial, face, gena and occiput densely whitish pollinose; interfrontal area rather thinly whitish pollinose in frontal view; antenna brown, apex of 2nd segment reddish, 3rd segment broadly reddish on basal 1/2 of inner surface; palpus brown, reddish at apex. Vertex about 1/3 of head width; interfrontal area parallel-sided or weakly widened anteriorly, 1.2-1.3× as wide as parafrontal at middle; parafacial narrowed below, about 0.8× as wide as 3rd antennal segment at middle height; gena 0.36-0.37 of eye-height. Inner vertical seta about 4/5 length of



FIGS. 95-100. *Linnaemya microchaeta* (95, 97, 99) and *microchaetopsis* (96, 98, 100), male genitalia: 95-96, epandrium, cerci and surstylus in dorsal view; 97-98, same in lateral view; 99-100, hypandrium, pre- and postgonites and aedeagus in lateral view.

eye-height; outer vertical seta about 2/3 length of inner one; ocellar seta slightly weaker than outer vertical seta; 1 rather fine outwardly directed prevertical seta, subequal in length to upper occipital setae; 1 reclinate orbital seta, subequal in length to ocellar seta; 2 strong proclinate orbital setae, anterior seta stronger than posterior one and 2/3 as long as inner vertical seta; 6 frontal setae; parafrontal rather densely clothed with fine black hairs; gena with sparse black hairs mixed with 4-5 bristle-like hairs; upper occiput with only a few black hairs just behind vertical setae; setae of postocular row long on upper 1/3, uppermost one about 1/2 as long as outer vertical seta. 2nd antennal segment about 0.4× as long as 3rd; 3rd segment 2× as long as wide. Arista subequal in length to 2nd and 3rd antennal segments combined; 2nd segment about 2.5× as long as wide. Palpus subequal in length to 2nd antennal segment; proboscis about 1/2 as long as eye-height.

Thorax black in ground color, humeral callus, notopleuron and intra-alar region and postalar callus reddish yellow, scutellum pale yellowish; dorsum and pleura rather densely whitish pollinose; 4 rather narrow longitudinal vittae on dorsum. Hairs black, 0+3 *ia*; 2+1 *stpl*; pteropleural seta longer than hind *stpl* seta; 2 lateral scutellar setae; scutellum with several strong and erect hairs on posterior portion.

Wing hyaline, basicosta creamy white; calypter white. 2nd costal sector about 2/7 as long as 3rd, 1.3× 4th; vein M_1 from discal crossvein to its bend about 1/7 as long as distance between the bend and wing margin, and about 1/3 length of M_1 appendage;

vein R_1 with several minute hairs at base dorsally; vein R_{4+5} setulose 1/2 way from base to r-m crossvein.

Legs balck, tibiae somewhat brownish, pulvilli pale brownish yellow. Fore coxa with dense recumbent minute hairs on inner anterior surface; hind tibia with 2 preapical *d* setae, posterodorsal seta hair-like and indistinct, and with an apical *pv* seta. Fore claw and pulvillus only slightly shorter than 5th tarsomere.

Abdomen black in ground color, side of T3 reddish brown; dorsum and venter evenly and densely whitish pollinose, the pollinosity with changing reflection. All hairs on abdomen black; T3 with 2 median discal setae (an additional weak seta present in a specimen examined), 2 median marginal setae and 1 lateral marginal seta; T4 with 2 weak (anterior) and 2 strong (posterior) median discal setae and and a row of marginal setae; T5 with irregular row of discal and a complete row of marginal setae; discal setae mixed with strong and erect hairs; lateral discal setae absent in intermediate terga. ♂ genitalia: Cerci in dorsal view strongly narrowed at apical 1/3, nearly parallel-sided on apical 1/3; surstylus subequal in length to cerci, in lateral view evenly narrowed apically, apex with 2 strong spines; pregonite rather narrow and short, with several hairs on posterior portion; postgonite longer than pregonite; epiphallus present.

♀. Unknown.

Body length, ca. 10 mm; wing length, ca. 8.1 mm.

Distribution. USSR (Tadzhikstan).

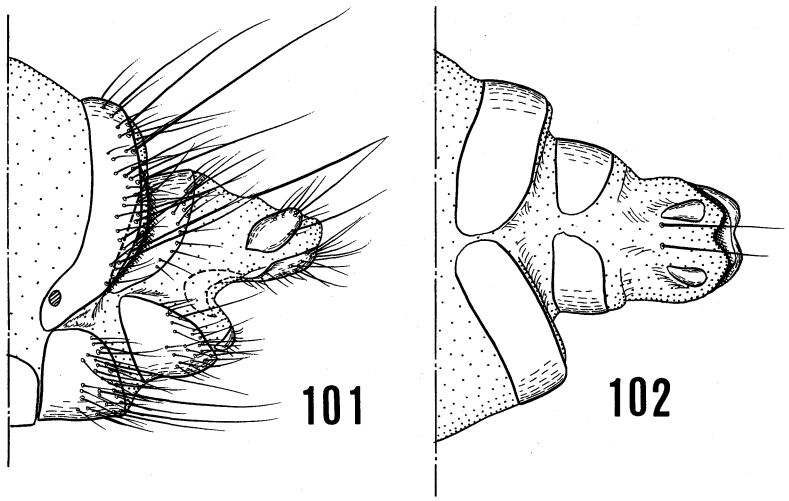
Material examined. USSR: Tadzhikstan, 1♂, Kondara, 30.vii.1964 (det. by L. ZIMIN) (CNC).

***Linnaemya microchaetopsis* sp. nov.** (Figs. 11, 96, 98, 100-102)

Closely resembling *L. microchaeta*, but differing as follows:

♂. Parafrontal grayish or yellowish gray pollinose; interfrontal area more thinly pollinose; vertex slightly narrower than 1/3 of head width (0.30-0.32 of head width); gena 0.25-0.28 of eye-height; 2nd antennal segment about 1/2 as long as 3rd, the latter about 1.8× as long as wide; palpus slightly shorter than 2nd antennal segment; pollinosity on thoracic dorsum more grayish; vein M_1 from discal crossvein to its bend about 1/6 as long as distance between the bend and wing margin, and about 1/2 as long as M_1 appendage; tibiae reddish yellow; hind tibia with 3 distinct preapical *d* setae; fore claw and pulvillus very short, about 1/2 as long as 5th tarsomere; abdomen broadly reddish on sides of T3 and T4; abdominal dorsum more thinly pollinose than in *microchaeta*; T5 shining brown-black on apical 1/2-2/3; St1 with pale brownish yellow hairs, hairs on other portion of abdomen black; T4 with strong lateral discal seta. ♂ genitalia: Cerci in dorsal view rather evenly narrowed posteriorly, in lateral view weakly swollen at apex; surstylus slightly shorter than cerci; epiphallus very narrow and straight.

♀. Very closely resembling ♂ and only slightly differing from it by the slightly wider gena (0.28-0.31 of eye-height) and by the weakly flattened fore tarsus. ♀ genitalia: T6 longitudinally divided into 2 hemitergites, subequal in length to T7; 6th spiracle on anteroventral portion of T6; T7 small, divided into 2 hemitergites, with fine hairs on posterior portion; 7th spiracle situated in membrane just behind T6.



FIGS. 101-102. *Linnaemya microchaetopsis*, female genitalia: 101, lateral view; 102, dorsal view (hairs omitted).

Body length, 10.1-14.3 mm; wing length, 8.2-11.1 mm.

Distribution. Japan (Hokkaido, Honshu, Kyushu), China (Fukien), Korea.

Holotype ♂, JAPAN, Fukuoka City, Mt Aburayama, 29.iv.1966 (SHIMA) (BLKU).

Paratypes, JAPAN: *Hokkaido*, 1♂, Hidaka, Mt Apoi, 21.vi.1959 (UEDA) (EIHU): *Honshu*, 1♂, Saitama Pref., Minano, 8.ix.1973 (HARA); 1♀, Minano, 19.x.1972 (HARA); 1♀, Saitama Pref., Kodama, 5.xi.1972 (HARA); 1♀, Saitama Pref., Hodosan, 19.ix.1971 (NAMBU); 1♀, Saitama Pref., Yorii, 6.v.1972 (NAMBU); 1♀, Saitama Pref., Ryokami, 25.vii.1972 (HARA); 1♀, Saitama Pref., Chichibu, 11.v.1974 (HARA); 1♀, Saitama Pref., Otaki, 6.x.1974 (HARA) (all in BLKU); 1♂, Nara Pref., Dorogawa, 25.vii.1967 (MIYATAKE) (OMNH); 1♂, Tamba, Sasayama, 31.v.1952 (IWATA) (BLKU): *Kyushu*, 3♂, Fukuoka City, Mt Aburayama, 5-10.v.1977 (SHIMA); 1♀, Fukuoka City, Minami Park, 11.xi.1974 (SHIMA); 1♂, Fukuoka Pref., Mt Inunaki, 3.v.1969 (HONDA); 1♀, Miyazaki Pref., Mt Takachiho, 26.vii.1965 (SHIMA) (all in BLKU). CHINA: *Fukien*, 1♀, Shaowu, 12.vi.1942 (MAA); 1♀, Sahowu,Tachulan, 18-20.viii.1945 (MAA); 1♀,Tachulan, viii.1945 (MAA); 1♂, Chungan, Upper Kuatun (1400 m), 4-6.viii.1945 (MAA); 1♂, 1♀, Chungan, 22-25.viii.1945 (MAA); 1♂, 1♀, Chungan, 22-23.viii.1945 (MAA) (all in BPBM). KOREA: *Gyongsangbuk-do*, 1♀, Mt Sudosan (700 m), 31.vii.1977 (YAMAGISHI) (BLKU).

Other specimens examined (all in rather poor condition): JAPAN, *Honshu*, 2♀, Saitama Pref., Yoshida, 8.x.1972 (HARA); 1♀, Minano, 20.ix.1974 (HARA); 1♀, Minano, 25.ix.1971 (HARA); 1♀, Minano, 28,ix,1972 (HARA) (all in BLKU): *Kyushu*, 1♀, Fukuoka City, Minami Park, 11.xi.1974 (SHIMA); 1♀, Fukuoka Pref., Nogochi, 28.v.1967 (MIYAMOTO); 1♂, Kagoshima Pref., Mt Shibi, Tomarino-Horikiri, 12.viii.1962 (HASHIMOTO) (all in BLKU). CHINA: *Fukien*, 1♂, Chungan, Bohea Hills, 16.iii.1940 (MAA);

1♀, Chungan,Tung Mu Ying to Aotow, 1-3.viii.1946 (MAA); 2♀, Chungan, Upper Kuatun (1400 m), 4-6.viii.1945 (MAA); 1♀, Chungan, Kuatun, 22-25.viii.1945 (MAA); 1♀, Chungan City, 30.x.1942 (MAA); 1♀, Hwangkeng, 11.x.1943 (MAA); 1♂, Shaowu, Tachulan, 18-20.iii.1945 (MAA); 1♂, Tachulan, 6-10.v.1942 (MAA); 1♀, Tachulan, 18-20.vii.1945 (MAA); 1♀, Shaowu, 20-25.iv.1940 (MAA) (all in BPBM).

Remarks. This species seems to be very closely allied to *L. microchaeta*, but is easily distinguished from it by the narrower gena, shorter male fore claw and pulvillus, blackish apex of the abdomen and St1 with pale hairs.

Linnaemya picta (MEIGEN) (Figs. 9, 69, 81)

Tachina picta MEIGEN, 1824: 261.
Linnemya (sic) *retroflexa* PANDELLÉ, 1895: 350.
Linnaemya haemorrhoidalis: auct. (nec FALLÉN, 1810).

This is one of the commonest species of *Linnaemya* in Japan and is characterized by the flexed apex of the male cerci. I have examined many specimens from Japan, Nepal, Taiwan and northern Thailand. The specimens from Thailand have broadly reddish abdomen, humeral callus and intra-alar region of the thorax. This species is here recorded for the first time from Nepal, Taiwan and Thailand.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu), China, Taiwan, Thailand, Nepal, India; Europe, USSR.

Material examined. JAPAN: 41♂, 130♀, as follows (only localities listed), *Hokkaido*, Mts Daisetsu, Kurodake; Mts Daisetsu, Ginmeisui; Ashoro, Kiyokawa; Ashoro, Berabonai; Sapporo, Mt Moiwa: *Honshu*, Yamagata Pref., Mt Chokai; Niigata Pref., Shiraike; Niigata Pref., Naeba; Niigata Pref., Mikunitoge; Nagano Pref., Shimashimadani; Nagano Pref., Karuizawa; Nagano Pref., Shigakogen, Kawaragoya; Yamanashi Pref., Kanayama; Saitama Pref., Nagatoro; Saitama Pref., Tokigawa; Saitama Pref., Minano; Saitama Pref., Jumonji; Saitama Pref., Ogano; Saitama Pref., Kamikawa; Saitama Pref., Konan; Saitama Pref., Yokose; Saitama Pref., Yorii; Saitama Pref., Syomata; Saitama Pref., Otaki; Saitama Pref., Hupu; Saitama Pref., Agano; Nara Pref., Mt Kongo; Nara Pref., Dorogawa; Nara Pref., Inamuragatake: *Shikoku*, Ehime Pref., Mt Ishizuchi; Ehime Pref., Jojusha: *Kyushu*, Fukuoka Pref., Mt Wakasugi; Fukuoka Pref., Mt Inunaki; Fukuoka Pref., Hikosan; Kumamoto Pref., Naidaijin (650-900 m); Kumamoto Pref., Mt Kunimi; Miyazaki Pref., Momiki; Kagoshima Pref., Iriki-toga; Kagoshima Pref., Mts Kirishima, Yunono; Yaku Is., Kosugidani -Hananoego (all in BLKU). TAIWAN: 2♂, 2♀. Suiho, 19.vi.1970 (NISHIDA) (BLKU); 1♀, Chia-i-Hsien, Ali Shan (2270 m), 8.iv.1965 (KANO) (TMDU); 1♀, Tattaka, 31.v.1965 (SHIRÔZU) (BLKU); 2♀, Tsiufeng, 29.v.1972 (LIN) (TMDU); 1♂, Ali Shan, 22.viii.1947 (GRESSITT) (BPBM). THAILAND: 4♂, 3♀, Doi Inthanon (2667 m), 19.xii.1975 (SHINONAGA & SHIMA) (BLKU). NEPAL: 1♂, Bokaihunde, 20 km N. Trisuli (Nawakot), 2100 m, 13-17.xi.1965 (QUATE) (BPBM); 2♂, 1♀, E. Nepal, Basantapur, 30.iv-8.v.1970 (SHIMA & NISHIDA) (BLKU); 1♂, Thare, 29.v.1968 (KUMATA) (EIHU); 1♀, Bagmati, Kulumsang-Pati Bhanjyang, 19.x.1975 (TAKAGI) (EIHU).

Linnaemya zachvatkini ZIMIN (Figs. 12, 42-43, 56, 73)

Linnaemyia (sic) *zachvatkini* ZIMIN, 1954: 276.

This species may be easily distinguished from the other species by the strong outer vertical seta of male and posteriorly widened interfrontal area. I have examined many specimens from Japan, one of which was reared from *Leucania separata* (Lepidoptera, Noctuidae). The same host is also known from China (CHAO, 1962b).

Distribution. Japan (Hokkaido, Honshu, Kyushu); Europe, USSR, Mongolia, China.

Hosts. Leucania separata (WALKER) (Japan; China, CHAO, 1962a, 1962b), *Agrotis* sp. (China, CHAO, 1962b) (Lepidoptera, Noctuidae).

Material examined. JAPAN: *Hokkaido*, 8♂, 15♀, Ashoro, Berabonai, 22-24.vii. 1967 (SHIMA, SAIGUSA & HONDA); 1♂,4♀, Ashoro, Kiyokawa, 23.vii.1967 (SHIMA & HONDA); 2♀, Ashoro, Ashorobuto, 28.vii.1967 (HONDA); 1♂, 5♀, Abashiri, Sharimachi, 2.viii.1967 (SHIMA & NAKANISHI); 3♀, Shibecha, Shirarutoro, 1.viii.1967 (HONDA & SHIMA); 1♀, Hidaka, Mt Apoi, 18.vii.1967 (NAKANISHI): *Honshu*, 6♂, 8♀, Nagano Pref., Karuizawa, Kutsukake, 11.vii.1966 (SHIMA, MIYATAKE & HONDA); 9♂, 8♀, Nagano Pref., Karuizawa, Nagahinata, 12.vii.1966 (SHIMA & MIYATAKE); 1♀, Nagano Pref., Togakushi, 6.vii.1966 (SHIMA); 4♂, 5♀, Nagano Pref., Kaida-mura, 15.viii.1964 (TANAKA); 2♂, 1♀, Niigata Pref., Naeba, 14.vii.1966 (SHIMA); 1♀, Saitama Pref., Minano, 25.v.1972 (HARA); 1♀, Minano, 6.vi.1972 (HARA); 1♂, Saitama Pref., Yorii, 28.v.1972 (HARA); 1♂, Saitama Pref., Hanno, 22.viii.1971 (HARA); 1♂, Saitama Pref., Hatoyama, 13.vii.1974 (HARA); 1♀, Saitama Pref., Hupu, 29.v.1971 (HARA); 1♀, Saitama Pref., Kodama, 19.vi.1971 (NAMBU): *Kyushu*, 1♀, Kagoshima Pref., Fukuyama, 2.vi.1960 (HASHIMOTO); 1♂, Kanoya City, Kotobuki-cho 20.x.1969, ex *Leucania separata* (TANAKA) (all in BLKU).

The ***smirnovi***-group

Linnaemya amicula MESNIL (Figs. 16, 103-109)

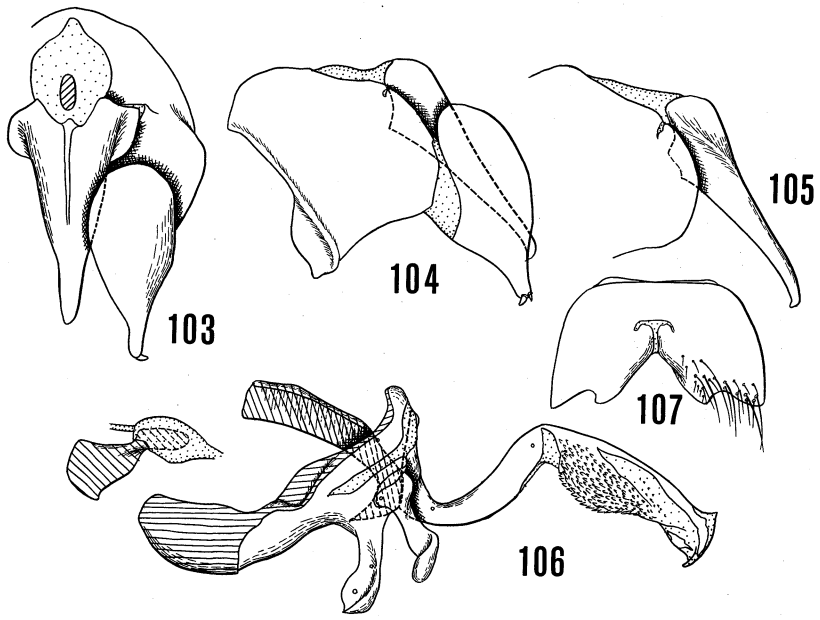
Linnaemyia (sic) *amicula* MESNIL, 1957: 49.

In addition to the type specimen of this species I have examined a male and a female from the Philippines, which agree quite well with *amicula*. This species appears to be widely distributed in the mountainous areas of Southeast Asia.

The male and female genitalia are described below.

♂ genitalia: St5 with posterior lobe occupying posterior 1/2 of sternum, inner portion of posterior lobe broadly produced posteriorly; T6 very short, broadly fused with St7+8; 6th spiracle on ventral portion of T6; cerci in dorsal view evenly narrowed posteriorly, in lateral view curved ventrally at apex; surstylus enlarged dorsally, rounded and tapering to apex, extending beyond cercal apex, with 1-2 strong spines on apex; pregonite with a few very fine hairs on posterior portion; postgonite longer than pregonite, sinuate apically; epiphallus absent; basiphallus curved dorsally, slightly shorter than distiphallus; distiphallus narrow; ejaculatory apodeme rather small, fan-shaped.

♀ genitalia: T6 entire, slightly longer than T7, with 1-2 rows of strong hairs on posterior portion; St6 slightly shorter than St7, with several strong hairs and many



FIGS. 103-107. *Linnaemya amicula*, male genitalia: 103, epandrium, cerci and surstylus in dorsal view; 104, same in lateral view; 105, cerci in lateral view; 106, hypandrium, pre- and postgonites and aedeagus in lateral view; 107, St5 in ventral view.

fine hairs on posterior 1/2; 6th spiracle on ventral portion of T6; 7th spiracle in membrane just behind T6; T7 entire, with a row of several fine hairs on posterior margin; St7 weakly concave at middle of posterior margin, with many fine hairs on posterior 1/3; St8 small, constricted at middle, with several fine hairs; cercus slightly longer than T7.

Distribution. Burma, Philippines.

Material examined. BURMA: Holotype ♂, Kambaiti, 7000 ft, 30.iv.1932 (MALAISE) (ZMU). PHILIPPINES: *Luzon*, 1♂, Nueva Vizcaya, Dalton Pass, 915 m, 9-10.iv.1968, malaise trap (HARDY & DELFINADO) (BPBM); 1♀, Baguio, 7.v.1954 (CENDAHA) (DEUP).

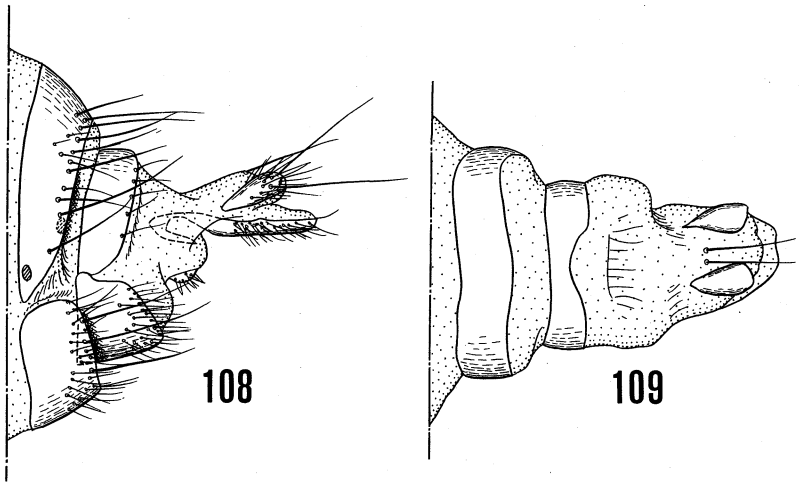
Subgenus ***Linnaemya*** ROBINEAU-DESVOIDY

The ***vulpina***-group

Linnaemya comta (FALLÉN) (Figs. 20, 59, 65)

Tachina comta FALLÉN, 1810: 273.
Linnaemya compta: auct. Incorrect subsequent spelling of *comta* FALLÉN, 1810.

This species is widely distributed in Europe, northern Asia and North America, but



FIGS. 108-109. *Linnaemya amicula*, female genitalia: 108, lateral view; 109, dorsal view (hairs omitted).

is not found in Japan. CROSSKEY (1976) listed northern India and Nepal as localities of this species in the Oriental Region. I have examined no specimen of this species from the Oriental Region, but have some speicmens from China and Afghanistan. This is the first record for Afghanistan.

Distribution. Northern India, Nepal; Europe, Afghanistan, China, USSR, North America.

Material examined. CHINA: *Hupe*, 1♀, Chengteh, 29.viii.1940 (MATSUMURA); *Shansi*, 1♀, 9.v.1942; 1♀, 14.v.1942 (all in EIHU). AFGHANISTAN: 1♂, Mts Koh-i-Baba, Mt Shah-Fuladi (3500-4200 m), 9.viii.1965 (KUNOU) (BLKU).

Linnaemya soror ZIMIN (Figs. 46-47)

Linnaemyia (sic) *soror* ZIMIN, 1954: 266.

I have seen many specimens of this species from India and Nepal. They appear to be darker in ground color of the abdomen and thorax than specimens from southern Europe and Central Asia and much resemble *L. comta* in appearance, but the male of *soror* lacks the proclinate orbital setae. This species is here recorded for the first time from Nepal.

Distribution. Nepal, India; Southern Europe, Middle East, Israel, USSR, Northern China.

Material examined. NEPAL: 1♂, Dunche (1900 m), 7.v.1967 (NICOLSON) (USNM); 1♂, Langtang Val. ca 60 km N of Kathmandu, 2700-3400 m, 13-25.xii.1965 (QUATE) (BPBM); 1♀, Gosainkund, 3000-2500 m, 7.vi.1968 (KUMATA); 1♀, Tesiga, 8.vii.1968

(MATSUMURA); 1♀, Kathmandu, Balaju, 21.iv.1968. (KUMATA); 2♂, Bagmati, Ghora Tobela, 23.ix.1975 (TAKAGI); 2♂, Bagmati, Syn Gomba, 2.x.1975 (TAKAGI); 1♀, Bagmati, Kulumsang-Patibajyang, 12.x.1975 (TAKAGI) (all in EIHU); 2♂, 6♀, Basantapur (2300 m) 27°06′N, 87°20′E, 28.iv-8.v.1972 (SHIMA & NISHIDA); 1♂, Hile (2100 m) 27°02′N, 87°19′E- Basantapur (2300 m), 24.iv.1972 (SHIMA); 7♂, Mulgat (550 m) 26°56′N, 87°20′E-Hile (2100 m), 23.iv.1972 (SHIMA) (all in BLKU). INDIA: 1♀, Bengal, Darjeeling, 31.iii.1938 (MAA) (BPBM).

Linnaemya vulpina (FALLÉN) (Figs. 19, 60, 66)

Tachina vulpina FALLÉN, 1810: 283.

I have no specimen of this species from eastern Asia or the Oriental Region. It is probable that CHAO (1962a) confused this species with *L. vulpinoides*, because he stated that the median discal setae on the T3 and T4 of this species are sometimes absent. CHAO (l.c.) recorded *L.vulpina* from Chinhai, Ynnan and Taiwan.

Distribution. China; Europe, USSR, Israel, Central Asia.

Linnaemya vulpinoides (BARANOV) (Fig. 18)

Micropalpus vulpinoides BARANOV, 1932: 2.
Linnaemya (Micropalpus) formosensis VILLENEUVE, 1932: 269.

This species is widely distributed in the Oriental Region. I have examined specimens from Nepal, southern China, Vietnam and Thailand and also from New Guinea. This species is recorded for the first time from these areas. CROSSKEY (1976) recorded this species from Jordan, but it is reported that it was misidentification of the African species *neavei* (HERTING, 1983).

Distribution. India, China (Fukien), Taiwan, Thailand, Vietnam, Malaysia, Indonesia (Sumatra); New Guinea.

Material examined. NEPAL: 2♀, Biratanti, 15.iv.1968 (KUMATA); 1♀, Sikba, 10.v.1968 (KUMATA) (all in EIHU). CHINA: *Fukien*, 1♂, Chungan, Bohea Hills, 26.iv.1940 (MAA) (BPBM). THAILAND: 1♂, Fang, Doi Huai Hwer (1231 m), 27.ix.1975 (KURAHASHI) (BLKU). VIETNAM: 1♀, Fyan (900-1000 m), 11.vii-9.viii.1961 (SPENCER) (BPBM). NEW GUINA: *Irian Jaya*, 1♀, Star Mts, Sibil Val., 1245 m, 18.x-8.xi.1961 (QUATE) (BPBM): *Papua New Guinea*, 1♀, East Highlands, Kundiawa, 1-4.i.1965 (SEDLACEK); 3♂, 10♀, Wau, Morobe Distr., 1100-1400 m., 30.i.1963, 17.vi.1961, 1-4.viii.1962, 20.viii.1961, 21.viii.1964, 29.viii.1963, 13-19.ix.1962, 1-4.x.1962, 5.x.1962, 15-25.x.1961, 23.xii.1961, 31.xii.1964 (SEDLACEK); 2♂, 1♀, Wau, Kunai Creek, 1400 m., 28.vii.1962 (SEDLACEK); 1♂, Wau, Hospital Creek, 1250 m., 8.iv.1965 (SEDLACEK); 1♀, Wau, 1100 m., 31.xii.1964 (SEDLACEK) (all in BPBM); 2♂, 1♀, Wau, 17.xii.1981, 22.xii.1981, 22-31.xii.1973 (SHINONAGA & SHIMA); 5♀, Wau, Mt Missim, 17, 29.xii.1981 (SHINONAGA); 1♂, Wau, Regina Creek, 1300 m, 18.viii.1982 (SHINONAGA) (all in BLKU).

The ***tessellans***-group

Linnaemya tessellans (ROBINEAU-DESVOIDY) (Figs. 31, 111, 113, 115)

Bonellia tessellans ROBINEAU-DESVOIDY, 1830: 56.
Micropalpus pudicus RONDANI, 1859: 69.

This species is widely distributed in the Palearctic Region. In addition to the Japanese specimens of this species I have examined several specimens from Taiwan and Nepal, which are the first record of this species from these areas.

The male T6 of this species is free and about 1/2 as long as St7+8. The other male genital structures are illustrated well by ZIMIN (1954); cerci rather wide and pointed at apex in dorsal view, apical portion nearly straight and bearing only a few hairs in lateral view; surstylus in lateral view strongly curved on anterior margin. The female T6 is relatively long but not longer than the T7. Both 6th and 7th abdominal spiracles of the female abdomen are situated on T6.

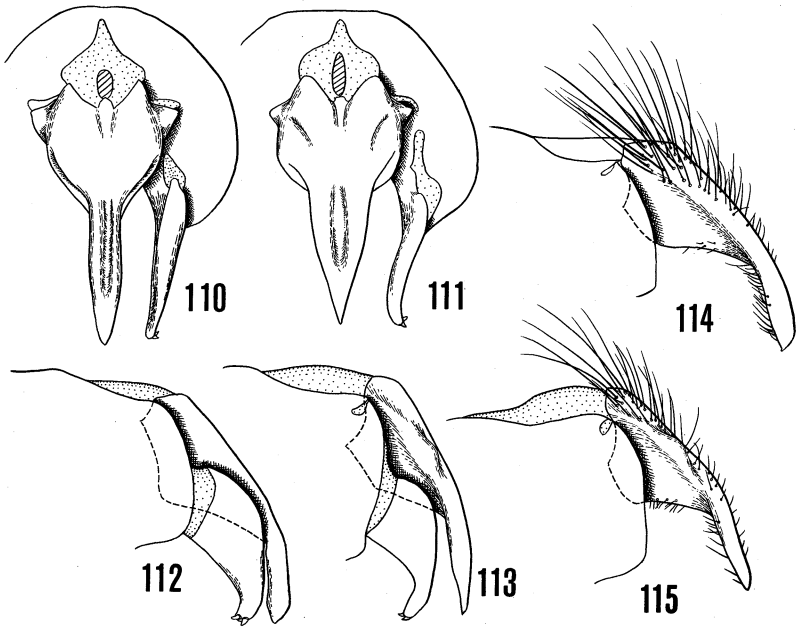
Distribution. Japan (Hokkaido, Honshu, Kyushu), Taiwan, Nepal; Europe, USSR, Central Asia.

Material examined. JAPAN: *Hokkaido*, 1♀, Mts Daisetsu, Mt Nagayama, 13.viii. 1967 (SAIGUSA); 2♀, Mt Yubari, 15.vii.1967 (SHIMA); 1♀, Nukabira, Fujikawa, 19.vii. 1967 (SHIMA): *Honshu*, 1♀, Hirosaki City, Jyoto, 9.ix.1979 (FUKUSHI); 1♂, Aomori City, Tsurugasaka, 14.vi.1974 (FUKUSHI); 1♂, Ajigasawa, Kuronbonuma, 28.vii.1972 (FUKUSHI); 1♂, Akita Pref., Mt Nyuto, 3.viii.1968 (FUKUSHI); 1♀, Mt Hakkoda (1200 m), 11. viii.1956 (BABA); 3♀, Saitama Pref., Minano, 12.ix.1974, 25.ix.1971, 19.x.1973 (HARA); 2♀, Saitama Pref., Kamikawa, 7.v.1972 (HARA); 1♀, Saitama Pref., Tokigawa, 6.v. 1973 (HARA); 1♀, Saitama Pref., Yorii, 13.v.1973 (HARA); 1♂, Saitama Pref., Hidaka, 26. v. 1973 (HARA); 1♀, Saitama Pref., Yoshida, 8.x.1972 (HARA); 1♀, Yamanashi Pref., Kanayama, 3.vi.1976, malaise trap (NAKANISHI & EMOTO); 1♂, Nagano Pref., Togakushi, 6.vii.1966 (SHIMA); 1♂, N. Echigo, Mts Washigaru, Mt Maegatake, 22.ix.1971 (BABA); 2♂, S. Echigo, Hiuchiyama, 27.viii.1960 (BABA); 1♀, Niigata Pref., Mikunitoge, 13.vii.1966 (SHIMA); 1♂, Niigata Pref., Mt Atema, 28.vii.1971 (HONDA) (all in BLKU); 3♀, Ishikawa Pref., Mt Hakusan, 12.x.1968 (TAKANO) (EIHU); 1♂, Ishikawa Pref., Mt Komagatake, 1.v.1974 (NISHIDA) (BLKU); 1♂, Nara Pref., Dorogawa, 28.v. 1958 (HIURA) (OMNH); 1♂, 1♀, Okayama Pref., Mt Hiruzen, 19.vii.1963 (BUEI) (BLKU): *Kyushu*, 1♂, Tsushima I, Izuhara-Uchiyama, 2.x.1948 (SHIRÔZU) (ELKU); 1♂, Tsushima I, Kamisaka Pass, 5.viii.1982 (SHIMA); 5♂, 1♀, Fukuoka City, Mt Aburayama, 23.iv.1983, 3.v.1983, 5-12.v.1983, 8.v.1982, 13.v.1983 (SHIMA); 4♀, Fukuoka Pref., Mt Kanayama, 21.v.1984, 15-21.v.1984, 1.vi.1984 (SHIMA); 1♀, Fukuoka Pref., Mt Inunaki, 5.v.1966 (SHIMA); 1♀, Fukuoka Pref., Mt Hikosan, 8.v.1967 (HONDA); 1♂, Nagasaki Pref., Matsuura, 1.v.1966 (IKEZAKI); 1♂, 1♀, Kumamoto Pref., Naidaijin (650 -800 m), 8.v.1967 (SHIMA); 2♂, Kumamoto Pref., Mt Hakucho, 2.viii.1975, 15.v.1979 (SHIRÔZU & SHIMA); 1♀, Kumamoto Pref., Mt Ichifusa, 24.v.1975 (SHIMA); 1♂, Kagoshima City, Takeoka, 25.iii.1966 (WAKAMATSU) (all in BLKU). TAIWAN: 1♀, Nantou Hsien, Tsuifeng, 19.vi.1970 (KURAHASHI) (BLKU). NEPAL: 1♀, Bagmati, Syn Gompa, 2.x.1975 (TAKAGI) (EIHU); 8♂, 1♀, Basantapur (2300 m) 27°07'N, 87°24'E, 28. iv-10.v.1972, malaise trap (SHIMA *et al.*) (all in BLKU).

***Linnaemya ambigua* sp. nov.** (Figs. 32, 110, 112, 114)

Closely resembling *L. tessellans*, but differing as follows.

♂. Head yellowish white pollinose; pile on upper occiput tinged with yellow; hairs on parafrontal very fine and dense, several hairs descending below lowest frontal seta; gena wide, 0.45-0.5 of eye-height, upper 1/2 with very fine black hairs, lower 1/2 with yellowish white hairs; parafacial in profile strongly concave, slightly narrowed below, 3/4-4/5 as wide as 3rd antennal segment at middle-height; 2nd antennal segment bearing a long hair which is about 1.5× as long as 2nd antennal segment, 3rd segment widened apically; proboscis about 1/2 as long as eye-height; palpus reddish yellow, sometimes darkened at base; humeral callus reddish brown; hairs around prostigmatic setae whitish, mixed with black ones; wing vein M_1 from discal crossvein to its bend about 2/3 as long as distance between the bend and wing margin; legs black, tibiae sometimes reddish brown at middle; T3 without median discal setae, at most with fine and short discal setae. ♂ genitalia: St7+8 shining brown; epandrium reddish brown; cerci and surstylus brown; St5 with inner posterior corner of posterior lobe weakly swollen and rounded, bearing dense and strong hairs; T6 free and entire, about 1/2 as long as St7+8; cerci in dorsal view broad at base and tapering to apical 1/2, nearly parallel-sided from apical 1/2 to 2/5, then weakly narrowed to apex, weakly excavated mid-dorsally from apical 1/2 to 1/5, in lateral view weakly swollen on apical 1/2,



FIGS. 110-115. *Linnaemya tessellans* (111, 113, 115) and *ambigua* (110, 112, 114), male cerci and surstylus: 110-111, dorsal view; 112-115, lateral view.

with dense hairs on ventral portion; surstylus weakly curved ventrally, narrowed to apex, about 1/2 as wide as long, bearing 2 strong spines at apex; pregonite rather narrow, curved ventrally, with a row of fine hairs on posterior margin; postgonite longer than pregonite, pointed at apex; epiphallus short and slender, weakly curved posteriorly; ejaculatory apodeme small.

♀. Differing from ♂ as follows: Vertex about 0.27 of head width; 1 fine prevertical seta present, subequal in length to ocellar seta; outer vertical seta 1/2 as long as inner one; 2 strong proclinate orbital setae, anterior seta stronger than posterior one; 3rd antennal segment 1.7× as long as 2nd; fore tarsus widened, 3rd tersomere nearly as long as wide; fore claw and pulvillus shorter than 5th tarsomere.

Body length, 10.8-12.3 mm; wing length, 8.5-9.6 mm.

Distribution. Japan (Honshu, Kyushu).

Holotype ♂, JAPAN, Kyushu, Miyazaki Pref., Mt Takachiho, 6.vi.1965 (TANAKA) (BLKU).

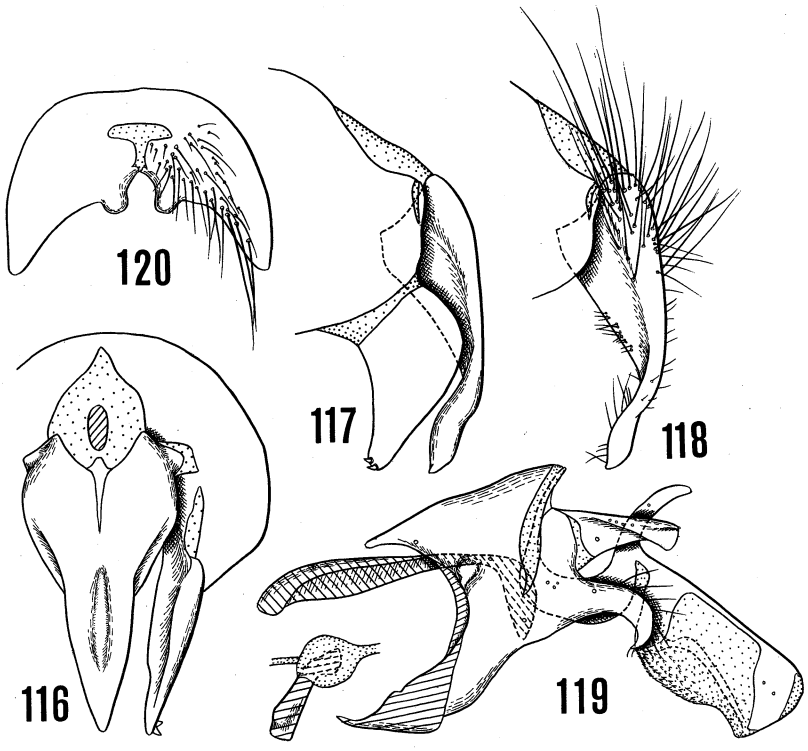
Paratypes, JAPAN: *Honshu*, 1♂, Saitama Pref., Otaki, 8.x.1971 (HARA); 1♀, Saitama Pref., Yorii, 1.x.1972 (HARA): *Kyushu*, 1♂, Fukuoka Pref., Shiibaru, 17.v.1977 (SHIMA); 1♂, Kagoshima City, Takeoka, 26.iii.1966 (WAKAMATSU); 1♂, same data as holotype (all in BLKU).

Remarks. This species seems to be closely related to *L. tessellans*. The male cerci of *ambigua* are narrower than those of *tessellans*. Both species occur sympatrically in Japan.

***Linnaemya siamensis* sp. nov.** (Figs. 34, 116-122)

♂. Head yellow in ground color, parafrontal and occiput black; parafrontal densely whitish gray, somewhat yellowish, pollinose; parafacial, face, gena and occiput densely whitish pollinose; interfrontal area brown-black; antenna black, apex of 2nd segment reddish yellow, especially on inner side; arista brown-black; palpus dark brown. Vertex about 0.23 of head width; interfrontal area widened anteriorly, subequal in width to parafrontal at middle; distance between hind ocelli about 3× as long as an ocellus; parafacial strongly concave in profile, narrowed below, about 5/8 as wide as 3rd antennal segment at middle height; gena 0.37-0.38 of eye-height; epistoma rather weakly prominent; proboscis about 2/3 as long as eye-height. Inner vertical seta about 4/5 of eye-height; outer vertical seta absent; 1 strong reclinate orbital seta, 3/4 as long as inner vertical seta; ocellar seta 2/3 as long as reclinate orbital seta; 6-8 frontal setae; parafrontal with dense fine black hairs; gena with dense fine and long white hairs mixed with several fine black hairs on upper portion; occiput without black setulae, with white pile. 2nd antennal segment about 0.4× as long as 3rd, bearing yellowish wart-like excrescence on inner surface; 3rd segment rather strongly widened anteriorly, about 2× as long as wide. Arista subequal in length to 2nd and 3rd antennal segments combined; 2nd segment about 2× as long as wide. Palpus about 1/2 as long as 2nd antennal segment.

Thorax black in ground color, yellowish on intra-alar region, on postalar callus and on posterior 2/3 of scutellum, broadly blackish on anterior portion of scutellum; dorsum and pleura densely grayish white pollinose, 4 longitudinal vittae present on



FIGS. 116-120. *Linnaemya siamensis*, male genitalia: 116, epandrium, cerci and surstylus in dorsal view; 117, same in lateral view; 118, cerci in lateral view; 119, hypandrium, pre- and postgonites and aedeagus in lateral view; 120, St5 in ventral view.

prescutum and scutum, outer vittae wider than inner ones; the outer and inner vittae of same side appearing as a fused broad vitta at low magnifications. Dorsum including scutellum with black hairs; humeral callus with black hairs, except on lower portions; pleura with whitish hairs, except on posterior portion of mesopleuron and upper portion of pteropleuron; mediotergite with black hairs; 0+3 *ia*; 2+1 *stpl*; pteropleural seta about 1/2 as long as hind *stpl* seta; subapical scutellar seta subequal in length to basal one, and about 2× as long as scutellum; lateral scutellar seta single, about 2/3 as long as subapical seta; preapical scutellar seta slightly longer than scutellum; apical scutellar seta 1.6× as long as scutellum; distance between bases of 2 subapical scutellar setae about twice that between basal and subapical setae of same side.

Wing hyaline, very slightly tinged with pale brown along veins; basicosta white; calypter white. Basal portion of wing without microtrichia, i.e., costal cell, base of subcostal cell and anal cell bare; 2nd costal sector about 0.6× as long as 3rd and slightly longer than 4th; vein R_{4+5} setulose dorsally on 2/3 way from base to r-m crossvein; vein M_1 from discal crossvein to its bend about 1/2 as long as distance

between the bend and wing margin; M_1 appendage about 2/3 as long as vein M_1 from discal crossvein to the bend.

Legs entirely black, hind tibia somewhat dark brownish; pulvilli yellowish. Inner surface of fore coxa with fine whitish hairs on posterior 1/4; coxae and trochanters mainly pale-haired; femora with whitish hairs on basal and lower portions; mid-tibia with a strong *v* seta; hind tibia with 2 preapical *d* and an apical *pv* setae. Fore claw and pulvillus longer than 5th tarsomere.

Abdomen black in ground color, side of T3 and anterolateral portion of T4 reddish, venter entirely black; dorsum densely grayish white pollinose; the pollinosity shifting in appearance with direction of light; mid-dorsal vitta indistinct; posterior portion of T4 and entire T5 densely yellowish pollinose; venter densely whitish pollinose. Hairs on St1 and ventral portion of T3 whitish, black on other portions; hairs on dorsum recumbent; T3 with 2 median marginal setae and 1 lateral marginal seta, without median discal seta; T4 with a pair of median discal setae and median marginal setae and with 2-3 lateral marginal setae; lateral discal seta absent on T3 and T4; T5 with 2 median discal setae, 2 lateral discal setae and a row of marginal setae; venter with fine and long recumbent hairs. T3 subequal in length to T5 and slightly shorter than T4; T5 2× as long as wide at base; posterior portions of St2 to St4 triangularly exposed.

♂ genitalia: St7+8 reddish yellow, darkened on posterior 1/2; epandrium reddish brown; cerci and surstylus shining brown-black. St5 with dense strong hairs, posterointerior portion of posterior lobe weakly swollen and rounded; T6 free and entire, rather weakly sclerotized, 1/3 as long as St7+8; cerci in dorsal view broad at base and strongly narrowed to apical 1/2, apical portion weakly narrowed to apex, mid-dorsal portion of anterior 2/3 longitudinally excavated, in lateral view weakly curved ventrally, with several long hairs on anteroventral portion; surstylus subequal in length to cerci, 1.5× as long as wide, bearing 2 strong spines at apex, in lateral view posterior margin strongly curved and anterior margin nearly straight; pregonite short, curved ventrally near apex, bearing several fine hairs on posterior margin of apical 1/3; postgonite rather slender and short; epiphallus short and slender.

♀. Differing from ♂ as follows: Vertex 0.24-0.26 of head width; interfrontal area slightly narrower than parafrontal at middle; inner vertical seta 5/7 of eye-height; outer vertical seta 1/2-2/3 length of inner one; 1 prevertical seta present, subequal in length to ocellar seta; 2 strong proclinate orbital setae, subequal in length to reclinate orbital seta; 5-7 frontal setae; 2nd antennal segment 1/2 as long as 3rd; apex of palpus slightly paler; tarsus of fore leg widened, 3rd tarsomere about 0.8× as wide as long; fore claw and pulvillus shorter than 5th tarsomere; abdomen entirely black in ground color. ♀ genitalia: T6 narrowly divided longitudinally into 2 hemitergites, subequal in length to T7; 6th spiracle on ventral margin of T6; St6 short and wide, rectangular, about 3× as wide as long, subequal in length to St7; 7th spiracle on median membranous portion just behind T6; T7 weakly sclerotized, very narrowly divided into 2 hemitergites at middle, a row of very fine hairs present on membranous area behind posterior margin of T7; St7 about 2.5× as wide as long, with irregular rows of dense hairs on posterior margin; St8 small, 5× as wide as long, without distinct hairs; supra-anal region with 2 very long sinuate hairs and several small hairs, the area from

which hairs arise narrowly sclerotized; cercus slightly longer than St7, with long sinuate hairs.

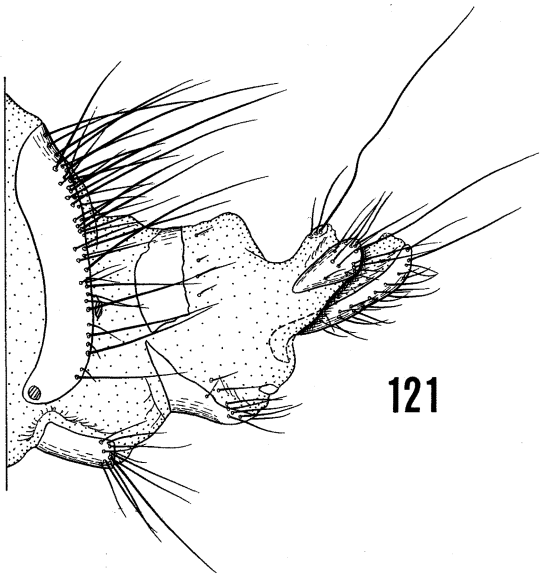
Body length, 9.8-11.9 mm; wing length, 8.4-9.5 mm.

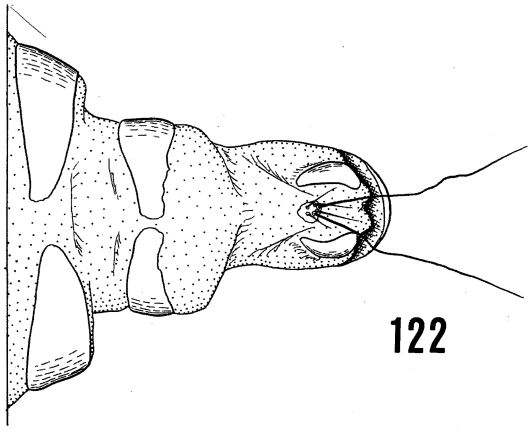
Distribution. Thailand.

Holotype ♂, THAILAND, Fang, Doi Huai Hwer (1231 m), 27.ix.1975 (KURAHASHI) (NSM).

Paratypes, THAILAND: 2♀, same data as holotype (KANO); 1♂, Chiangmai, Doi Pui (1685 m), 16.ix.1975 (KANO); 1♀, Fang, Fang Exp. St. (500 m), 25.ix.1975 (W. TUMRASVIN) (BLKU).

Remarks. This species seems to be most closely related to *L. tessellans* and the





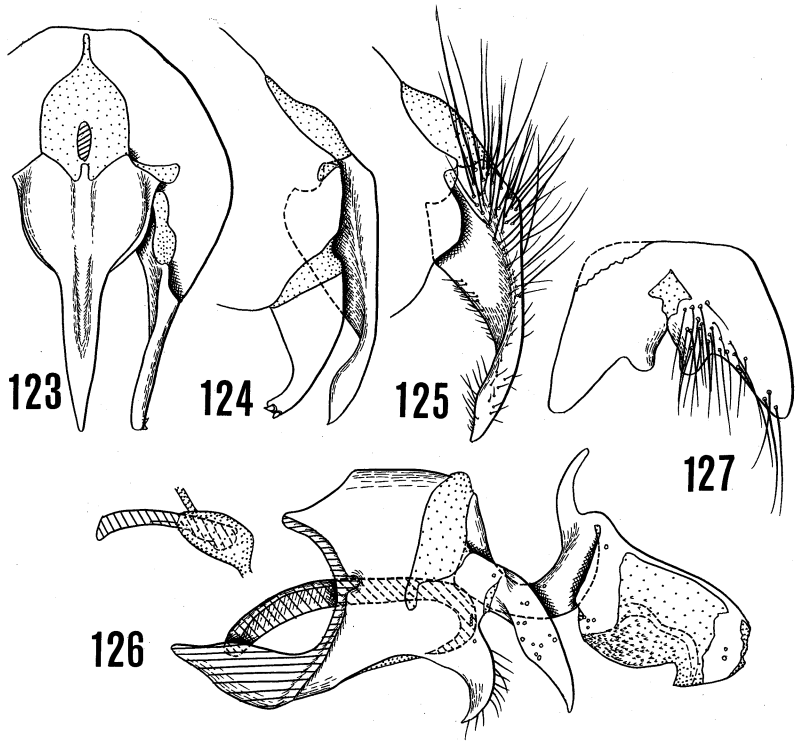
FIGS. 121-122. *Linnaemya siamensis*, female genitalia: 121, lateral view; 122, dorsal view (hairs omitted).

male genitalia of these two species are only slightly different from each other; in *siamensis* the surstylus is wider, the pregonite is strongly curved ventrally and the postgonite is more slender. The female genitalia of these two species are also slightly different; in *siamensis* the St7 is wider and the supra-anal region is weakly sclerotized. In superficial appearance this species is easily distinguished from *tessellans* by the whitish hairs on almost the entire gena and on mesopleuron, and by the yellowish pollinose T5.

***Linnaemya kanoi* sp. nov.** (Figs. 33, 123, 127)

Closely resembling the preceding species, but differing as follows.

♂. Upper occiput somewhat yellowish pollinose; 3rd antennal segment broadly reddish yellow on base of inner surface; palpus reddish yellow; vertex about 0.20 of head width; interfrontal area slightly narrower than parafrontal at middle; parafacial narrowed below, about 5/6 as wide as 3rd antennal segment at middle height, not much



FIGS. 123-127. *Linnaemya kanoi*, male genitalia: 123, epandrium, cerci and surstylus in dorsal view; 124, same in lateral view; 125, cerci in lateral view; 126, hypandrium, pre- and postgonites and aedeagus in lateral view; 127, St5 in ventral view.

excavated in profile; gena about 0.4 of eye-height; ocellar seta short, about 1/2 as long as reclinate orbital seta; occiput with yellowish white pile; thoracic dorsum with outer longitudinal vitta narrower than in the preceding species, the inner and outer vittae not appearing as a fused broad vitta at low magnifications; scutellum entirely yellowish; whitish hairs on mesopleuron confined to its anterior 1/2; vein M_1 from discal cross-vein to its bend about 2/5 as long as distance between the bend and wing margin; basal 1/2 of hind femur and all tibiae reddish yellow, sometimes fore and mid-tibiae darkened; abdomen more broadly reddish, side and venter of T3 and anterolateral portion of T4 reddish yellow; abdomen more thinly whitish pollinose, pollinosity on T5 concolorous with that on the preceding terga. ♂ genitalia: St7+8 broadly dark reddish brown; epandrium reddish yellow; St5 with posterior lobe rounded and weakly produced on inner posterior portion; T6 free and entire, 1/3 as long as St7+8; cerci in dorsal view broad at base and narrowed to apical 4/7, parallel-sided from apical 4/7 to 1/2 and then evenly narrowed to pointed apex, mid-dorsal portion excavated longitudinally on apical 4/7-2/7, in lateral view very weakly curved ventrally, with several fine hairs on ventral surface; surstylus in lateral view 2× as long as wide, with 2 strong spines on apex, strongly narrowed at posterior 1/3; pregonite short, curved ventrally, bearing a row of fine hairs on posterior portion; postgonite longer than pregonite, rather wide, pointed at apex; epiphallus short and slender.

♀. Closely resembling ♂, but differing as follows: Vertex about 0.25 of head width; 1 fine prevertical and 2 strong proclinate orbital setae present; gena about 0.44 of eye-height; 3rd antennal segment about 2× as long as 2nd; abdomen mostly black in ground color, reddish yellow-brown on mid-ventral portion of T2 and T3.

Body length, 9.9-12.2 mm; wing length, 8.1-9.9 mm.

Distribution. Thailand.

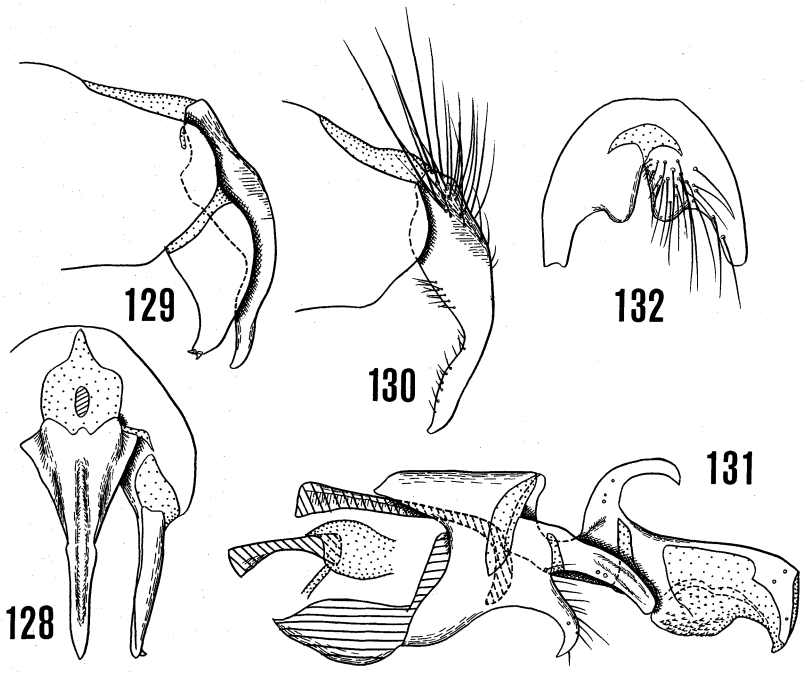
Holotype ♂, THAILAND, C. Chiangmai, Doi Pui (1685 m), 16.ix.1975 (TUMRASVIN) (NSM).

Paratypes, THAILAND: 1♀, Petchaboon, 30.v.1965 (DEKU); 1♀, Doi Suthep (1278 m), 29.iii-4.v.1958 (MAA) (BPBM).

Remarks. This species seems to be most closely related to *L. ambigua* from Japan, because the male genitalia of these two species much resemble each other. But in *kanoi* the male cerci are more slender and the surstylus is more strongly narrowed and curved ventrally at apical 1/3. In superficial appearance *kanoi* may be easily recognized by the reddish yellow basal half of the hind femur.

***Linnaemya ruficaudata* sp. nov.** (Figs. 35, 128-132).

♂. Closely resembling *siamensis*, but differing as follows: Parafrontal densely grayish pollinose; apex of 2nd antennal segment and base of 3rd broadly orange yellow; palpus reddish yellow; gena about 0.33-0.36 of eye-height; parafrontal with whitish hairs on upper portion; parafacial about 1/2 width of 3rd antennal segment at middle height; gena with only whitish hairs; thoracic dorsum with narrower longitudinal vittae, which do not appear as broad fused vittae at low magnifications; scutellum broadly yellowish, anterior portion narrowly darkened; mesopleuron mainly with black hairs; apex of T5 reddish yellow; dorsum of abdomen densely whitish pollinose;



FIGS. 128-132. *Linnaemya ruficaudata*, male genitalia: 128, epandrium, cerci and surstylus in dorsal view; 129, same in lateral view; 130, cerci in lateral view; 131, hypandrium, pre- and postgonites and aedeagus in lateral view; 132, St5 in ventral view.

intermediate abdominal terga without median discal setae; T3 subequal in length to T4 and slightly longer than T5. ♂ genitalia: St5 short, posterior lobe occupying posterior 1/2 of sternum, with long dense hairs; T6 about 1/3 as long as St7+8; cerci in dorsal view very narrow, tapering to pointed apex, mid-dorsal portion longitudinally excavated from basal 1/5 to 4/5, in lateral view weakly curved ventrally, with several hairs on ventral surface of basal 1/2; surstylus long-triangular in shape, with 2 strong spines at apex; pregonite short and narrow, with several hairs on posterior margin; postgonite longer than pregonite; epiphallus curved posteriorlly; ejaculatory apodeme rather small.

♀. Differing from ♂ as follows: Vertex about 0.24 of head width; inner vertical seta about 2/3 of eye-height; outer vertical seta about 1/2 length of inner one; 2 reclinate orbital setae; 2 proclinate orbital setae; 3rd antennal segment about twice as long as 2nd; claws and pulvilli shorter than 5th tarsomere.

Body length, 9.4-9.6 mm; wing length, 6.5-6.7 mm.

Distribution. Thailand, Laos.

Holotype ♂, THAILAND, Nkn. Batcha. Prov., Nakhon Batchasima 60 km S, Sakaerat Exp. Sta. 14°30′N, 101°55′E (300-600 m), 24.iii.1971, malaise trap (SPANGLER) (USNM, Type No.76936).

Paratypes, THAILAND: 1♂, Khao Yai, 10.iv.1963 (DEKU). LAOS: 1♀, Vientiane Prov., Gi Sion Vill., de Tha Ngone, 19-26.vii.1965, light trap (BPBM).

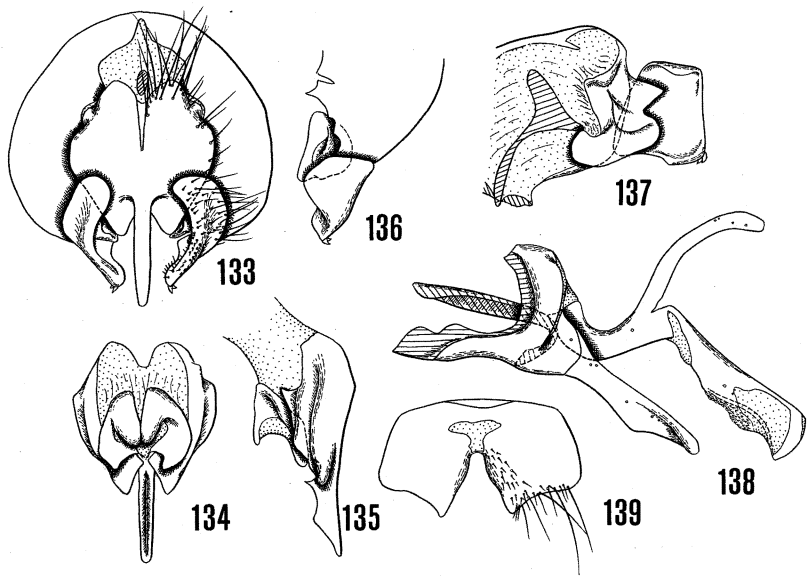
Remarks. This species closely resembles *L. siamensis* in general appearance, but is distinguished from it by the absence of median discal setae on the intermediate abdominal terga and reddish yellow apex of the T5. The male genitalia of *ruficaudata* are distinct among the species allied to this species, such as *tessellans, ambigua, kanoi*, and *siamensis*, because of the very narrow male cerci.

The ***oralis***-group

Linnaemya speciosissima MESNIL (Figs. 21, 133-140, 200)

Linnaemyia (sic) *speciosissima* MESNIL, 1957: 52.

This species was described from a female obtained in Kyoto. I have examined some specimens which correspond well to the original description and redescription of this species made by MESNIL (1957, 1972). As the male of this species and the female genitalia have not been described, the following descriptions are given.



FIGS. 133-139. *Linnaemya speciosissima*, male genitalia: 133, epandrium, cerci and surstylus in dorsal view; 134, cerci in ventral view, showing secondary sclerites below cerci; 135, cerci in lateral view; 136, right surstylus and secondary process inside the surstylus in dorsal view; 137, inside of right surstylus, showing secondary process inside the surstylus; 138, hypandrium, postgonite and aedeagus in lateral view; 139, St5 in ventral view.

♂. Differing from ♀ as follows: Reddish portion of 3rd antennal segment narrower; palpus reddish yellow, sometimes darkened at base; vertex 0.23-0.24 of head width; interfrontal area at least 1.2× as wide as parafrontal at middle; hairs on parafrontal denser than in ♀; parafacial about 2/3 as wide as 3rd antennal segment at middle height; no proclinate orbital seta; 1-2 reclinate orbital setae present, if 2 setae present, then upper one fine and subequal in length to ocellar seta; 5-7 frontal setae, upper one slightly reclinate; 3rd antennal segment falling short of lower margin of face by about length of 2nd antennal segment, about 2× as long as wide and 3.5× as long as 2nd segment; palpus variable in length, subequal to 2nd aristal segment or twice as long as the latter; anteroventral portion of sternopleuron bearing several yellowish white hairs; lateral scutellar seta always absent; fore claw and pulvillus slightly longer than 5th tarsomere; abdomen shining black, without pollinosity on dorsum, evenly and thinly whitish pollinose on venter; anterolateral portion of T3 narrowly and faintly reddish brown. ♂ genitalia: St7+8 and epandrium shining black; St5 short and wide, inner portion of posterior lobe weakly prominent posteriorly; T6 free from St7+8, about 1/5 as long as the latter; cerci in dorsal view with broad basal and slender apical portions, the basal portion produced posteriorly on each side, apical slender portion in lateral view with a ventral keel which is prominent on basal 1/3; a pair of strong sclerites present below cerci, the sclerites closely associated with each other and with cerci at apex; surstylus triangular, as wide as long; a short secondary process developed on inner portion of surstytlus; pregonite not developed as lobe; postgonite very long; epiphallus slender, longer than basiphallus; ejaculatory apodeme small.

♀ genitalia: T6 short, narrowly divided into 2 hemitergites at middle; 6th spiracle on lower portion of T6; St6 2/5 as long as wide; 7th spiracle in intersegmental membrane between 6th and 7th segments; T7 reduced to 2 small triangular hemitergites, about 2/3 as long as T6; St7 slightly shorter than St6, 1/2 as long as wide, sclerotization weak at ventromedian portion; St8 weakly sclerotized, 3-4× as wide as

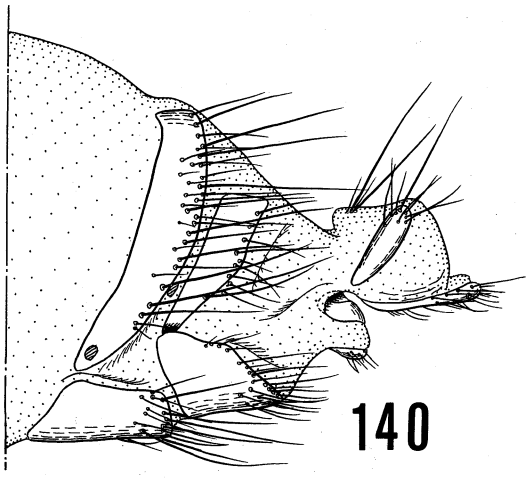


FIG. 140. *Linnaemya speciosissima*, female genitalia in lateral view.

long; cercus slightly longer than T6.

Body length, 5.5-7.5 mm; wing length, 6.6-9.5 mm.

Distribution. Japan (Hokkaido, Honshu, Kyushu).

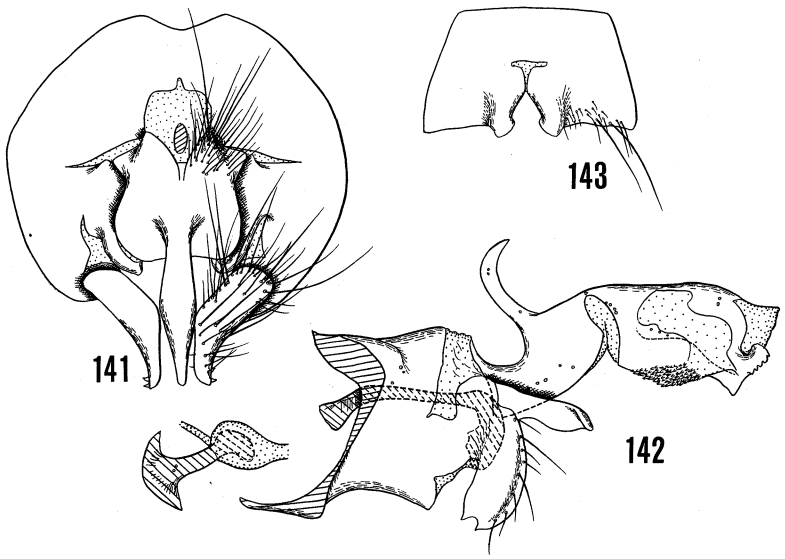
Material examined. JAPAN: *Hokkaido*, 1♂, Sapporo, Maruyama Park, 27.vii.1965 (KANO & SHINONAGA) (TMDU); 1♀, Mt Petegari (400 m), 28.vii.1970 (ISHIKAWA) (NSM): *Honshu*, 1♂, Fukushima Pref., Mt Adatara, 19.vii.1966 (FUKUSHI) (BLKU); 1♀, Yamato, Kawasetoge, 14.viii.1952 (ITO) (EIHU): *Kyushu*, 4♂, Oita Pref., Mts Kuju, Chojabaru, 28.vi.1976 (OHARA & GOTO); 1♀, Miyazaki Pref., Gokanosho, Momiki, 23. vii.1968 (KANMIYA) (all in BLKU).

Remarks. This species is characterized by the absence of the lateral scutellar setae, shining black abdomen which contrasts with entirely whitish postalar callus and scutellum and undeveloped pregonite of the male genitalia. The male cerci of this species resemble in shape those of *L. pallidohirta* and *oralis*. The presence of the secondary lobe on inner basal portion of the surstylus and presence of a pair of sclerites below the male cerci seem to show a close relationship among these three species.

Linnaemya pallidohirta CHAO (Figs. 22, 141-149, 199)

Linnaemyia (sic) *pallidohirta* CHAO, 1962a: 87.
Linnaemyia pallidochirta: Incorrect spellings of *pallidohirta*.

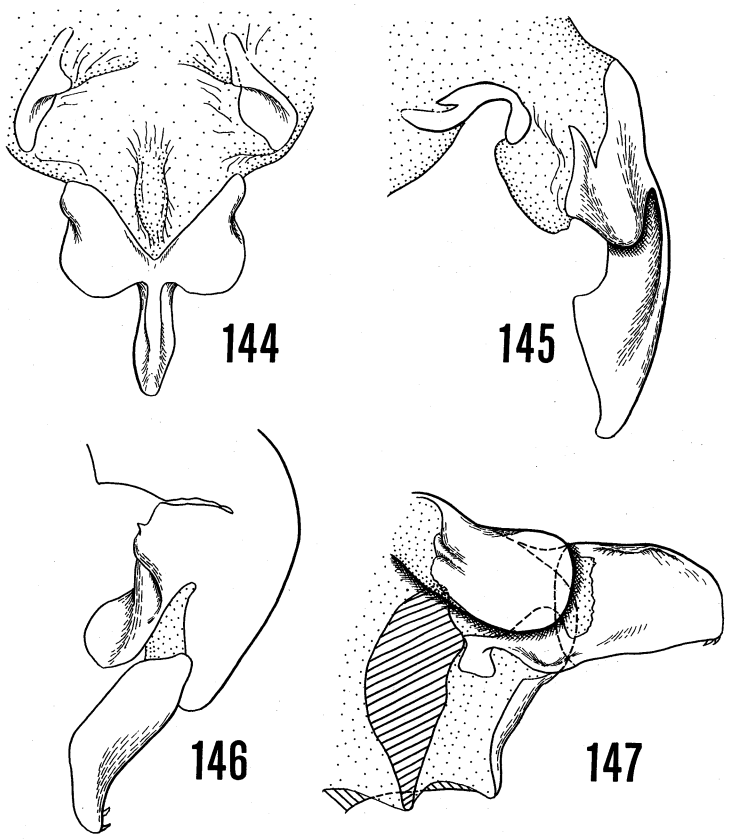
This species was originally described by CHAO (1962a) from a female specimen, of



FIGS. 141-143. *Linnaemya pallidohirta*, male genitalia: 141, epandrium, cerci and surstylus in dorsal view; 142, hypandrium, pre- and postgonites and aedeagus in lateral view; 143, St5 in ventral view.

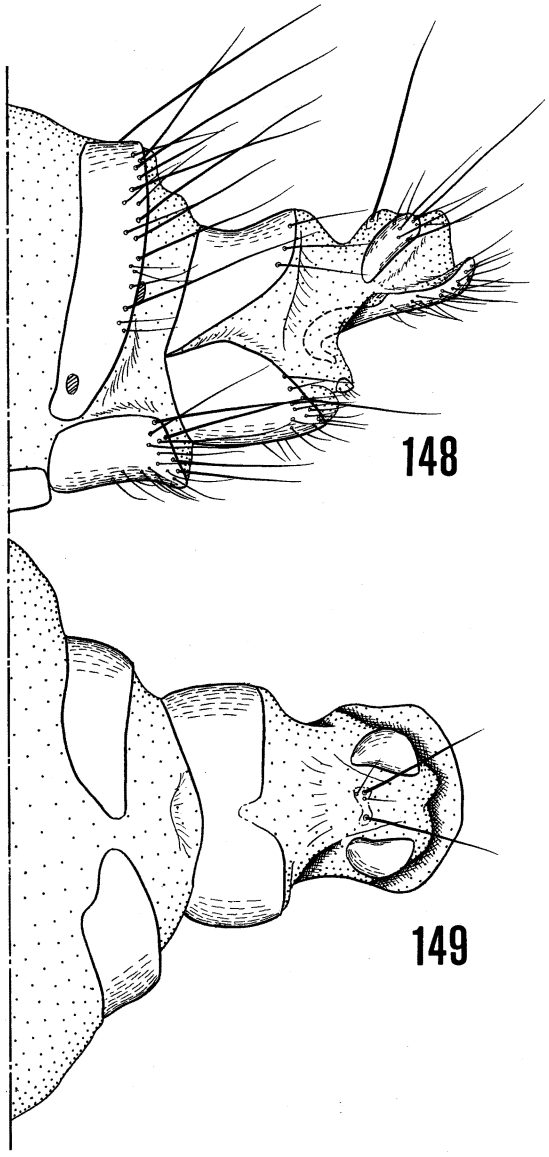
which locality was doubtfully referred to Japan. MESNIL (1971) redescribed this species from a female from Japan. I have examined several Japanese specimens which correspond well to the original description and redescription of this species. As the male of this species was unknown and the female genitalia were not described, a brief description is made below from these specimens.

♂. Vertex 0.18-0.22 of head width; inner vertical seta about 3/4 of eye-height; outer vertical seta indistinct; ocellar seta very fine, shorter than upper postocular setae, 1-2 reclinate orbital setae, if 2 setae present, then posterior seta stronger than anterior one and about 1/2 as long as inner vertical seta; proclinate orbital seta absent; 6-7 frontal setae; parafacial very slightly narrowed below, 0.42-0.56× as wide as 3rd antennal segment at middle height; gena 0.43-0.5 of eye-height; 2nd antennal segment reddish yellow at apex; 3rd antennal segment very slightly reddish on anterior margin,



FIGS. 144-147. *Linnaemya pallidohirta*, male genitalia: 144, cerci in ventral view, showing a pair of sclerites below the cerci; 145, same in lateral view; 146, right surstylus and secondary process inside the surstylus in dorsal view; 147, inside of right surstylus, showing secondary process.

falling short of lower margin of face by about length of 2nd antennal segment, 3.4-3.7× as long as 2nd, 2.1-2.3× as long as wide; palpus about 1.5× as long as 2nd antennal segment, with fine yellowish hairs on basal portion and a few longer black hairs at apex; mediotergite with whitish hairs, mixed with a few black ones; scutellum with black hairs on disk, anterolateral portion with yellow hairs; mid-tibia with a very fine hair-like *v* seta; fore claw and pulvillus longer than 5th tarsomere; T1+2 and T3



FIGS. 148-149. *Linnaemya pallidohirta*, female genitalia: 148, lateral view; 149, dorsal view (hairs omitted).

broadly yellowish dorsally and ventrally, except for black mid-dorsal portion; antero-lateral portion of T4 yellowish; T3 sometimes with 2 fine median discal setae; T4 and T5 each with a pair of median discal setae; lateral discal setae absent on T3 and T4. ♂ genitalia: T6 and St7+8 brown or blackish brown; epandrium dark brown, narrowly reddish on base of surstylus; T6 entire and free, about 1/4 as long as St7+8; St5 weakly prominent on inner posterior portion of posterior lobe; cerci in dorsal view with broad rectangular basal and slender tube-like apical portions, the apical portion evenly narrowed to rounded apex in dorsal view, in lateral view apical portion with a ventral keel on basal 1/3; a pair of small sclerites present in membrane below cerci, the sclerites free from the cerci, surstylus and basiliform sclerite; surstylus in lateral view as long as wide, weakly narrowed to apex which bears 2 strong spines; short secondary lobe developed on inner basal portion of surstylus; hypandrium weakly produced posteriorly on ventral portion; pregonite broad, curved ventrally, with several rather strong hairs on posterior portion, apex roundly concave; postgonite rather short and narrow, shorter than pregonite; epiphallus narrow, curved posteriorly; ejaculatory apodeme small.

♀ genitalia: T6 shorter than T7, longitudinally divided into 2 hemitergites, with long hairs on posterior margin; St6 slightly wider than St7, subequal in length to St7, with several strong and many fine hairs; 6th spiracle on ventral portion of T6; 7th spiracle in membrane just behind T6; T7 almost entire, with a few hairs on posterior margin; St7 with many fine hairs on posterior portion; St8 very short, about 6× as wide as long, with several fine hairs; supra-anal region weakly sclerotized; cercus subequal in length to T7.

Body length, 9.5-9.7 mm; wing length, 8.0-8.3 mm.

Distribution. Japan (Hokkaido, Honshu, Kyushu); China (?).

Material examined. JAPAN: *Hokkaido*, 1♂, Mts Daisetsu, Aizankei, 9.viii.1967 (HONDA) (BLKU); 2♂, Mt Tokachi, 2-4.viii.1970 (SHINONAGA) (TMDU); 1♂, Sounkyo, 6.viii.1960 (UEDA) (EIHU): *Honshu*, 2♂, Akita Pref., Yatate-toge, 20.viii.1973 (FUKUSHI); 1♀, Hirosaki City, Zatoishi, 17.x.1977 (FUKUSHI); 1♂, Saitama Pref., Moroyama, 23.ix.1977 (TAMAKI); 1♂, Gifu Pref., Tokuyama-mura, Shiratani, 10.x.1976 (HASHIMOTO) (all in BLKU); 1♀, Ishikawa Pref., Shiromine, 12.x.1968 (TAKANO) (EIHU): *Kyushu*, 1♀, Yakushima, Kosugidani, 7-10.vi. 1965 (KUMATA) (EIHU).

Remarks. This species appears to be closely related to the Oriental species *L. oralis*, because the male genitalia are similar in both species. They have the same character states of the cerci, hypandrium, pre- and postgonites and basiphallus.

Linnaemya oralis (TOWNSEND) (Figs. 23, 150-155, 201-202)

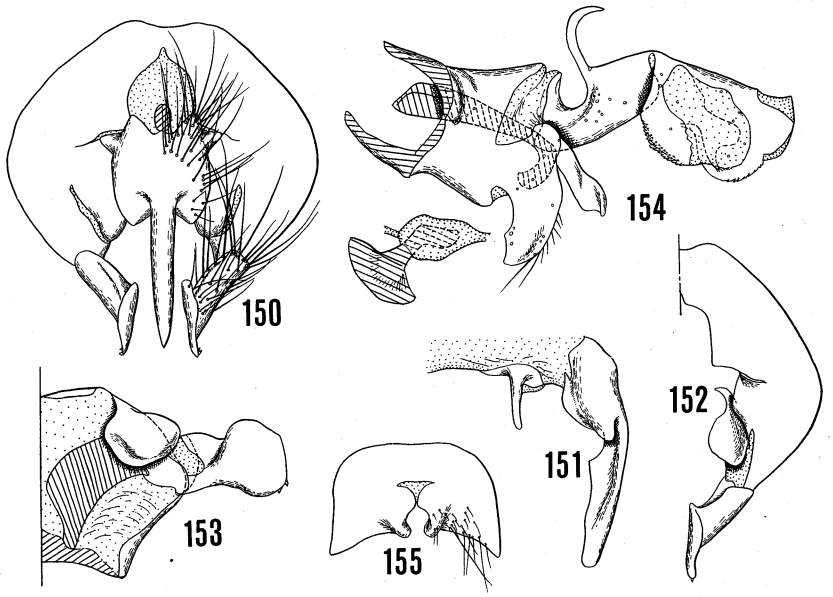
Xanthoerigone oralis TOWNSEND, 1927a: 72.
Linnaemyia (sic) *longipalpis* MESNIL, 1957: 54.

I identified four males with this species, which were collected near the summit of Mt Brinchang, Cameron Highlands, Malaysia, because they have the surstyli peculiar in shape, and very similar to those illustrated by MALLOCH (1935). The other characters of these specimens seem to agree well with his description. I have examined the holotype female of *L. longipalpis* MESNIL and agree entirely with CROSSKEY's treat-

ment of *longipalpis* as a junior synonym of *oralis* (CROSSKEY, 1976). Although CROSSKEY (l.c.) mentioned in his key to the Oriental species of *Linnaemya* that the femora of *oralis* are reddish yellow, it is only applicable to the female of this species. The femora of *oralis* are usually dark in the male. Dr CROSSKEY informed me that he has some specimens in which the femora are partially reddish, and I also have one male whose hind femur is broadly reddish.

A description of the male is given below.

♂. Head yellowish in ground color, parafrontal and upper occiput blackish gray; interfrontal area brown; parafrontal grayish pollinose; parafacial, face and gena densely yellowish white pollinose; occiput whitish pollinose; antenna brown-black, interior apex of 2nd segment narrowly reddish; arista brown; palpus reddish yellow, darkened at base. Vertex 0.20-0.23 of head width; interfrontal area strongly widened anteriorly, slightly wider than parafrontal at middle; parafacial nearly parallel-sided, 0.7-0.8× as wide as 3rd antennal segment at middle height; gena 0.55-0.58 of eye-height; epistoma prominent. Inner vertical seta about 4/5 length of eye-height; outer vertical seta indistinct; ocellar seta indistinct; reclinate orbital seta about 3/4 of inner vertical seta; 8-11 inclinate frontal setae, upper 3-4 reclinate, uppermost seta strongest and appearing as an additional reclinate orbital seta; parafrontal with very fine and dense black hairs; gena densely clothed with fine and long black hairs, bristle-like hairs absent; vibrissa inserted above level of lower margin of face by about



FIGS. 150-155. *Linnaemya oralis*, male genitalia: 150, epandrium, cerci and surstylus in dorsal view; 151, cerci in lateral view; 152, right surstylus and secondary process inside the surstylus in dorsal view; 153, inside of right surstylus, showing secondary process inside the surstylus; 154, hypandrium, pre- and postgonites and aedeagus in lateral view; 155, St5 in ventral view.

1/2 length of 2nd antennal segment; occiput with dense and long yellowish pile, without black setulae. 2nd antennal segment without wart on inner surface; 3rd segment obliquely rounded at apex, falling short of lower margin of face by about length of 2nd antennal segment, about 3.5× as long as 2nd segment, 2.7× as long as wide. Arista distinctly longer than 2nd and 3rd antennal segments combined; 2nd segment about 1/2 length of 2nd antennal segment. Proboscis about 1/2 of head height; labella large; palpus about 1.5× as long as 2nd antennal segment.

Thorax black in ground color, yellowish on lateral and posterior portion of scutum, on postalar callus and scutellum; dorsum and pleura densely yellowish white pollinose; scutellum thinly whitish pollinose. Dorsum with dense, fine and black hairs, mixed with fine whitish ones; scutellum with only black hairs; pleura entirely with yellowish white hairs, mediotergite with short black hairs; 0+3 *ia*; 1+1 *stpl*; pteropleural seta about 1/2 as long as hind *stpl* seta; basal scutellar seta subequal in length to subapical one, and about 2× as long as scutellum; apical scutellar seta 1.5× as long as scutellum, and slightly longer than lateral one, the latter single; preapical scutellar seta slightly longer than scutellum; distance between bases of two subapical scutellar setae about 2× that between basal and subapical ones of same side.

Wing hyaline, slightly tinged with brown along veins, especially along apical and discal crossveins; basicosta white; calypter creamy white. 2nd costal sector 0.4× as long as 3rd and subequal in length to 4th; basal node of vein R_{4+5} with 3-5 fine hairs at base dorsally and ventrally; vein M_1 from discal crossvein to its bend 1.2-1.5× as long as distance between the bend and wing margin; M_1 appendage short, about 1/3 as long as r-m crossvein.

Legs with coxae and trochanters black; femora blackish brown, mid- and hind femora sometimes reddish brown, posteroventral portion reddish; tibiae yellow; tarsi black; pulvilli dull yellowish. Coxae, trochanters and posterior portion of femora with yellowish white hairs; mid-tibia with 2 *ad* and 2 *pd* setae, without *v* seta, if *v* seta present, then very weak and hair-like; hind tibia with 2 preapical *d* setae, without *pv* apical seta or with very fine hair-like *pv* seta. Fore claw and pulvillus distinctly longer than 5th tarsomere.

Abdomen broadly yellowish on dorsum of T1+2, T3 and anterior portion of T4, brown-black on mid-dorsal vitta of T1+2 to T4, on posterior portion of T4 and entire T5; venter broadly yellowish on T2 to T4, T5 brown-black; dorsum evenly and thinly whitish pollinose, venter of T2 and T3 not pollinose, venter of T4 and T5 thinly whitish pollinose. Dorsum with fine dense black hairs, mid-dorsal portion of T3 with stronger and erect hairs; St1, St2 and anterior 2/3 of St3 and venter of T2 and T3 broadly clothed with yellowish white hairs; St4, St5 and posterior 1/3 of St3 and venter of posterior margin of T3 and entire T4 and T5 with normal black hairs; T3 with 2 strong median marginal and 1 lateral marginal setae; T4 with 2 strong median discal setae, 2 median marginal setae and 1-2 lateral marginal setae; T5 with 2 median discal setae, 2 lateral discal and a row of marginal setae. T4 subequal in length to T5, 1.2× as long as T3; T5 broadly truncated; T4 and T5 fused on dorsum, suture between them thus obliterated on mid-dorsal portion.

♂ genitalia. T6 reddish yellow; ST7+8 reddish brown to brown; epandrium yellow to reddish brown; cerci and surstylus bright reddish brown. St5 concave on posterior

margin, with weakly prominent and rounded process on inner posterior portion of posterior lobe; T6 short and free, at most 1/7 as long as St7+8; cerci in dorsal view with basal rectangular and apical slender tube-like portions, posterior margin of the basal portion weakly prominent on each side, the slender portion weakly narrowed posteriorly, 1.6× as long as basal portion; a pair of free sclerites present on area below cerci; surstylus in lateral view widened and rounded on apical 2/3, 3 strong spines on apex; epandrium with rather small secondary lobe on inner basal portion of surstylus; hypandrium short, posterior portion weakly poroduced posteriorly; pregonite normal, with several fine hairs on posterior margin; postgonite narrow, shorter than pregonite; epiphallus narrow and long; distiphallus large; ejaculatory apodeme small.

Body length, 8.2-9.1 mm; wing length, 7.2-8.1 mm.

Distribution. Indonesia (Sumatra), Burma, Malaysia (Malaya, Sabah).

Material examined. BURMA: Holotype ♀ of *L. longipalpis* MESNIL, N.E. Burma, Kambaiti, 2000m, 17.v.1934 (MALAISE) (ZMU). MALAYSIA: *Malaya*, 4♂, Cameron Highlands, Mt Brinchang (2300 m), 25.x.1975 (SHIMA) (BLKU).

Linnaemya pellex MESNIL

Linnaemyia (sic) *pellex* MESNIL, 1957: 53.

The male of this species is unknown. Judging from characters, such as the bend of wing vein M_1 being closer to wing margin than to discal crossvein, M_1 appendage represented by a dark fold, vein R_{4+5} with setulae confined to its basal node, thorax entirely with pale yellowish hairs and mid-tibia without *v* seta, this species seems to be related to the preceding two species.

Distribution. Burma.

Material examined. BURMA: Holotype ♀, N.E. Burma, Kambaiti, 2000 m, 6.iv. 1934 (MALAISE) (ZMU).

Linnaemya melancholica MESNIL (Figs. 156-161)

Linnaemyia (sic) *melancholica* MESNIL, 1957: 54.

In the shape of the male cerci and surstylus this species resembles *L. lithosiophaga* from Europe. But this species is entirely different from *lithosiophaga* in having a pair of secondary sclerites below the male cerci. This structure seems to show close relationship of this species to *pallidohirta* and *oralis*.

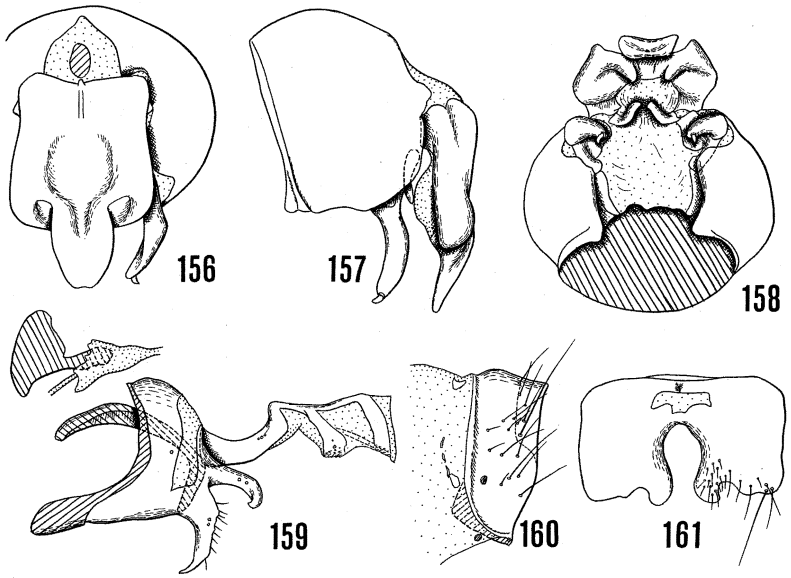
Distribution. Burma.

Material examined. BURMA: Holotype ♂, N.E. Burma, Kambaiti, 7000 ft, 28.v. 1934 (MALAISE) (ZMU).

Linnaemya bella MESNIL (Figs. 162-163)

Linnaemyia (sic) *zimini* MESNIL, 1963: 35. (Junior homonym of *L. zimini* CHAO, 1962a).
Linnaemyia (sic) *bella* MESNIL, 1971: 122.

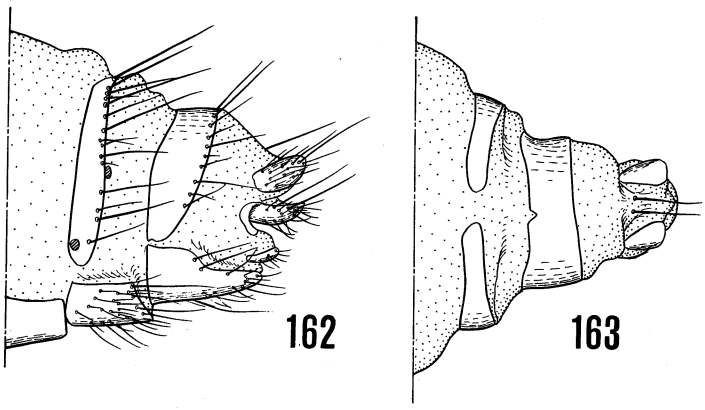
This species was described from a male obtained at Sapporo, Hokkaido. I have several females from Hokkaido, which correspond well to the original description and



FIGS. 156-161. *Linnaemya melancholica* (holotype), male genitalia: 156, epandrium, cerci and surstylus in dorsal view; 157, same in lateral view; 158, same in ventral view, showing a pair of secondary sclerites below cerci; 159, hypandrium, pre- and postgonites and aedeagus in lateral view; 160, T6 and St7+8 in lateral view; 161, St5 in ventral view.

redescription of this species (MESNIL, 1963, 1971). I have identified these specimens as *bella* and briefly describe them below.

♀. Differing from ♂ as follows: Vertex 0.25-0.28 of head width; interfrontal area slightly widened anteriorly, subequal in width to parafrontal at middle; parafacial 0.56-0.65× as wide as 3rd antennal segment at middle height; gena about 2/5 of eye-height, with rather strong black hairs, at most mixed with a few whitish hairs; brownish portion on occipital stripe sometimes indistinct; outer vertical seta absent; inner vertical seta subequal in length to eye-height; sometimes 1 fine prevertical seta present, 1/4-1/3 length of inner vertical seta; 1 reclinate orbital seta, 2/3 length of inner vertical seta; 2-3 proclinate orbital setae, anterior seta stronger than posterior seta and subequal in length to reclinate orbital seta; ocellar seta fine, 1/4 as long as reclinate orbital seta; 4-6 inclinate frontal setae; antenna falling short of lower margin of face by about length of 2nd antennal segment, apices of 2nd and 3rd segments brown to reddish brown, 3rd segment 2.5-2.8× as long as 2nd, 2.5-3× as long as wide; palpus dark brown, slightly shorter than 2nd antennal segment; wing cell R_{4+5} closed or slightly open before wing tip; 2nd costal sector of wing about 2/5 as long as 3rd; fore tarsus widened; claw and pulvillus of fore leg 1/3 as long as 5th tarsomere; T3 without median discal seta, lateral discal seta sometimes absent. ♀ genitalia: T6 short, about 3/5 as long as T7, divided longitudinally into 2 hemitergites; 6th spiracle on ventral portion of T6, 7th spiracle in intersegmental membrane just behind T6; St6 nearly rectangular, about 1/3 as long as wide; T7 entire, not divided into hemitergites, with



FIGS. 162-163. *Linnaemya bella*, female genitalia: 162, lateral view; 163, dorsal view (hairs omitted).

a row of hairs on posterior margin; St7 rounded on posterior margin, about 2/3 as long as wide; St8 rather broad, about 1/2 as long as St7, with fine hairs on posterior 1/2; cercus subequal in length to T7.

Body length (♀), 6.5-7.6 mm; wing length, 5.4-6.3 mm.

Distribution. Japan (Hokkaido).

Material examined. JAPAN, *Hokkaido*, 5♀, Ashoro, Berabonai, 22,24.vii.1967 (SAIGUSA, SHIMA & HONDA); 2♀, Ashoro, Kiyokawa, 23.vii.1967 (SAIGUSA) (all in BLKU).

Remarks. Among the Japanese species of *Linnaemya*, this species is peculiar in having reddish yellow legs. Although I have not examined the male of this species, the structure of the male cerci described by MESNIL (1971) seems to show close relationships to *pallidohirta* and *oralis*. *L. amicorum* from Ussuri seems to very closely resemble *bella*, judging from the original description and illustrations (DRABER-MONKO & KOLOMYETZ, 1982).

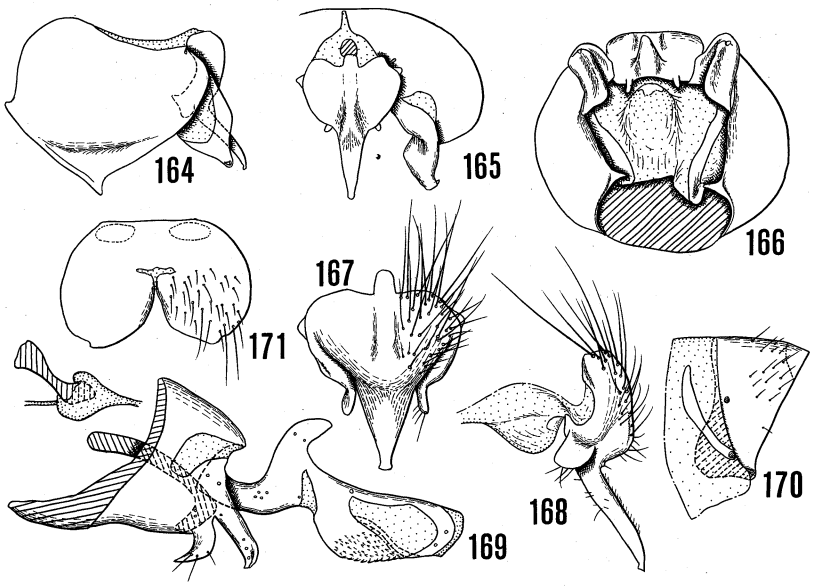
Linnaemya scutellaris (MALLOCH) (Figs. 164-173)

Palpina scutellaris MALLOCH, 1927: 423.
Linnaemyia (sic) *rohdendorfi* CHAO, 1962a: 86. **Syn. nov.**

♂. Head yellowish, parafrontal and upper occiput weakly darkened; interfrontal area brown; parafrontal, parafacial, face and gena rather thinly yellowish white pollinose; occiput densely whitish pollinose; antenna brown-black, 2nd segment and inner surface of basal 2/3 of 3rd reddish yellow; palpus reddish yellow. Vertex 0.22-0.24 of head width; interfrontal area weakly widened anteriorly, 1.5-1.6× as wide as parafrontal at middle; parafacial narrowed below, about 1/2 as wide as 3rd antennal segment; gena 0.36-0.4 of eye-height; epistoma weakly prominent. Inner vertical seta about 2/3 of eye-height; outer vertical seta absent; 1 reclinate orbital seta, about 1/2

length of inner vertical seta; ocellar setae divergent and weakly proclinate, slightly shorter than reclinate orbital seta; 5-6 frontal setae; parafrontal with sparse fine black hairs; vibrissa inserted only slightly above lower margin of face; gena with 2-3 strong hairs on anterior portion and many fine black hairs, pale yellowish hairs present on lower and posterior portions; occiput with several black setulae on upper 1/4. 2nd antennal segment without wart on inner surface, 2/5-1/3 as long as 3rd segment; 3rd segment falling short of lower margin of face by about length of 2nd antennal segment, about 2× as long as wide. Arista slightly longer than 2nd and 3rd antennal segments combined; 2nd segment about 3× as long as wide. Proboscis about 2/3 of eye-height; palpus very short, about 2× as long as wide.

Thorax black in ground color, pale yellowish white on humeral callus, notopleural and intra-alar regions, postalar callus and scutellum; base of scutellum sometimes darkened; dorsum and pleura thinly grayish white, somewhat bluish, pollinose; dorsum with 4 narrow longitudinal vittae. Hairs dense, recumbent and black on dorsum, longer and sparser on pleura; sternopleuron and lower portion of pteropleuron with pale yellowish white hairs; mediotergite with pale hairs mixed with a few black hairs; 0+3 *ia*; 2+1 *stpl*; pteropleural seta not extending beyond middle of lower calypter; subapical scutellar seta slightly longer than basal seta, and about 2× as long as scutellum; lateral scutellar seta single, subequal in length to apical seta and about 1/2 as long as basal seta; distance between bases of 2 subapical scutellar setae about 1.3×



FIGS. 164-171. *Linnaemya scutellaris*, male genitalia: 164, epandrium, cerci and surstylus in lateral view; 165, same in dorsal view; 166, same in ventral view, showing weak sclerite below cerci; 167, cerci in posterodorsal view, showing secondary process on each side; 168, same in lateral view; 169, hypandrium, pre- and postgonites and aedeagus in lateral view; 170, T6 and St7+8 in lateral view; 171, St5 in ventral view.

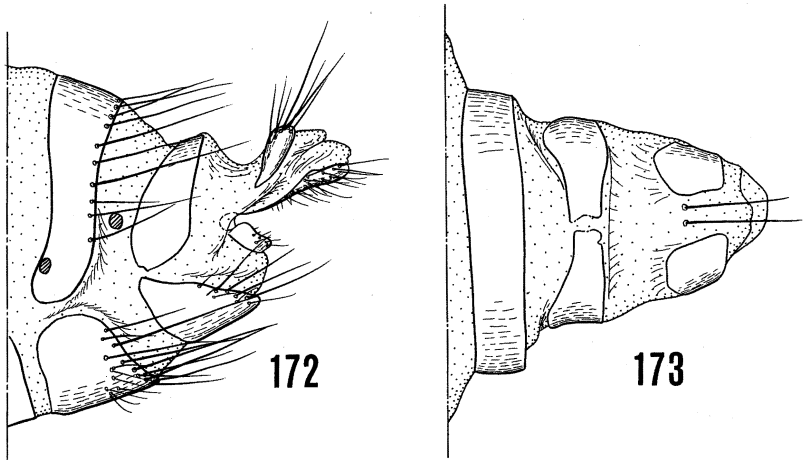
that between basal and subapical setae of same side.

Wing hyaline, usually tinged with brown along veins from level of r-m crossvein to apex; basicosta pale yellow to pale brownish yellow; calypter pale brownish yellow. 2nd costal sector about 1/2 as long as 3rd, and subequal to 4th; vein R_{4+5} setulose 2/3 -3/4 way from base to r-m crossvein dorsally, only on basal node ventrally; vein M_1 from discal crossvein to its bend subequal in length to distance between the bend and wing margin or slightly longer, and slightly longer than M_1 appendage.

Legs reddish yellow; tarsi brown-black; pulvilli pale brownish yellow. Fore coxa without minute hairs on inner anterior surface; coxae and trochanters with yellowish white hairs mixed with black hairs; mid-tibia with 2 *ad* and 1 *v* setae; hind tibia with 3 preapical *d* setae, posterodorsal one about 3/4 as long as mid-dorsal one, and with a strong *pv* apical seta; fore claw and pulvillus longer than 5th tarsomere.

Abdomen shining brown-black, broadly reddish yellow on side of T1+2 to anterior portion of T4 and posterior 1/3-1/2 of T5; dorsum very thinly pollinose. Hairs dense, recumbent and black on dorsum, sparser and longer on venter, St1 and venter of T1+2 with yellowish white hairs; T3 without median discal and median marginal setae, with 1-2 lateral marginal setae; T4 with 2 median marginal and 1-2 lateral marginal setae, without median discal seta; T5 with regular rows of discal and marginal setae.

♂ genitalia: St5 with posterior lobe occupying posterior 1/2 of sternum; T6 short, free from St7+8, broadly divided on mid-dorsal portion into 2 hemitergites; 6th spiracle on ventral portion of T6; cerci in dorsal view strongly narrowed from base to apical 1/2 and then evenly tapering to apex, in lateral view strongly angulated dorsally at apical 1/2, a short ventrally directed secondarly process present on each side of apical 1/2 of ventral portion of cerci; semitubular plate present on membranous area below cerci, which is weakly sclerotized on upper portion; surstylus in lateral view



FIGS. 172-173. *Linnaemya scutellaris*, female genitalia: 172, lateral view; 173, dorsal view (hairs omitted).

nearly triangular, with a spine at apex; pregonite curved ventrally at apex, with a few hairs on posterior portion; postgonite nearly straight, longer than pregonite; epiphallus broad, curved posteriorly at apex; ejaculatory apodeme small.

♀. Differing from ♂ as follows: Interfrontal area pale brown to pale yellowish brown, about 1.2× as wide as parafrontal at middle; upper parafrontal thinly with golden yellow pollinose; vertex 0.23-0.25 of head width; 2 strong proclinate orbital setae, anterior seta stronger than posterior seta and subequal in length to reclinate orbital seta; 2nd antennal segment about 1/2 as long as 3rd; wing more faintly tinged with brown than in ♂; fore claw and pulvillus shorter than 5th tarsomere. ♀ genitalia: T6 entire, subequal in length to T7, with a row of strong hairs on posterior margin; St6 1.5× as long as St7, about 3× as wide as long; 6th spiracle on antero-ventral portion of T6; T7 narrowly divided on mid-dorsal portion into 2 hemitergites, without hair; St7 about 3× as wide as long; 7th spiracle in intersegmental membrane between T6 and T7; St8 very short, weakly sclerotized, about 1/7 length of St7.

Body length, 5.2-7.5 mm; wing length, 4.2-6.3 mm.

Distribution. China, Laos, Malaysia, Philippines.

Material examined. CHINA: 1♂, Peking, Yen-ching, 26.vi.1959 (CHAO) (PIZ); 1♀, Kwansi, 9.v.1959 (PIZ). MALAYSIA: *Malaya*, Holotype ♀ of *Palpina scutellaris* MALLOCH, Selangor, Bukit Kutu, 3500 ft, 20.iv.1926 (PENDLEBURY) (BMNH). LAOS: 1 ♀, Vientiane Prov., Ban Van Eue, 29.iv.1966, light trap (BPBM); 1♂, Ban Van Eue, 15.xii.1966 (BPBM). PHILIPPINES: *Mindanao*, 1♂, Mt Apo, Agko (1350 m)-Sungho (1600 m), 2.viii.1978 (NAKANISHI & YATA) (BLKU).

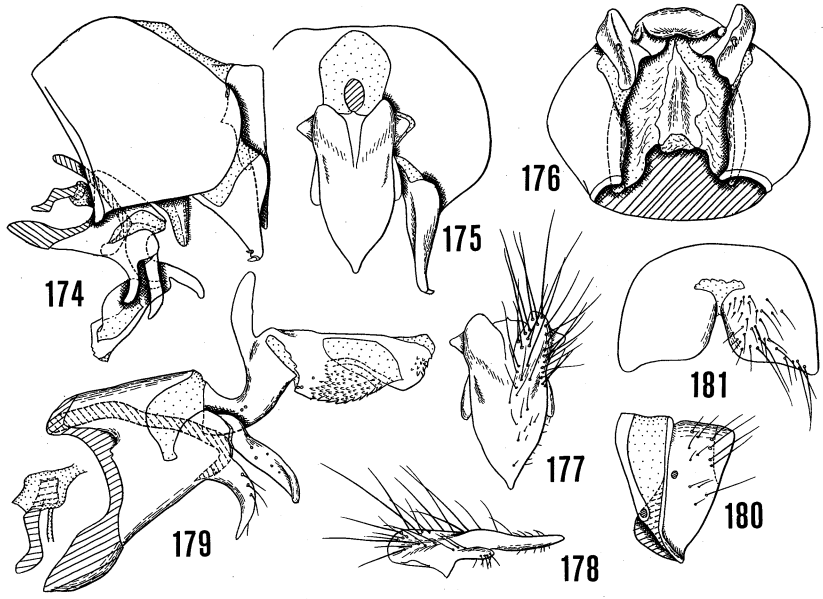
Remarks. In general appearance this species resembles *lateralis*, but is distinguished from it by the wider vertex and interfrontal area, only weakly prominent epistoma, thinner pollinose abdominal dorsum and absence of median marginal setae on T3. *L. scutellaris* seems to be allied to *lateralis* and *atrisetosa* to judge from the presence of a short secondary process on each side of the male cerci and a weakly sclerotized semitubular plate below the cerci.

Linnaemya lateralis (TOWNSEND) (Figs. 174-183)

Eugymnochaetopsis lateralis TOWNSEND, 1927b: 287.
Hemilinnaemyia decorata VILLENEUVE, 1932: 262.
Palpina nigrohirta MALLOCH, 1935: 579. **Syn. nov.**

The holotype male of *L. nigrohirta* described from Malaysia is identical with the holotype female of *lateralis* from Taiwan except for sexual dimorphic characters. In addition to the types of *lateralis* and *nigrohirta*, I examined a female from Borneo, which agrees quite well with *lateralis*.

♂ (Holotype of *nigrohirta*). Head pale yellowish in ground color, parafrontal and upper occiput blackish; interfrontal area brown; parafrontal grayish white pollinose; parafacial, face, gena and occiput densely pale yellowish white pollinose; antenna brownish, narrow apical portion of 2nd segment and posterior 1/2 of inner surface of 3rd broadly reddish yellow; arista brown-black; palpus yellow. Vertex 0.18-0.19 of head width; interfrontal area widened anteriorly, slightly wider than parafrontal at middle; parafacial nearly parallel-sided, about 1/2 as wide as 3rd antennal segment;



FIGS. 174-181. *Linnaemya lateralis* (holotype of *nigrohirta*), male genitalia: 174, lateral view; 175, epandrium, cerci and surstylus in dorsal view; 176, same in ventral view, showing secondary longitudinal sclerite below cerci; 177, cerci in dorsal view; 178, same in lateral view; 179, hypandrium, pre- and postgonites and aedeagus in lateral view; 180, T6 and St7+8 in lateral view; 181, St5 in ventral view.

epistoma strongly prominent; gena about 2/5 of eye-height. Inner vertical seta strong; outer vertical seta absent; ocellar seta very fine, shorter than setulae of upper post-ocular row; 1 strong reclinate orbital seta; 8-9 frontal setae; parafrontal with rather dense fine black hairs; gena with fine black hairs, mixed with 3-5 strong bristle-like hairs on anterior portion and several fine pale yellowish hairs on lower portion; vibrissa inserted above lower margin of face by about 1/2 length of 2nd antennal segment; occiput without black setulae. 2nd antennal segment without wart-like excrescence on inner surface, about 0.28× as long as 3rd segment; 3rd segment about 2× as long as wide, falling short of lower margin of face by about length of 2nd antennal segment. Arista about 1.2× as long as 2nd and 3rd antennal segments combined; 2nd segment about 5× as long as wide. Palpus about 1/2 as long as 2nd antennal segment.

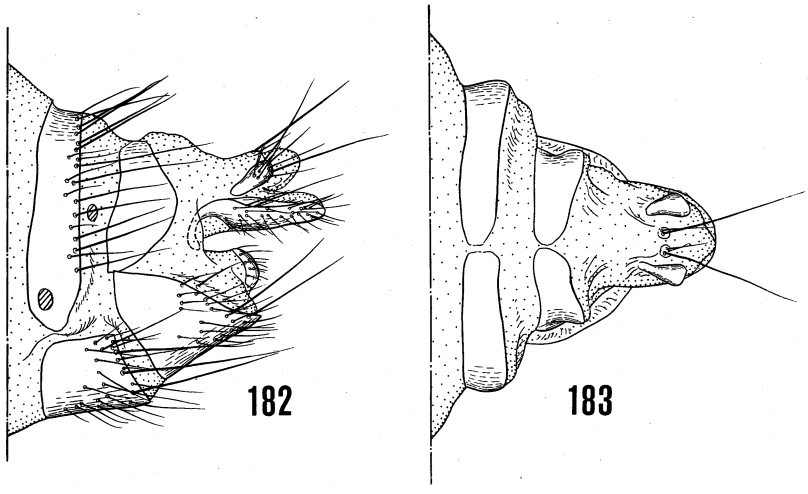
Thorax black in ground color, humeral callus, postalar callus and scutellum pale brownish yellow; dorsum and pleura rather thinly grayish white pollinose; dorsum with 4 longitudinal vittae. Hairs fine, dense and black on dorsum and pleura, except on sternopleuron that bears whitish hairs on lower 2/3; 2+1 *stpl*; pteropleural seta not extending beyond middle of lower calypter; subapical scutellar seta subequal in length to basal seta and about 2× as long as scutellum; apical scutellar seta subequal in length to lateral seta and slightly lenger than scutellum; distance between bases of 2 subapical scutellar setae about 1.5× that between basal and subapical setae of same side.

Wing hyaline, slightly tinged with brown along veins; basicosta pale yellowish white; calypter pale yellowish white. Vein R_{4+5} setulose 1/2 way from its base to r-m crossvein. 2nd costal sector about 1/2 as long as 3rd and sebequal in length to 4th; vein M_1 from discal crossvein to its bend about 4/5 as long as distance between the bend and wing margin, and slightly longer than M_1 appendage.

Legs reddish yellow, tarsi brown-black. Fore coxa bare on inner anterior surface; coxae and trochanters with yellowish white hairs mixed with several black hairs. Right fore leg, apex of left fore tarsus, mid- and hind legs missing. Fore tarsus not widened.

Abdomen yellowish on dorsum of T1+2 to anterior 1/3 of T4, except for broad median longitudinal vitta; posterior 2/3 of T4 and entire T5 shining black; venter broadly reddish yellow on T1+2 to anterior 1/3 of T4; dorsum thinly grayish white pollinose, the pollinosity conspicuous on median longitudinal vitta of T3, on anterior portion of T4 and on entire T5. T3 with 2 rather weak median marginal setae and 1 lateral marginal seta, median discal seta absent; T4 with 1 rather weak median discal, 2 strong median marginal and 2-3 lateral marginal setae; T5 with regular rows of discal and marginal setae; hairs on dorsum fine, dense and recumbent; St1 and venter of T1+2 with pale yellowish hairs. T3, T4 and T5 subequal in length to each opther; T5 1.6-1.7× as wide as long at base and as wide as long at apex.

♂ genitalia: Posterior lobe of St5 not produced posteriorly on inner portion; T6 short, about 1/4 as long as St7+8; cerci in dorsal view narrowed from basal 3/5 to apex, with secondary short processes on each side, in lateral view nearly straight; surstylus in lateral view nearly triangular, with 1-2 spines at apex; mid-ventral portion of epandrium below cerci longitudinally sclerotized, the sclerite with dense pubescence; pregonite short, posterior portion with several hairs; epiphallus present.



FIGS. 182-183. *Linnaemya lateralis*, female genitalia: 182, lateral view; 183, dorsal view (hairs omitted).

♀. Differing from ♂ as follows: 2nd antennal segment more broadly reddish; vertex about 0.21 of head width; inner vertical seta about 3/4 of eye-height; 2 strong proclinate orbital setae, anterior seta stronger than posterior one and subequal in length to reclinate orbital seta; 5 frontal setae; parafrontal with rather sparse hairs; 2nd antennal segment about 2/5 as long as 3rd; 2nd aristal segment about 3× as long as wide; wing vein M_1 appendage subequal in length to vein M_1 from discal crossvein to its bend; mid-tibia with 1 strong *v* seta; hind tibia with 3 preapical *d* setae, of which posterodorsal one is very fine and about 1/2 as long as mid-dorsal one, and with a strong *pv* apical seta; 5th tarsomere of fore leg slightly longer than 4th; fore claw and pulvillus very short, at most 1/2 as long as 5th tarsomere; abdomen reddish yellow on T1+2 to anterior 1/4 of T4, except for median vitta that is broad and triangularly expanded posteriorly; T4 with 2 rather weak median discal setae; T5 reddish brown on apical 1/5-1/2, strongly narrowed posteriorly and narrowly truncated at apex. ♀ genitalia: T6 narrowly divided into 2 hemitergites on mid-dorsal portion, slightly shorter than T7, with a row of strong hairs on posterior margin; St6 subequal in length to St7, with dense hairs; 6th spiracle on ventral portion of T6; 7th spiracle on intersegmental membrane between T6 and T7; T7 narrowly divided into 2 hemitergites on mid-dorsal portion, without hair; St7 with rather dense hairs on posterior 2/3; St8 about 1/4 as long as St7; supra-anal region narrowly and weakly sclerotized; cercus subequal in length to T7.

Body length, 7.2-8 mm; wing length, 6.3-6.4 mm.

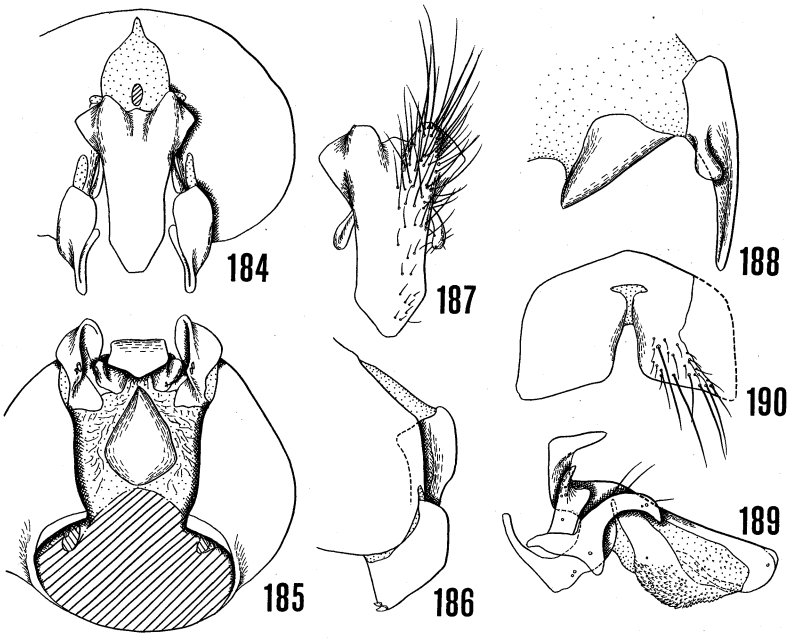
Distribution. Taiwan, Malaysia (Malaya, Sabah), Indonesia (Jave, Sumatra).

Material examined. TAIWAN: Holotype ♀ of *Eugymnochaetopsis lateralis* TOWNSEND, Toa Tsui Kutsu, v.1914 (SAUTER) (IPSF). MALAYSIA: *Malaya*, Holotype ♂ of *Palpina nigrohirta* MALLOCH, Cameron Highlands, Pahang, Rhododendron Hill, 5200 ft, 13.vi.1923 (PENDLEBURY) (BMNH): *Sabah*, 1♀, Mt Kinabalu, Tenompok-Kundasan, 4.xii.1958 (MAA) (BPBM).

Remarks. This species seems to be closely allied to the following species because of the close resemblance of the male genitalia.

***Linnaemya atrisetosa* sp. nov.** (Figs. 184-192)

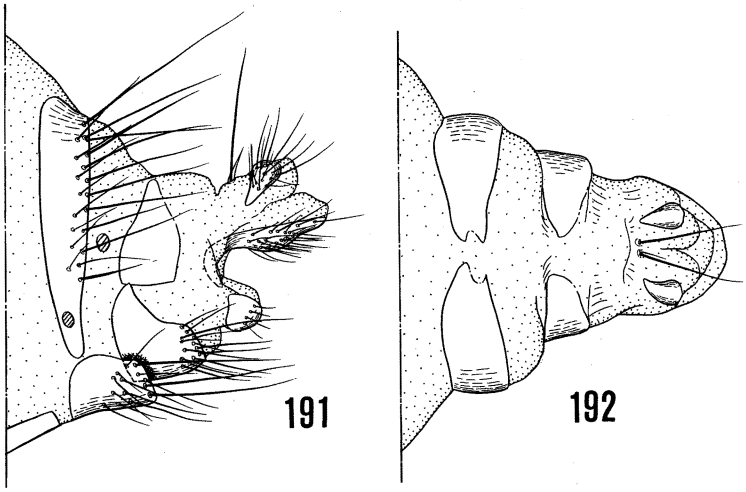
♂. Head yellow in ground color, parafrontal and postorbit black; interfrontal area brown-black; parafrontal grayish pollinose; parafacial, face, gena and occiput densely whitish pollinose; antenna black, apex of 2nd segment and base of 3rd reddish yellow; arista black; palpus reddish yellow. Vertex about 0.19 of head width; interfrontal area widened anteriorly, subequal in width to parafrontal at middle; parafacial nearly parallel-sided, about 2/3 as wide as 3rd antennal segment; epistoma strongly prominent; gena about 0.4 of eye-height. Inner vertical seta about 0.6 of eye-height; outer vertical seta absent; ocellar seta absent; 1 reclinate orbital seta, about 2/3 as long as inner vertical seta; 7 frontal setae, upper 3 reclinate; parafrontal with fine black hairs, mixed with several fine whitish hairs; vibrissa inserted above level of lower margin of face by about length of 2nd antennal segment; gena with dense fine black hairs, and with 4-5 strong bristle-like hairs on anterior portion and with several very fine whitish hairs on lower portion; occiput without black hairs. 2nd antennal segment about 2/5



FIGS. 184-190. *Linnaemya atrisetosa* (holotype), male genitalia: 184, epandrium, cerci and surstylus in dorsal view; 185, same in ventral view, showing semitubular secondary sclerite below cerci; 186, same in lateral view; 187, cerci in dorsal view; 188, same in lateral view, showing secondary sclerite; 189, pre- and postgonites and aedeagus in lateral view; 190, St5 in ventral view.

as long as 3rd, without wart on inner surface; 3rd segment falling short of lower margin of face by about 1/2 length of 2nd antennal segment, about 2.5× as long as wide, apex obliquely rounded. Arista longer than 2nd and 3rd antennal segments together; 2nd segment about 4× as long as wide. Proboscis about 1/2 as long as head height; labella large; palpus about 4/5 as long as 2nd antennal segment, about 2× as long as 2nd aristal segment.

Thorax black in ground color, yellowish on humeral callus, on intra-alar region, on postalar callus, on posterior 1/5 of scutum and on entire scutellum; dorsum thinly whitish pollinose, 4 narrow longitudinal vittae present; pleura rather densely whitish pollinose. Hairs on dorsum black, several fine whitish hairs on anterior portion of scutellum; pleural region mainly with black hairs, whitish hairs present on narrow lower portion of mesopleuron, almost entire sternopleuron and posterior portion of pteropleuron; mediotergite pale-haired; 0+3 *ia*; 2+1 *stpl*; pteropleural seta about 1/2 as long as hind *stpl* seta; basal scutellar seta subequal in length to subapical seta and 1.7-1.8× as long as scutellum; lateral scutellar seta single, subequal in length to apical seta, and slightly longer than scutellum; distance between bases of 2 subapical scutellar setae about twice that between basal and subapical setae of same side.



FIGS. 191-192. *Linnaemya atrisetosa*, female genitalia: 191, lateral view; 192, dorsal view (hairs omitted).

Wing hyaline, very slightly tinged with brown along veins; basicosta pale yellowish; calypter pale yellowish white. 2nd costal sector subequal in length to 4th and about 1/2 as long as 3rd; vein R_{4+5} setulose 1/2-2/3 way from its base to r-m crossvein; vein M_1 from discal crossvein to its bend about 1/2 as long as distance between the bend and wing margin, and subequal in length to M_1 appendage.

Legs reddish yellow, bases and apices of femora narrowly dark brownish; tarsi black; pulvilli dull yellowish. Fore coxa without minute recumbent hairs on inner surface; mid-tibia with 2 strong submedian and a fine lower *ad* setae and with 2 *pd* and 1 *v* setae; hind tibia with 2 preapical *d* setae and with a rather strong apical *pv* seta; fore claw and pulvillus longer than 5th tarsomers.

Abdomen shining black in ground color on mid-dorsal vitta of T1+2 to T4, on posterior 1/2 of T4 and on entire T5; semipellucid yellow on side and venter of T1+2 and T3, on anterior 1/2 of T4 and on St1; dorsum very thinly silvery white pollinose on anterior portions of T3 and T4, the pollinosity only visible when viewed posteriorly; mid-dorsal black portion of T3 and T4 thinly whitish brown pollinose; dorsum of T5 rather thinly whitish pollinose; venter of T4 and T5 rather thinly silvery white pollinose. T3 subequal in length to T5 and slightly shorter than T4; T5 broadly truncated at apex, about 2.5× as wide as long at base, 1.5× at apex; suture between T4 and T5 obliterated on mid-dorsal portion. Hairs on dorsum fine, dense, recumbent and black; St1 and almost entire venter of T1+2 with pale yellow hairs; venter of T3 to T5 with longer hairs; T3 with 2 median marginal and 1 lateral maraginal setae; T4 with 2 median discal setae, 2 median marginal setae and 1-2 lateral marginal setae; T5 with rows of discal and marginal setae.

♂ genitalia: St7+8 shining brown; epandrium reddish yellow. Posterior lobe of St5 occupying about posterior 2/3 of sternum; T6 free and entire; cerci short, in dorsal

view nearly parallel-sided from basal 1/4 to 3/4, strongly narrowed at posterior 1/4, weakly pointed at apex, in lateral view nearly straight; a pair of secondary processes present on base of cerci, the process about 1/6 as long as cerci; surstylus short and broad, narrowed to apex, bearing 2 strong spines at apex; a sclerotized semitubular plate present below cerci; pregonite narrow, curved ventrally, with a few hairs on posterior margin; postgonite shorter than pregonite, apex weakly bifurcated; epiphallus large, curved ventrally, broad on basal portion; distiphallus in lateral view rounded ventrally.

♀. Differing from ♂ as follows: Antenna broadly reddish yellow on inner portion of 2nd and 3rd segments; vertex 0.22-0.24 of head width; parafacial only slightly narrower than 3rd antennal segment; inner vertical seta about 3/4 of eye-height; outer vertical seta indistinct; ocellar seta fine but distinct, subequal in length to finest frontal seta: 2 strong reclinate orbital setae, subequal in length to each other and slightly shorter than inner vertical seta; 6-8 frontal setae; 3rd antennal segment at most twice as long as wide; fore claw and pulvillus shorter than 5th tarsomere; abdomen thinly whitish pollinose; T5 reddish brown at apex. ♀ genitalia: T6 subequal in length to T7, rather broadly divided into 2 hemitergites, with 1-2 rows of strong hairs on posterior portion; St6 slightly longer than St7, about 4× as wide as long, with rather dense hairs on posterior 1/2; 6th spiracle on ventral portion of T6; 7th spiracle in intersegmental membrane between T6 and T7; T7 broadly divided into 2 hemitergites, without hair; St7 with hairs on posterior 1/2; St8 about 1/2 as long as St7; supra-anal region weakly sclerotized; cercus subequal in length to T7.

Body length, 9.6-11.9 mm; wing length, 8.1-10.1 mm.

Distribution. Thailand.

Holotype ♂, THAILAND, Kanchana Buri, Sai Yok (500 m), 9-13.xii.1975 (SHINONAGA) (NSM).

Paratypes, THAILAND: *Chiangmai*, 1♀, Fang (500 m), 15.iv.1958 (MAA) (BPBM); 1♀, Chiangdao (450 m), 5-11.iv.1958 (MAA) (all in BPBM).

Remarks. This species very closely resembles *L. lateralis*, but is distinguished from it by the wider parafacial (parafacial only slightly narrower than 3rd antennal segment in *atrisetosa*, about 1/2 in *lateralis*), wing vein M_1 from discal crossvein to its bend shorter (about 1/2 as long as distance between the bend and wing margin in *atrisetosa*, 2/3-4/5 in *lateralis*) and larger size. This species also very closely resembles *L. felis* except for color of the thoracic hairs, but I consider that the coloration of hairs is enough to separate the species in this species-group.

Linnaemya felis MEŚNIL

Linnaemyia (sic) *felis* MESNIL, 1957: 50.

At a glance this species resembles *L. oralis*, but is easily distinguished from it by the longer wing vein M_1 appendage and the shorter palpus; these characters seem to suggest that this species is more closely related to the preceding two species than to *oralis*. The male of this species is unknown.

Distribution. Burma.

Material examined. BURMA: *N.E. Burma*, Holotype ♀, Kambaiti, 7000 ft

(MALAISE) (ZMU).

Linnaemya linguicera CHAO et SHI (Figs. 24, 193-198, 203-204)

Linnaemya (Eurysurstyla) linguicera CHAO et SHI, 1980: 264.

♂. Head yellow in ground color, parafrontal and occiput black; interfrontal area brown; parafrontal grayish pollinose; parafacial, face and gena densely pale yellowish white pollinose; occiput whitish pollinose; antenna brown, apex of 2nd segment and base of 3rd broadly reddish yellow; arista brown; palpus reddish yellow. Vertex 0.18-0.21 of head width; interfrontal area strongly widened anteriorly, slightly wider than parafrontal at middle; parafacial weakly narrowed below, about 1/2 as wide as 3rd antennal segment at middle height; gena 0.4-0.43 of eye-height; epistoma rather weakly prominent. Inner vertical seta 1/2-1/3 of eye-height; outer vertical seta absent; ocellar seta indistinct; 1 reclinate orbital seta, about 2/3 as long as inner vertical seta; proclinate orbital seta absent; 6-7 frontal setae; parafrontal with dense and fine black hairs; gena with 3-4 strong bristle-like hairs on anterior portion and dense fine black hairs on lower portion, mixed with pale yellowish white hairs; vibrissa inserted above level of lower margin of face by about 1/2 length of 2nd antennal segment; occiput without black hairs. 2nd antennal segment without wart-like excrescence; 3rd segment falling short of lower margin of face by about length of 2nd antennal segment, about 2.2× as long as 2nd segment, 1.8× as long as wide. Arista 1.2× as long as 2nd and 3rd antennal segments combined; 2nd segment about 3× as long as wide. Proboscis 5/6 of eye-height; palpus very short, subequal in length to 2nd aristal segment.

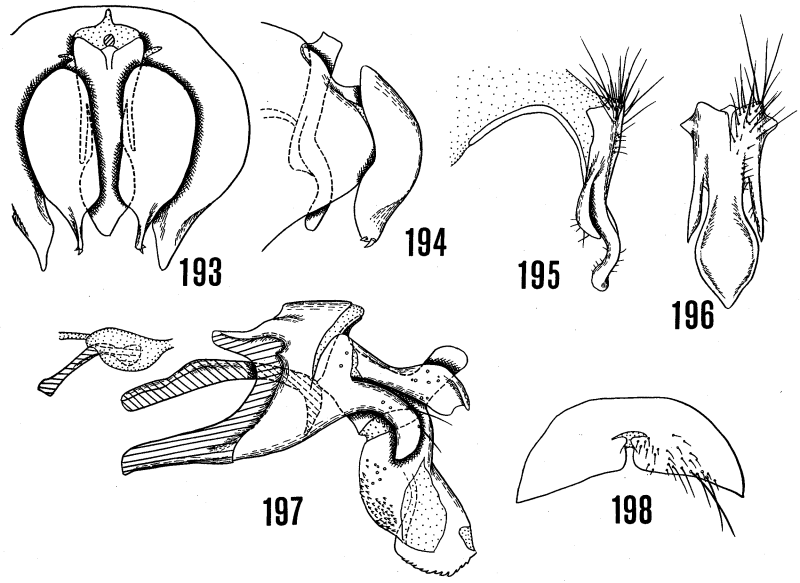
Thorax black in ground color, humeral callus, postalar callus, supra-alar region of scutum and posterior 2/3 of scutellum yellowish; dorsum and pleura thinly whitish pollinose; scutellum very thinly pollinose; dorsum with 4 rather narrow longitudinal vittae. Dorsum with dense and fine black hairs; sternopleuron, pteropleuron and hypopleuron bearing yellowish white hairs mixed with black hairs; mediotergite with black hairs; 0+3 *ia*; 2+1 *stpl*; pteropleural seta about 1/2 as long as hind *stpl* seta; lateral scutellar seta single; distance between bases of 2 subapical scutellar setae about 2× that between basal and subapical setae of same side.

Wing hyaline, slightly tinged with yellowish brown along veins, base of wing yellowish; basicosta whitish yellow; calypter pale yellowish white. 2nd costal sector about 1/2 as long as 3rd and slightly longer than 4th; vein R_{4+5} setulose 1/2-2/3 way from its base to r-m crossvein dorsally, only 1/3 way ventrally; vein M_1 from discal crossvein to its bend about 2/3 as long as distance between the bend and wing margin; M_1 appendage subequal in length to vein M_1 from discal crossvein to the bend.

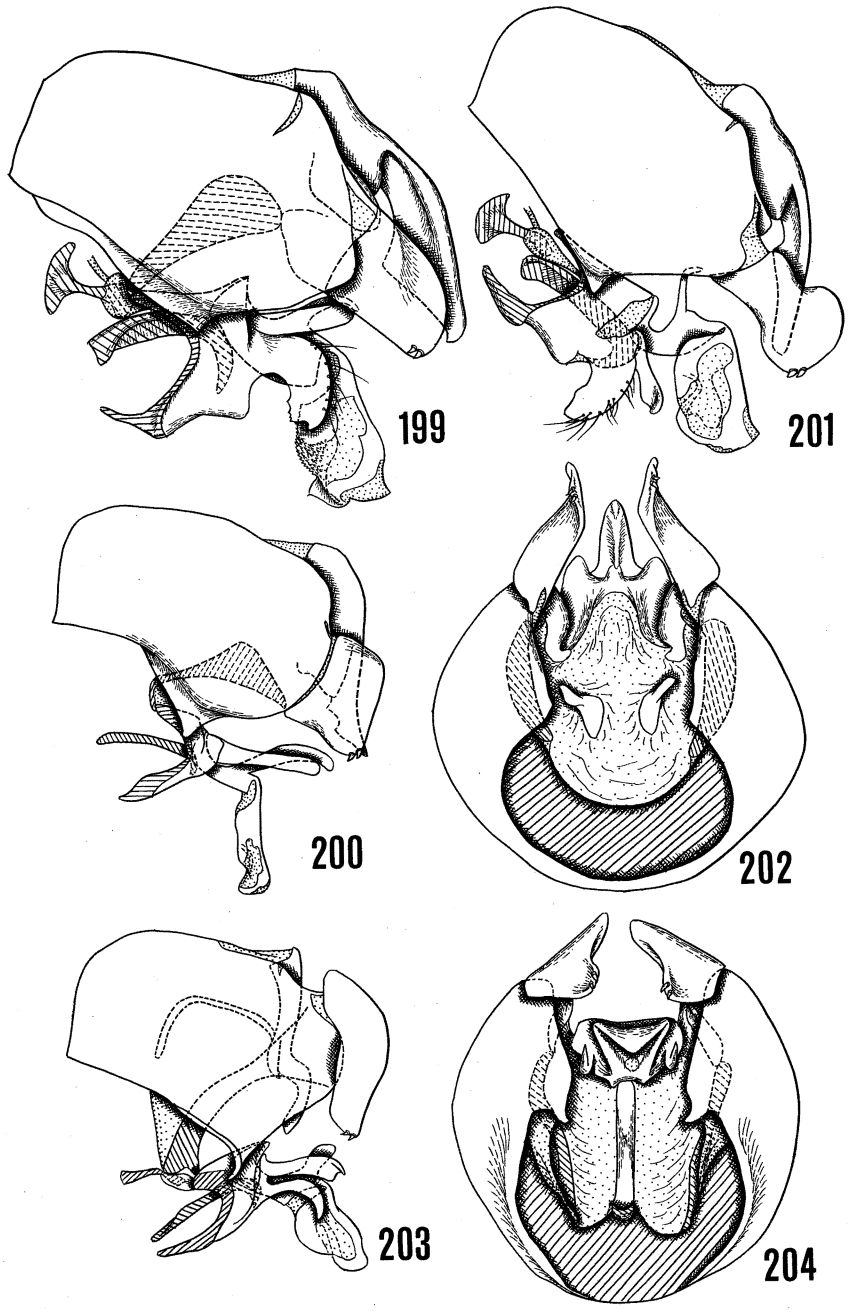
Legs black, trochanters and apices of femora reddish brown, tibiae reddish yellow at least on distal 2/3; pulvilli dull yellowish. Fore coxa without dense recumbent hairs on inner surface; all coxae and trochanters with whitish hairs mixed with black ones; mid- and hind femora with whitish hairs on posteroventral portion; mid-tibia with 2 *ad* and 2 *pd* setae, and with 1 weak *v* seta or without it; hind tibia with 3 preapical *d* setae, posterodorsal seta very weak, and with a weak apical *pv* seta; fore claw and pulvillus longer than 5th tarsomere.

Abdomen rather broad, narrowed posteriorly; broadly pale brownish yellow on dorsum of T1+2 to anterior 1/2-2/3 of T4 and venter of T1+2 to anterior 2/3 of T4, shining black on anterolateral portion of T1+2, mid-dorsal portion of T3 and T4, posterior 1/2-1/3 of T4 and entire T5; mid-dorsal black portion of T3 and T4 and entire T5 thinly silvery white pollinose, the pollinosity denser on T5. Hairs on dorsum recumbent and black; St1 and venter of T1+2 and T3 with whitish yellow hairs; T3 with 2 weak median marginal and 1-2 lateral marginal setae, without discal setae, median marginal seta at most 1/2 as long as T4; T4 with 2 strong median marginal setae and 2 lateral marginal setae, median discal setae absent or very weak and lateral discal seta sbsent; T5 with 2-3 lateral discal setae and a row of marginal setae, median discal setae very weak or absent. T3 subequal in length to T5 and slightly shorter than T4; T5 broadly truncated at apex, about 2/5 as long as wide at base and 2/3 at apex; suture between T4 and T5 obliterated on mid-dorsal portion.

♂ genitalia: St5 short and broad, posterior lobe occupying posterior 1/2 of sternum; T6 free and entire, about 1/4 as long as St7+8; epandrium enlarged on posterior portion; cerci in dorsal view sagittate in form, hiden below enlarged epandrium and surstyli, a slender secondary process present on both sides, the process about 1/2 as long as cerci; surstylus enlarged dorsally, rounded on dorsal margin and narrowed apically, apex with 2 strong spines; long and narrow sclerite present below cerci; pregonite short, strongly curved ventrally, with a few hairs on posterior margin;



FIGS. 193-198. *Linnaemya linguicera*, male genitalia: 193, epandrium, cerci and surstylus in dorsal view; 194, same in lateral view, showing hiden condition of cerci below enlarged epandrium and surstyli; 195, cerci in lateral view, showing longitudinal secondary sclerite below cerci; 196, same in dorsal view; 197, hypandrium, pre- and postgonites and aedeagus in lateral view; 198, St5 in ventral view.



FIGS. 199-204. *Linnaemya* spp., male genitalia in lateral view (199-201, 203), epandrium, cerci and surstyli in ventral view, showing secondary sclerites below cerci (202, 204): 199, *pallidohirta*; 200, *speciosissima*; 201-202, *oralis*; 203-204, *linguicera*.

postgonite wider than pregonite, apex weakly bifurcated; epiphallus rather broad, straight; ejaculatory apodeme small.

♀. Unknown.

Body length, 7.2-8.3 mm; wing length, 6.4-6.9 mm.

Distribution. China (Yunnan), Vietnam, Philippines.

Material examined. VIETNAM: 1♂. Dalat (1500 m), 29.iv-4.v.1960 (QUATE) (BPBM). PHILIPPINES: *Luzon*, Mountain Prov., Abatan, 60 km S of Bantoc (1800-2000 m), Buguias, 31.v.1964 (TORREVILLANS) (BPBM); 1♂, Asin Ibanque, 7000 ft, 26.vi. 1957 (VIADA) (DEUP).

Remarks. I have identified above specimens as *linguicera* because of their peculiar male genitalia. In general appearance this species closely resembles *L. lateralis*, but is distinguished from it by the entirely brown-black femora.

The ***atriventris*** -group

Linnaemya atriventris (MALLOCH) (Figs. 25, 205-212, 253)

Palpina atriventris MALLOCH, 1935: 580.
Linnaemyia (sic) *montshadskyi* ZIMIN, 1954: 272. **Syn. nov.**
Linnaemyia montschadskyi: Incorrect subsequent spellings of *montshadskyi*.

Although I have not examined the type specimen of *L. montshadkyi*, the type specimen of *Palpina atriventris* MALLOCH corresponds quite well to the original description and illustration of *montshadskyi*. As CROSSKEY (1976) suggested, I concluded that *montshadskyi* is a junior synonym of *atriventris*. In addition to the type of *atriventris*, I have seen many specimens of this species from Japan and a male from Thailand. Dr V. RICHTER, Leningrad, kindly compared a couple of Japanese specimens, which I identified as *atriventris*, with the type specimen of *montshadskyi* ZIMIN, and confirmed my identification. This species appears to be widely distributed in eastern Asia.

♂. Head yellow, parafrontal and occiput black; parafrontal grayish white, somewhat yellowish, pollinose; parafacial, face and gena densely yellowish white pollinose; occiput grayish white pollinose; interfrontal area brown; antenna brown-black, base of 3rd segment sometimes narrowly reddish brown; arista black; palpus reddish brown to brown. Vertex 0.19-0.22 of head width; interfrontal area weakly widened anteriorly, 0.6-0.9× as wide as parafrontal at middle; parafacial parallel-sided or at most weakly narrowed below, 0.7-0.8× as wide as 3rd antennal segment at middle height; epistoma prominent; gena 0.4-0.48 of eye-height. Inner vertical seta strong, about 2/3 of eye-height; outer vertical seta indistinct; ocellar seta fine and hair-like; 1 reclinate orbital seta, about 3/4 as long as inner vertical seta; 6-8 frontal setae; vibrissa inserted above level of lower margin of face by about 2/3 length of 2nd antennal segment; parafrontal with rather dense and very fine black hairs, sometimes mixed with fine whitish hairs; gena with several strong hairs on anterior portion and dense fine black hairs, usually mixed with whitish hairs on lower portion; occiput without black setulae. Antenna falling short of lower margin of face by about length of 2nd antennal segment, 2nd segment without wart-like excrescence; 3rd segment 2.8-3.2× as long as 2nd

segment, about 3× as long as wide. Arista subequal in length to 2nd and 3rd antennal segments combined; 2nd segment 2-4× as long as wide. Proboscis about 1/2 of eye-height; palpus about 1/2-4/5 as long as 2nd antennal segment.

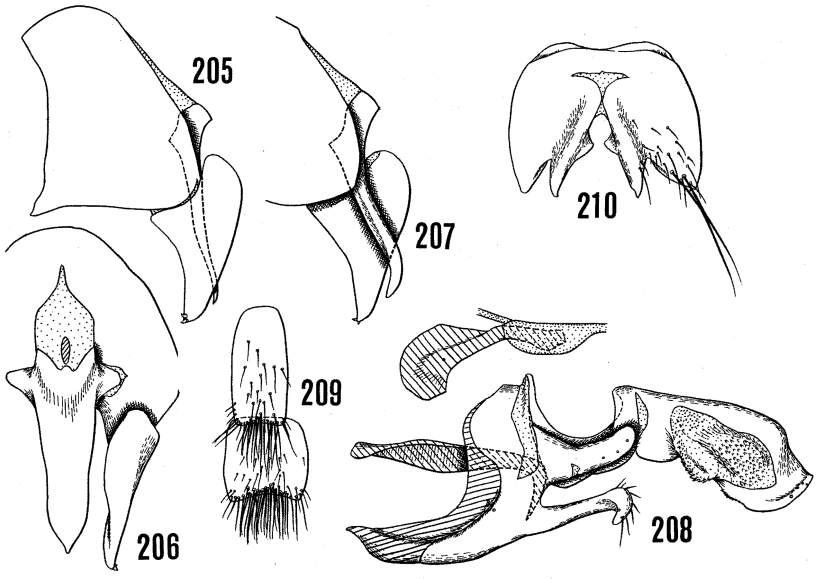
Thorax black in ground color, postalar callus and scutellum yellowish; dorsum whitish or sometimes yellowish white pollinose; pleura usually more yellowish pollinose; scutellum thinly whitish pollinose, visible when viewed from behind; dorsum with 4 longitudinal vittae. Hairs on dorsum very fine, dense and black; pteropleuron, sternopleuron and hypopleuron with whitish hairs, mixed with normal black hairs; 2+1 *stpl*; pteropleural seta at most 2/3 as long as hind *stpl* seta; basal scutellar seta subequal in length to subapical seta, and about 2× as long as scutellum; lateral scutellar seta single, subequal in length to apical seta, and about 0.6× as long as subapical seta; distance between bases of 2 subapical scutellar setae 1.2-1.5× that between basal and subapical setae of same side.

Wing hyaline, slightly tinged with brown along veins; veins brown, basal portion yellowish from wing base to level of basal crossvein; basicosta yellowish white; calypter yellowish white. 2nd costal sector subequal in length to 4th and about 0.6× as long as 3rd; vein R_{4+5} setulose dorsally 2/3-3/4 way from base to r-m crossvein, only on basal node ventrally; vein M_1 from discal crossvein to its bend usually slightly longer than distance between the bend and wing margin; M_1 appendage represented by a dark fold or very short vein, at most as long as r-m crossvein.

Legs black, tibiae sometimes dark reddish; pulvilli dull yellowish; coxae, trochanters and femora with some yellowish white hairs mixed with black hairs; inner anterior surface of fore coxa without minute recumbent hairs; mid-tibia with 2-3 *ad* and 1 *v* setae; hind tibia with 2 preapical *d* setae, sometimes a fine posterodorsal *d* seta distinguishable from others, and with a strong *pv* apical seta; fore claw and pulvillus longer than 5th tarsomere.

Abdomen shining black in ground color, anterior 1/2-2/3 of T3 to T5 thinly whitish pollinose dorsally, anterior portion of each tergum more densely pollinose; venter evenly and thinly whitish pollinose. Hairs on dorsum rather short and black, suberect to recumbent, longer on venter; St1 and mid-ventral portion of T3 with pale yellowish hairs; T3 with 2 median marginal and 1 lateral marginal setae, median discal seta normally absent; T4 with 2 median discal, 2 mdian marginal and 2-4 lateral marginal setae, median discal setae rarely absent; T5 with 2 median discal, 3-4 lateral discal and a row of marginal setae, median discal setae rarely absent; St3 with rather dense hairs on posterior margin; St4 nearly straight or very weakly convex on posterior margin, with dense comb-like hairs on posterior portion. T3 subequal in length to T4 and 1.2-1.3× as long as T5; T5 broadly truncated at apex.

♂ genitalia: St7+8 and epandrium shining blackish brown; cerci and surstylus shining brown-black. St5 with strong posterior process on inner portion of posterior lobe, which is swollen ventrally and extends beyond posterior margin of lobe; cerci in dorsal view weakly narrowed posteriorly and strongly sharpened at apical 1/6 towards pointed apex, in lateral view weakly curved ventrally at apical 1/5-1/6; surstylus broad at base and narrowed posteriorly, about 2× as long as wide, apex with 2 strong spines; pregonite narrow tube-like, curved ventrally at apex, with several hairs on apical portion; postgonite very weakly curved dorsally, subequal in length to pregonite,



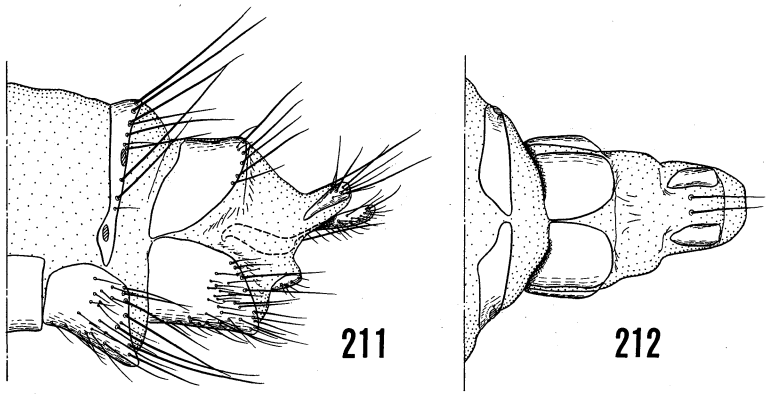
FIGS. 205-210. *Linnaemya atriventris*, male St3 to St5 and male genitalia: 205, epandrium, cerci and surstylus in lateral view; 206, same in dorsal view; 207, cerci and inside of right surstylus in lateral view; 208, hypandrium, pre- and postgonites and aedegus in lateral view; 209, St3 and St4 in ventral view; 210, St5 in ventral view.

rounded at apex; hypandrium normally without secondary lobe on posteroventral portion, rarely with weakly produced lobe; epiphallus absent; distiphallus in lateral view with ventral margin weakly porduced at middle.

♀. Differing from ♂ as follows: Vertex 0.21-0.24 of head width; interfrontal area 0.56-0.8× as wide as parafrontal at middle; inner vertical seta strong, about 5/6 of eye-height; outer vertical seta about 1/2 length of inner seta; ocellar seta more developed than in ♂, at most 2/3 length of inner vertical seta; 2 strong proclinate orbital setae, subequal in length to reclinate orbital seta; 3rd antennal segment reddish brown at base, 2-2.3× as long as 2nd, 2.5× as long as wide; 2nd to 5th tarsomeres of fore leg slightly widened; fore claw and pulvillus shorter than 5th tarsomere; T4 usually with a row of marginal setae; T5 with rows of discal and marginal setae; St3 and St4 without dense hairs on posterior portions. ♀ genitalia: T6 very short, about 1/2 as long as T7, divided longitudinally into 2 hemitergites at middle; 6th and 7th spiracles on T6; St6 about 2/5 as long as wide, and about 2/3 as long as St7; T7 narrowly divided into 2 hemitergites at middle, in lateral view oblique on posterior margin, with several hairs on upper 1/2; St7 about 2/3 as long as wide, weakly rounded on posterior margin, with fine hairs on posterior 1/2-2/3; St8 very small, 2/3 as long as wide; cercus narrow and long, 4/5 as long as T7.

Body length, 7.1-9.4 mm; wing length, 5.8-7.6 mm.

Distribution. Japan (Hokkaido, Honshu, Kyushu), Northern Thailand, Malaysia



FIGS. 211-212. *Linnaemya atriventris*, female genitalia: 211, lateral view; 212, dorsal view (hairs omitted).

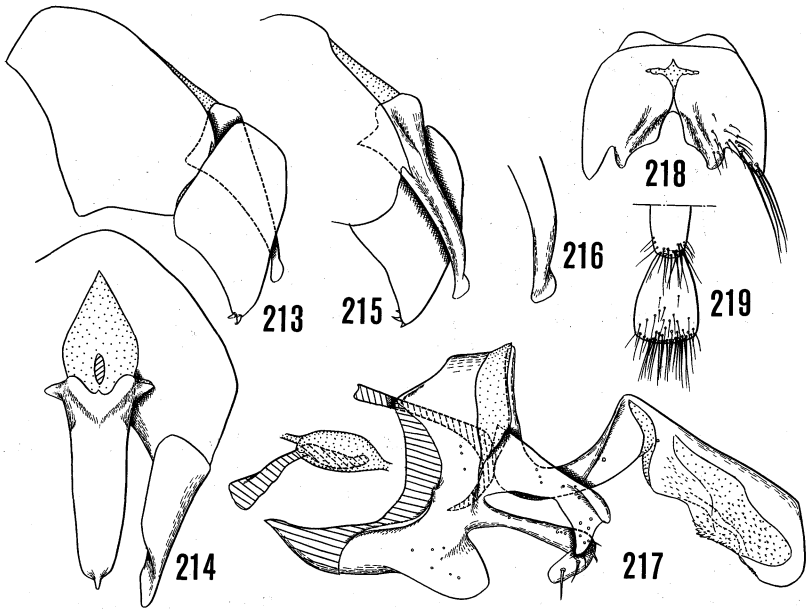
(Malaya), Indonesia (Java); Eastern USSR.

Material examined. JAPAN: *Hokkaido*, 9♂, Sapporo, Mt Moiwa, 11.vii.1968 (SHIMA, KUSIGEMATI & NAKANISHI) (BLKU): *Honshu*, 1♀, Saitama Pref., Otaki, 29.viii.1972 (HARA); 3♂, Saitama Pref., Minano, 20,29.ix.1974 (HARA); 5♂, Saitama Pref., Arakawa, 8.x.1971 (HARA); 1♀, Saitama Pref., Ogano, 10.x.1973 (HARA); 3♀,Saitama Pref., Kodama, 5.ix.1972 (HARA); (all in BLKU); 1♂, Hyogo Pref., Mt Hyonosen, 9.viii.1967 (MIYATAKE) (OMNH): *Kyushu*, 1♂, 16♀, Fukuoka City, Mt Tachibana, 13-19.v.1979, 15-21.x.1978, 5-11.xi.1978, 19-25.xi.1978, yellow pan trap (YAMAGISHI); 1♂, 1♀, Fukuoka Pref., Mt Inunaki, 29.v.1966, 20.ix.1966 (SHIMA); 1♂, 3♀, Kumamoto Pref., Mt Hakucho, 2.viii.1975, 16.ix.1978, 18.ix.1980 (SHIRÔZU, OHARA & GOTO) (all in BLKU). MALAYSIA: *Malaya*, holotype ♂ of *Palpina atriventris*, Cameron Highlands, Rhododendron Hill, 5200 ft, Paphag, 16.v.1923 (PENDLEBURY) (BMNH). THAILAND, 1♂, Chiangmai, Doi Inthanon (2667 m), 19.ix.1975 (TUMRASVIN) (BLKU).

Remarks. This species very closely resembles the following species, but may be distinguished from it by the longer 3rd antennal segment and wider gena.

***Linnaemya tuberculata* sp. nov.** (Figs. 26, 213-221, 254)

According to ZIMIN (1954), *L. montshadskyi* has the male cerci evenly narrowed posteriorly and strongly sharpened at apical 1/6 in dorsal view, and the apex not swollen in lateral view. His illustration of the male cerci of *montshadskyi* published in 1963 is, however, fairly different from that in 1954. Because the illustration of 1963 shows that the cerci of this species are nearly parallel-sided from basal 1/5 to apical portion in dorsal view and rounded at apex which bears a small process. In lateral view in his illustratinon of 1963 the small apical process is weakly swollen dorsally. Among the Japanese specimens of *Linnaemya*, I have found three species closely resembling *montshadskyi* in general appearance. One of them is clearly distinguished



FIGS. 213-219. *Linnaemya tuberculata*, male St3 to St5 and male genitalia: 213, epandrium, cerci and surstylus in lateral view; 214, same in dorsal view; 215, cerci and inside of right surstylus; 216, apex of cerci; 217, hypandrium, pre- and postgonites and aedeagus in lateral view; 218, St5 in ventral view ; 219, St3 and St4 in ventral view.

from the others by the setulose wing vein R_1 and by differences of the male genitallia. The other two have the male cerci corresponding well to those illustrated by ZIMIN in 1954 and 1963, respectively. One male from eastern USSR determined as *montshadskyi* by ZIMIN corresponds quite well to ZIMIN's drawing of *montshadskyi* of 1963. I believe that ZIMIN had two different species confused under the name *montshadskyi*; one is unnaned. Dr RICHTER kindly informed me by personal communication that she has not seen specimens corresponding to the description and figures of *montshadskyi* of ZIMIN in 1963. The description is as follows:

Very closely resembling the preceding species, but differing as follows:

♂. Apex of 2nd antennal segment and base of 3rd usually more broadly reddish, 3rd segment 2-2.4× as long as 2nd, and 2-2.3× as long as wide; vertex 0.18-0.20 of head width; interfrontal area 0.4-0.5× as wide as parafrontal at middle; gena 0.35 of eye-height; 2nd costal sector of wing about 1/2 length of 3rd, and subequal in length to 4th; St3 and St4 more densely haired on posterior portions. ♂ genitalia: Posterior process of inner portion of St5 shorter, not extending beyond posterior margin of posterior lobe, and not distinctly swollen ventrally; cerci in dorsal view very weakly narrowed posteriorly and rounded at apex which bears small process, in lateral view the apical process weakly bulged dorsally; surstylus triangular in lateral view, about 1.5× as long as wide; hypandrium with secondarily prominent posterior lobe below pregonite; pregonite long and slender, strongly curved at apex which bears several

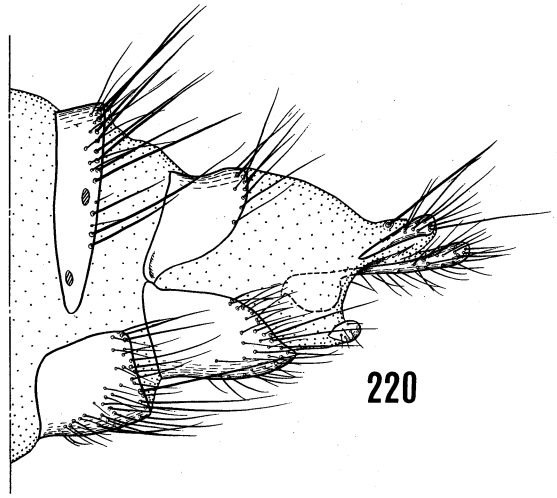
hairs; postgonite very weakly bifurcated at apex; epiphallus absent; distiphallus in lateral view with only slightly bulged ventral margin at middle.

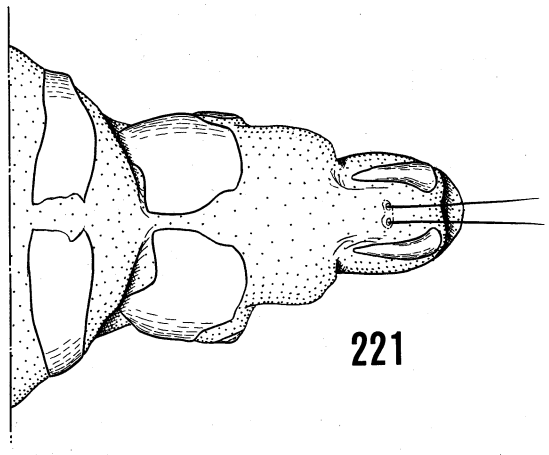
♀. 3rd antennal segment 1.8-2× as long as 2nd, 2.2-2.5× as long as wide. ♀ genitalia: T6 longer than in the preceding species, 0.6-0.7× as long as T7; St6 2.3-2.5× as wide as long; T7 broadly divided into 2 hemitergites, nearly rectangular in lateral view, with a row of hairs on posterior margin; St7 rectangular, not much rounded on posterior margin, 1.2-1.3× as long as St6 and about 2/3 as long as wide, with many fine hairs on posterior 2/3; St8 broader than in the preceding species, about 1/2 as long as wide; cercus slightly shorter than T7.

Body length, 7.1-9.3 mm; wing length, 5.8-7.4 mm.

Distribution. Japan (Hokkaido); Eastern USSR.

Holotype ♂. JAPAN, Hokkaido, Ashoro, Kiyokawa, 23.vii.1967 (SHIMA) (BLKU).





FIGS. 220-221. *Linnaemya tuberculata*, female genitalia: 220, lateral view; 221, dorsal view (hairs omitted).

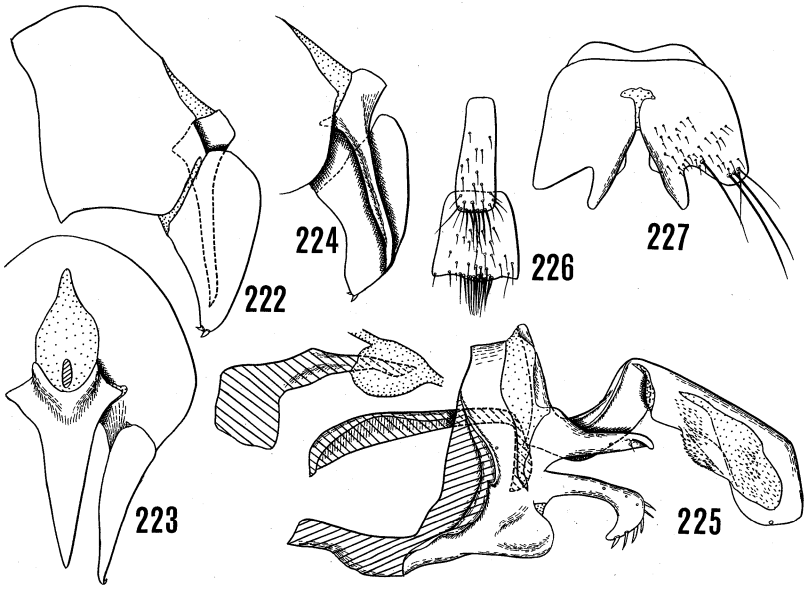
Paratypes, JAPAN: *Hokkaido*, 1♂, 3♀, Ashoro, Berabonai, 22.vii.1967 (SHIMA); 12 ♂, 6♀, same data as holotype (SHIMA, SAIGUSA & HONDA); 1♀, Sapporo, Nopporo Forest Park, 15.viii.1977 (OHARA) (all in BLKU). USSR: 1♂, Chabarovsk, 19.vii.1959, det. as *montshadskyi* by ZIMIN (CNC).

Remarks. This species closely resembles the European species *L. steini*, but may be distinguished from it by the upper occiput without black setulae behind postocular row and the male St3 and St4 with very dense comb-like hairs. *L. tuberculata* has a very characteristic hypandrium, which ZIMIN did not illustrate. The ventral portion of the hypandrium is produced posteriorly as a pair of lobes, and the true pregonited is a slender tube, so that the lobe looks like a true pregonite and the pregonite like a secondary process. As the pregonite of *Linnaemya* species bears several hairs on posterior portion, this lobe can be identified as the secondary modification of the hypandrium.

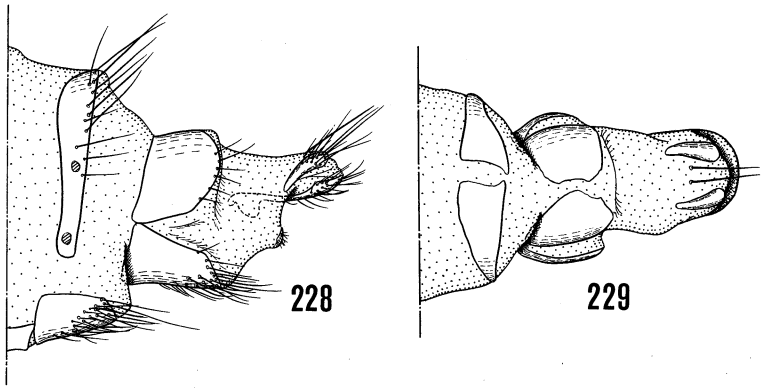
Linnaemya hirtipennis **sp. nov.** (Figs. 27, 222-229, 255)

Closely resembling *L. atriventris*, but differing as follows:

♂. Interfrontal area subequal in width to parafrontal at middle; parafacial slightly narrowed below, 0.5-0.6× as wide as 3rd antennal segment at middle height; gnea 0.35-0.4 of eye-height, vibrissa inserted above lower margin of face by about 1/2



FIGS. 222-227. *Linnaemya hirtipennis*, male St3 to St5 and male genitalia: 222, epandrium, cerci and surstylus in lateral view; 223, same in dorsal view; 224, cerci and inside of right surstylus in lateral view; 225, hypandrium, pre- and postgonites and aedeagus in lateral view; 226, St3 and St4 in ventral view; 227, St5 in ventral view.



FIGS. 228-229. *Linnaemya hirtipennis*, female genitalia: 228, lateral view; 229, dorsal view (hairs omitted).

length of 2nd antennal segment; antenna broadly reddish on apex of 2nd segment and base of 3rd, falling short of lower margin of face by about 3/5 length of 2nd antennal segment, 3rd segment 2.6-2.9× as long as 2nd segment, 2-2.4× as long as wide; palpus variable in length and in color, in shortest case 1/4 as long as 2nd antennal segment and in longest case subequal to 2nd antennal segment, in 1 specimen examined left and right palpi differ in length each other, dark brown to reddish yellow; wing vein R_1 setulose dorsally from base to level of bifurcation of veins R_{2+3} and R_{4+5}; 2nd costal sector of wing about 1/2 as long as 3rd and subequal to 4th; M_1 appendage about 1/2 as long as r-m crossvein; St4 with posterior margin weakly concave at both sides and weakly produced posteriorly at middle, bearing dense hairs only on posteromedian portion. ♂ genitalia: St5 with posterior process of postreior lobe rather rounded at apex; cerci in dorsal view narrowed to pointed apex, in lateral view weakly curved ventrally at apex; surstylus in lateral view narrower than in the preceding species, 2× as long as wide; hypandrium with secondary posterior lobe as in the preceding species; pregonite thicker than in the preceding species; postgonite more slender, apex not bifurcate; distiphallus almost same as in the preceding species.

♀. Apex of 2nd antennal segment and basal and posterior portions of 3rd broadly reddish yellow, 3rd segment 2-2.2× as long as 2nd, and 2.2-2.5× as long as wide; wing vein R_1 setulose as in ♂. ♀ genitalia: T6 short, about 1/2 as long as T7, narrowly divided into 2 hemitergites; 6th and 7th spiracles on T6; St6 weakly rounded on anterior margin, subequal in length to St7, about 2× as wide as long; T7 very narrowly and weakly divided at middle into 2 hemitergites, in lateral view rather rounded on posterior margin, with a few hairs on upper portion of posterior margin; St7 1.5-1.7× as wide as long; St8 weakly sclerotized, about 3× as wide as long; cercus 0.6× as long as T7.

Body length, 7.2-9.1 mm; wing length, 6.2-7.8 mm.

Distribution. Japan (Hokkaido).

Holotype ♂, JAPAN. Hokkaido, Ashoro, Kiyokawa, 23.vii.1967 (SHIMA) (BLKU).

Paratypes, JAPAN: *Hokkaido*, 4♂, 9♀, Ashoro, Berabonai, 22-24.vii.1967 (SHIMA, NAKANISHI, HONDA & SAIGUSA); 1♂, 1♀, same data as holotype (SAIGUSA & SHIMA) (all in BLKU).

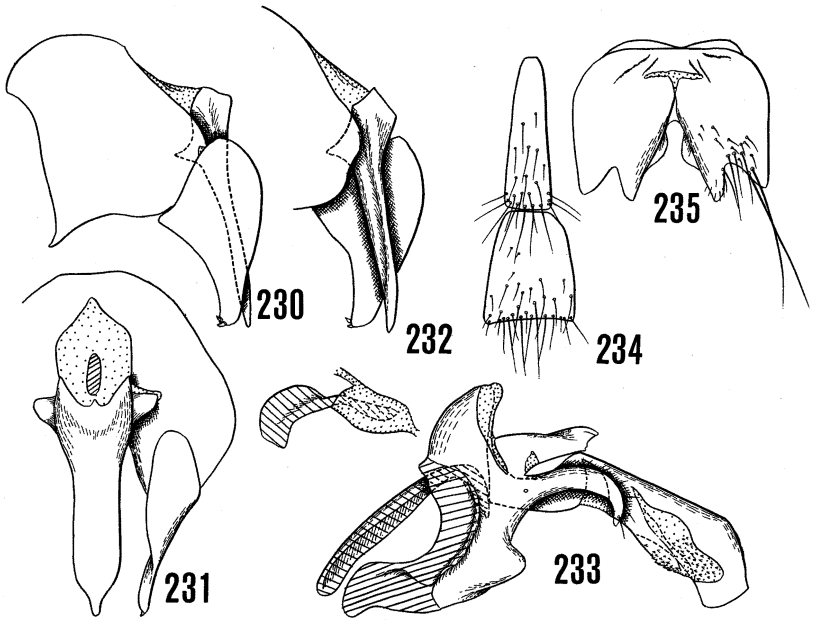
Remarks. This species seems to be more closely related to the preceding species than to *L. atriventris* because of the modified hypandrium. *L. hirtipennis* also seems to very closely resemble *hirtiradia* from China, but I treat here both of them as distinct species, since I have not seen *hirtiradia* in detail and it is difficult to identify correctly these species based only on description.

***Linnaemya persimilis* sp. nov.** (Figs. 28, 230-235, 256)

♂. Head pale yellowish in ground color, parafrontal, occipital dilation and occiput black; interfrontal area brown-black; parafrontal densely grayish yellow pollinose; parafacial, face and gena except for occipital dilation pale yellowish white pollinose; occipital dilation and occiput whitish pollinose; antennal black, apex of 2nd segment and base of 3rd narrowly reddish brown on inner side; arista brown-black; palpus black. Vertex about 0.18 of head width; interfrontal area widened anteriorly, about 1/2 as wide as parafrontal at middle; parafacial parallel-sided, about 2/3 as wide as 3rd antennal segment; gena about 0.4 of eye-height. Inner vertical seta about 0.6× as long as eye-height; outer vertical seta absent; ocellar seta very fine, directed outwards, shorter than setulae on upper postocular row; 1 reclinate orbital seta, about 2/3 as long as inner vertical seta; 8-9 frontal setae, upper 2 reclinate; parafrontal with dense fine hairs; gena with several strong bristle-like hairs and many fine black hairs, strong hairs confined on anterior portion, some pale yellowish white hairs on lower and posterior portion; vibrissa inserted above level of lower margin of face by about 2/3 length of 2nd antennal segment; occiput without black setulae. Antenna falling short of lower margin of face by about length of 2nd antennal segment; 2nd segment without wart on inner surface, about 0.4× as long as 3rd; 3rd segment about 2× as long as wide. Arista subequal in length to 2nd and 3rd antennal segments combined; 2nd segment about 2× as long as wide, about 1/2 as long as 2nd antennal segment.

Thorax shining black in ground color, postalar callus pale brownish yellow, scutellum yellowish; dorsum thinly pale yellowish white pollinose, 4 narrow longitudinal vittae present; pleura thinly whitish pollinose. Hairs dense, fine, suberect and black on dorsum, longer on pleura, lower portion of sternopleuron with whitish hairs; pteropleural seta about 1/2 as long as hind *stpl*; basal scutellar seta subequal in length to subapical seta and about 2× as long as scutellum; lateral scutellar seta single, subequal in length to apical seta and about 1.2× as long as scutellum; distance between bases of 2 subapical scutellar setae about 1.5× that between basal and subapical setae of same side.

Wing hyaline, slightly pale yellowish on basal portion; basicosta pale yellowish white; calypter pale brownish yellow. 2nd costal sector subequal in length to 4th and about 1/2 as long as 3rd; vein R_1 setulose dorsally 3/7 way from base to its apex (much beyond level of bifurcation of veins R_{2+3} and R_{4+5}); vein R_{4+5} setulose dorsally 2/3 way from base to r-m crossvein, with 3-4 setulae ventrally on its basal node; bend of vein M_1 about equidistant between discal crossvein and wing margin; M_1 appendage slightly



FIGS. 230-235. *Linnaemya persimilis* (holotype), male St3 to St5 and male genitalia: 230, epandrium, cerci and surstylus in lateral view; 231, same in dorsal view; 232, cerci and inside of right surstylus in lateral view; 233, hypandrium, pre- and postgonites and aedeagus in lateral view; 234, St3 and St4 in ventral view; 235, St5 in ventral view.

shorter than r-m crossvein.

Legs entirely black; pulvilli pale brownish yellow. Fore coxa without fine hairs on inner anterior surface; coxae, trochanters and basal portions of femora with fine yellowish hairs mixed with black hairs; mid-tibia with 2 *ad* and 1 *v* setae; hind tibia with 2 preapical *d* setae and 1 apical *pv* seta; fore claw and pulvillus longer than 5th tarsomere.

Abdomen shining black in ground color, T3 thinly whitish pollinose on anterior 1/2; T4 more densely pale yellowish pollinose on anterior 1/3-1/2; T5 thinly whitish pollinose on entire dorsum; anterior portions of each tergum more densely pollinose; venter evenly thin whitish pollinose, a broad black spot appearing on each side of venter of each tergum in some lights. Lengths of T3, T4 and T5 approximately in the proportions of 2 : 2.5 : 1.5; T5 broadly truncated at apex, about 2.8× as wide as long at base and 2× at apex; St3 only with several strong hairs on posterior portion; hind margin of St4 with a row of hairs, which are not comb-like. Hairs on dorsum fine, dense and recumbent, suberect on T5 and longer on venter; St1 only with whitish hairs; venter of T1+2 almost entirely with whitish hairs except on both sides and on hind margin; T3 only with 1 weak lateral marginal seta, without median discal, lateral discal and median marginal setae; T4 with 2 median marginal and 3 lateral marginal setae, without median discal and lateral discal setae; T5 with 1 median discal and a row of marginal setae, without lateral discal seta.

♂ genitalia: Posterior lobe of St5 with a strong posterior process on inner portion, the process extending beyond posterior margin of the lobe and weakly pointed at apex; T6 free and entire, about 1/4 as long as St7+8, without hair; cerci in dorsal view narrow and long, weakly narrowed from base to basal 1/3 and parallel-sided to apical 1/4, apical portion rather strongly narrowed to pointed apex, in lateral view nearly straight; surstylus in lateral view broad at base and strongly narrowed at basal 1/2, apex rounded and bearing 2 strong spines; pregonite long, tube-like, curved ventrally at apex, with a row of hairs on posterior margin of apical 1/2; postgonite shorter than pregonite, weakly pointed at apex; epiphallus absent; distiphallus in lateral view only slightly produced ventrally at middle; hypandrium with secondary lobe below pregonite; ejaculatory apodeme rather small.

♀. Unknown.

Body length, ca. 7.3 mm; wing length, ca. 6.6 mm.

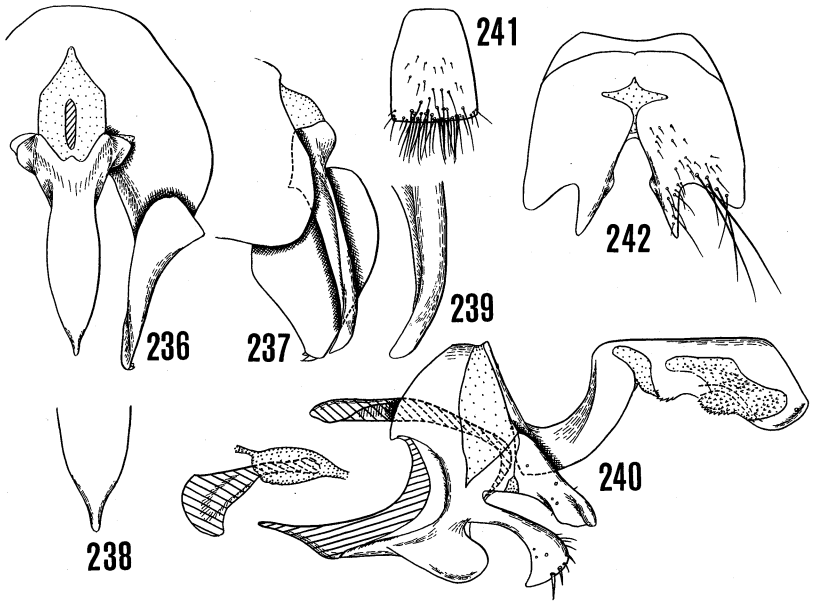
Distribution. Thailand.

Holotype ♂, THAILAND, Kau Yai Nat. Park, 24-26.xii.1975 (TUMRASVIN) (NSM).

Remarks. In superficial appearance this species closely resembles *L. hirtipennis*, but may be distinguished from it by the setulae on wing vein R_1 extending well beyond the level of bifurcation of veins R_{2+3} and R_{4+5}, by the absence of median marginal seta on the T3 and by the sparse hairs on posterior margin of the male St4. In the male genitalia this species is fairly different from *hirtipennis*; the male cerci of *persimilis* are nearly parallel-sided from basal 1/2 to 3/4, but those of *hirtipennis* are evenly narrowed to apex. The male cerci of *persimilis* rather resemble those of *atriventris*, but more slender in dorsal view and nearly straight in lateral view, and the hypandrium of *persimilis* is strongly produced posteriorly as a pair of lobes.

***Linnaemya burmana* sp. nov.** (Figs. 29, 236-242, 258)

♂. Closely resembling the preceding species, but differing as follows: Vertex about 0.19 of head width; interfrontal area only slightly narrower than parafrontal at middle; parafacial only slightly narrower than 3rd antennal segment at middle height (5 : 6); gena about 0.38 of eye-height; antenna narrower, 3rd segment 2.5× as long as 2nd and 2.5× as long as wide; intra-alar region of thorax broadly yellowish; distance between bases of 2 subapical scutellar setae about twice that between basal and subapical setae of same side; wing more strongly tinged with brown along veins, basicosta yellowish; wing vein R_1 setulose dorsally from its base to level of bifurcation of wing veins R_{2+3} and R_{4+5}; T4 slightly longer than T3, and 1.5× as long as T5; T5 broadly truncated at apex, 2.3× as wide as long at base and 1.5× at apex; T3 with 2 rather weak median marginal setae and 1 lateral marginal seta, the former about 1/3 as long as T4; posterior margin of St4 slightly rounded and bearing dense comb-like hairs. ♂ genitalia: St7+8 and surstylus shining brown-black; cerci black. Posterior process of St5 well extending beyond posterior margin of the lobe and pointed at apex; cerci in dorsal view closely resembling those of the preceding species, evenly narrowed to apex which is weakly compressed laterally, in lateral view the apex well curved ventrally; surstylus short and wide, nearly triangular in shape, 1.5× as long as wide, apex with 2



FIGS. 236-242. *Linnaemya burmana* (holotype), male St4 and St5 and male genitalia: 236, epandrium, cerci and surstylus in dorsal view; 237, cerci and inside of right surstylus in lateral view; 238, apex of cerci in dorsal view; 239, same in lateral view; 240, hypandrium, pre- and postgonites and aedeagus in lateral view; 241, ST4 in ventral view; 242, St5 in ventral view.

strong spines; hypandrium with a pair of posterior lobes; pregonite slender, curved ventrally and widened apically, with several hairs on posterior portion; postgonite shorter than pregonite, rather rounded at apex; ventral margin of distiphallus rather strongly produced at middle.

♀. Unknown.

Body length, ca. 9.6 mm; wing length, ca. 8.2 mm.

Distribution. Burma.

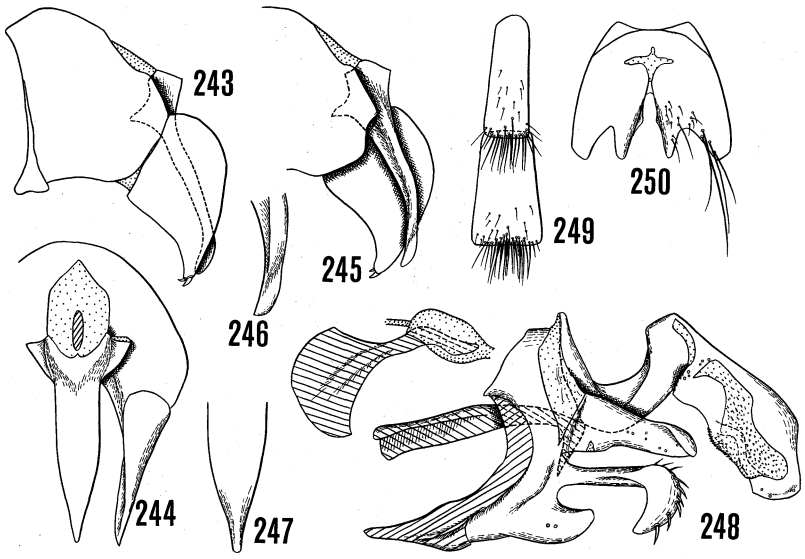
Holotype ♂, BURMA, Upper Burma, Nam Tamal Valley (alt. 3000 ft, lat.N.27°42′, long. E.97°54′), 15.viii.1938 (KAULBACK) (BMNH).

Remarks. This species seems to be closely allied to the preceding species, but may be recognized in male by the dense comb-like hairs on the St3 and St4.

***Linnaemya sulensis* sp. nov** (Figs. 30, 243-252, 257)

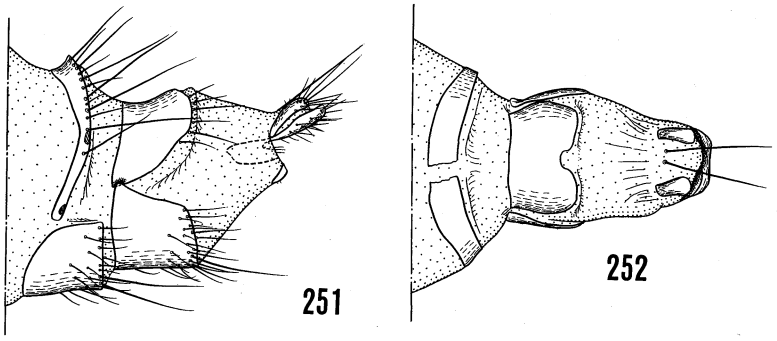
Closely resembling *L. persimilis*, but differing as follows:

♂. Parafrontal, face and gena whitish pollinose; apex of 2nd antennal segment and base of 3rd more broadly reddish; vertex 0.16-0.17 of head width; parafacial narrowed below, about 1/2 as wide as 3rd antennal segment at middle height; gena 0.34-0.36 of eye-height; inner vertical seta about 1/3 length of eye-height; reclinate orbital seta



FIGS. 243-250. *Linnaemya sulensis*, male St3 to St5 and male genitalia: 243, epandrium, cerci and surstylus in lateral view; 244, same in dorsal view; 245, cerci and inside of right surstylus in lateral view; 246, apex of cerci in lateral view; 247, same in dorsal view; 248, epandrium pre- and postgonites and aedeagus in lateral view; 249, St3 and St4 in ventral view; 250, St5 in ventral view.

about 3/4 as long as inner vertical seta; 3rd antennal segment 2.5-2.8× as long as 2nd, 2.3-2.5× as long as wide; scutellum darkened on its anterior portion; distance between bases of 2 subapical scutellar setae 1.6-2.2× that between basal and subapical setae of same side; wing more strongly tinged with brown; wing vein R_1 setulose dorsally from its base to level of bifurcation of wing vein R_{2+3} and R_{4+5}; M_1 appendage longer than r-m crossvein, about 0.4× as long as vein M_1 from discal crossvein to its bend; hind tibia with 3 preapical *d* setae, posterodorsal seta 1/2-2/3 as long as mid-dorsal one; dorsum of T3 and T4 rather densely whitish pollinose on anterior 3/4; T3 with 2 median marginal setae and 1 lateral marginal seta, the former about 2/3 as long as T4; T4 with 2 median marginal setae and 2 lateral marginal setae; T5 with a row of marginal setae; median discal and lateral discal setae usually absent on T3 to T5, irregular median discal setae rarely present on T5; posterior portion of St3 and St4 each with dense comb-like hairs; T4 slightly longer than T3 (4 : 3.5) and 1.3× as long as T5; T5 about 2× as wide as long at base and about 1.2× at apex. ♂ genitalia: T6 brown-black; St7+8, epandrium, surstylus and cerci shining brown-black; St5 with posterior process not extending beyond posterior margin of posterior lobe, the process weakly pointed at apex; cerci in dorsal view weakly narrowed posteriorly from basal 1/4 to 3/4, and therefrom rather strongly narrowed to apex, apical portion more strongly compressed laterally than in the preceding species, in lateral view rather weakly curved ventrally; surstylus in lateral view about 0.7× as wide as long, apical



FIGS. 251-252. *Linnaemya sulensis*, female genitalia: 251, lateral view; 252, dorsal view (hairs omitted).

portion narrowed, 2 strong spines at apex; hypandrium with secondary processes; pregonite strongly widened and curved at apex; postgonite rather broad; ejaculatory apodeme rather large, fan-shaped.

♀. Differing from ♂ as follows: Vertex 0.19-0.21 of head width; fine outer vertical seta present, about 1/2 as long as inner vertical seta; 2 strong proclinate orbital setae, anterior seta stronger than posterior seta and subequal in length to inner vertical seta; antenna more broadly reddish on apex of 2nd segment and base of 3rd, 3rd segment 2.2-2.3× as long as 2nd, weakly widened anteriorly, 2.2-2.3× as long as wide; wing vein M_1 appendage about 1/2 as long as vein M_1 from discal crossvein to its bend; scutellum more broadly darkened at base; claws and pulvilli of legs short, fore claw and pulvillus shorter than 5th tarsomere; T5 with 5-6 discal setae; St3 and St4 without dense hairs on posterior portions; T5 strongly narrowed posteriorly. ♀ genitalia: T6 short, about 1/3 as long as T7, narrowly and longitudinally divided into 2 hemitergites; 6th and 7th spiracles on T6; St6 subequal in length to St7; T7 not divided into hemitergites, posteromedian portion concave; St7 rectagular; St8 rhomboid in ventral view, with fine hairs; cercus about 1/2 as long as T7, with several long hairs on apical 1/3-1/2.

Body length, 7.9-9.3 mm; wing length, 6.1-7.2 mm.

Distribution. Philippines (Tawi Tawi).

Holotype ♂, PHILIPPINES, Tawi Tawi, Tarawakan, North of Batu Batu, 12.xi. 1961, malaise trap (Noona Dan Exp. 61-62) (CM).

Paratypes, PHILIPPINES: *Tawi Tawi*, 4♂, 8♀, same locality as holotype, 26, 27, 29.x., 2,5,7,10,14.xi.1961, malaise trap (Noona Dan Exp. 61-62) (CM).

Remarks. This is a distinctive species easily distinguished from other related species by the very narrow verterx. This species seems to be most closely related to *L. burmana*, and the male genitalia much resemble each other. This species was listed by DEAR & CROSSKEY (1979).

The preceding six Oriental species closely resemble each other and occur allopatrically. I consider at present each of them a distinct species because of the

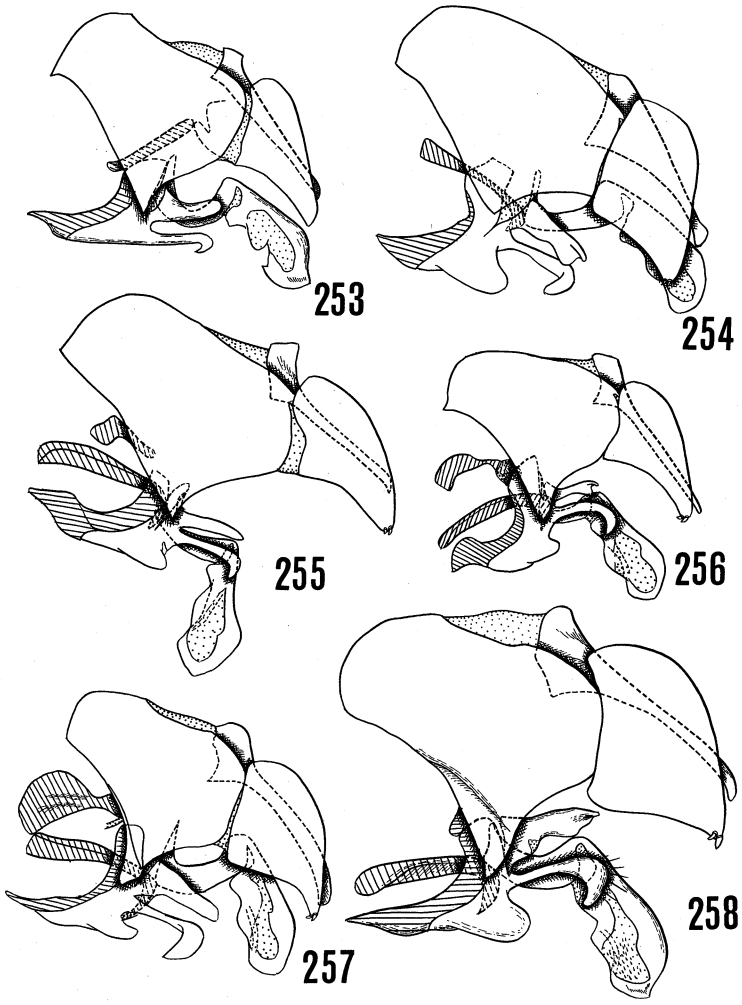
structure of the male genitalia and superficial characters.

The ***takanoi*** -group

Linnaemya takanoi MESNIL (Figs. 259-263)

Linnaemyia (sic) *takanoi* MESNIL, 1957: 51.

This species is originally described from a female from Obihiro, Hokkaido. The description of the male and that of female genitalia are given below.



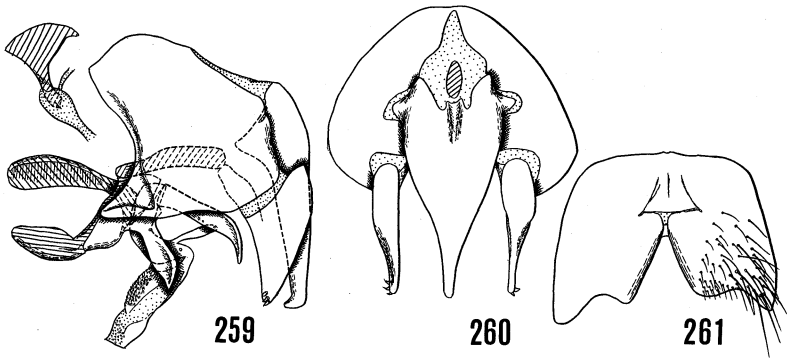
FIGS. 253-258. *Linnaemya* spp., male genitalia in lateral view (hairs omitted): 253, *atriventris*; 254, *tuberculata*; 255, *hirtipennis*; 256, *persimilis* (holotype); 257, *sulensis*; 258, *burmana* (holotype).

♂. Head reddish brown in ground color, parafrontal, upper portion of parafacial and occiput black; epistoma pale yellow; interfrontal area reddish brown; parafrontal and occiput grayish yellow pollinose; parafacial, face and gena yellowish white pollinose; antenna brown-black, apex of 1st segment and anterior portion and apex of 2nd segment reddish; paplus reddish yellow. Vertex about 0.23 of head width; interfrontal area strongly widened anteriorly, slightly narrower than parafrontal at middle; parafacial nearly parallel-sided, 1.4-1.5× as wide as 3rd antennal segment; gena about 0.56 of eye-height. Inner vertical seta about 1/2 of eye-height; outer vertical seta indistinct; postvertical seta indistinct, several minute black hairs present on upper occiput behind uppermost portion of eye; ocellar seta indistinct; 1 reclinate orbital seta; 10-12 frontal setae, lower 4-5 lined obliquely to eye margin; parafrontal with dense and fine black hairs; vibrissa inserted above level of lower margin of face by about 1/2 length of 2nd antennal segment; gena with several strong bristle-like hairs on anterior portion and dense long and fine black hairs; occiput with dense dull yellowish pile. 2nd antennal segment about 1/2 as long as 3rd; 3rd segment 2.3× as long as wide, obliquely rounded at apex, falling short of lower margin of face by about length of 2nd antennal segment. Arista longer than 2nd and 3rd antennal segments combined; 2nd segment 2× as long as wide. Palpus subequal in length to 2nd antennal segment.

Thorax black in ground color, humeral callus, postalar callus and scutellum reddish; dorsum and pleura rather thinly yellowish white pollinose; 4 rather broad longitudinal vittae on prescutum and scutum; hairs on lower portion of sternopleuron yellowish white.

Wing almost same as in ♀; hyaline, slightly tinged with brown along veins, especially along vein M_1 from its bend to apex and along discal crossvein; vein M_1 from discal crossvein to its bend about 2/3 as long as its appendage.

Legs black; trochanters and ventral portion of apical 1/3 of femora reddish brown; tibiae reddish yellow. Hairs yellowish white on anterior portion of mid- and hind coxae, on trochanters and posterior proximal portion of femora. Mid-tibia with 5 *ad*, 3 *pd* and 1 *v* setae; fore tarsus normal, 5th tarsomere of fore leg subequal in length to



FIGS. 259-261. *Linnaemya takanoi*, male genitalia: 259, lateral view; 260, dorsal view; 261, St5 in ventral view.

3rd and 4th tarsomeres combined; fore claw and pulvillus longer than 5th tarsomere.

Abdomen reddish brown on dorsum, black on mid-dorsal portion of T1+2 to T5 and on venter; dorsum and venter rather thinly grayish white pollinose. Lengths of T3, T4 and T5 approximately in the ratio of 3 : 3.5 : 2.5; St2 to St4 narrowly exposed. Hairs on dorsum fine and dense; T3 with 2 median discal, 2 median marginal and 1 lateral marginal setae; T4 with 2 median discal and a row of marginal setae; lateral discal seta absent on T3 and T4; T5 with 2 median discal, 2 lateral discal and a row of marginal setae; hairs on venter longer and sperser than on dorsum; St1 and anterior portion of venter of T3 with yellowish white hairs.

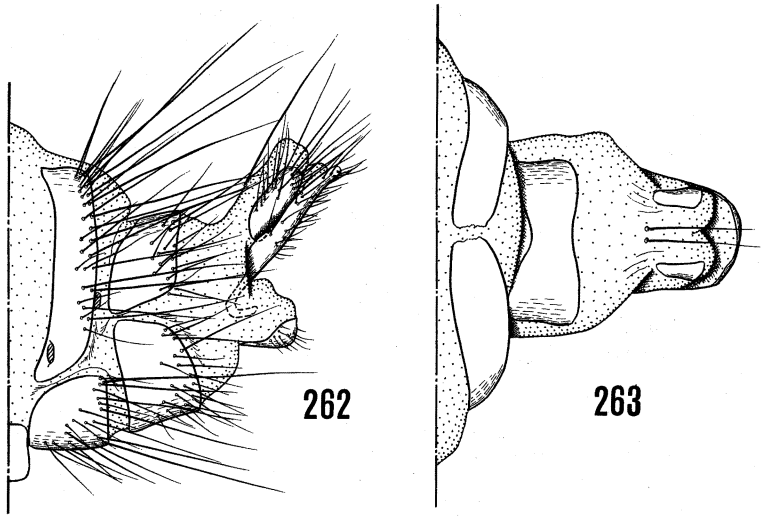
♂ genitalia: T6, St7+8 and epandrium reddish brown. St5 widened posteriorly, posterior lobe occupying about 2/3 of sternum, with dense hairs; T6 free and entire, without hair, 1/4 as long as St7+8; cerci in dorsal view evenly narrowed to apex, in lateral view straight, apex bill-shaped, strongly curved ventrally; surstylus in lateral view long-triangular in shape, apex with 3 strong spines; pregonite narrow and long, apical portion with several hairs; postgonite longer than pregonite; epiphallus long and slender; distiphallus rather long and narrow; ejaculatory apodeme large, fan-shaped.

♀ genitalia: T6 narrowly divided into 2 hemitergites, slightly shorter than T7, with dense long hairs; St6 short and wide, distinctly wider than St7, subequal in length to St7, with dense hairs; 6th spiracle on anteroventral portion of T6; 7th spiracle in intersegmental membrane between T6 and T7; T7 almost entire, with rather fine and long hairs on posterior portion; St7 with many fine hairs on posterior 1/2; St8 wider than long, anterior margin rounded, with fine hairs; cercus subequal in length to T7.

Body length, 10.6-11.6 mm; wing length, 9.6-10 mm.

Distribution. Japan (Hokkaido).

Material examined. JAPAN, *Hokkaido*, 1♀, **Obihiro**, 14.v.1950 (TAKANO); 1♀,



FIGS. 262-263. *Linnaemya takanoi*, female genitalia: 262, lateral view; 263, dorsal view (hairs omitted).

Nukabira, 17.vi.1967 (TAKANO); 1♂, Sapporo, 30.iv.1959 (TAKAGI) (all in EIHU); 1♂, Jozankei, 23.v.1967 (KUSIGEMATI) (BLKU).

Remarks. This species closely resembles *L. paralongipalpis* from China, but judging from the original description of that species, *takanoi* may be distinguished from *paralongipalpis* by the narrower vertex (about 0.23 of head width in the male of *takanoi*, 0.26–0.28 in *paralongipalpis*) and by the shorter palpus.

Linnaemya paralongipalpis CHAO

Linnaemyia (sic) *paralongipalpis* CHAO, 1962a: 84, 96.

Linnaemyia (sic) *paralonipalpis* CHAO, 1962a: 88, 89. Incorrect alternative original spelling, lapsus for *paralongipalpis*.

This species was originally described from Omei-shan, Szechwan, and later recorded from Khabarovsk and Sakhalin, eastern USSR (ZIMIN, 1963; KOLOMYETZ, 1975). I have not seen this species.

Distribution. China (Szechwan), Eastern USSR (Khabarovsk, Sakhalin).

Summary of the classification of *Linnaemya* from the Holarctic and Oriental Regions

Names in synonymy are indented. Specific synonymy is listed only when newly established.

Genus *Linnaemya* ROBINEAU-DESVOIDY, 1830

Subgenus *Homoeonychia* BRAUER et BERGENSTAMM, 1891
- *lithosiophaga*-group
  - *lithosiophaga* (RONDANI, 1859)
  - *frater* (RONDANI, 1859)
- *crosskeyi*-group
  - *crosskeyi* **sp. nov.**

Subgenus *Ophina* ROBINEAU-DESVOIDY, 1863
- *Gymnochaetopsis* TOWNSEND, 1914
- *Nigrobonellia* BROOKS, 1944 **syn. nov.**
- *haemorrhoidalis*-group
  - *olsufjevi* ZIMIN, 1954
  - *haemorrhoidalis* (FALLÉN, 1810)
  - *tessellata* (BROOKS, 1944)
  - *glauca* (BROOKS, 1944)
  - *nigrescens* CURRAN, 1925
  - *varia* CURRAN, 1925
  - *media* ZIMIN, 1954
  - *helvetica* HERTING, 1963
  - *rossica* ZIMIN, 1954
  - *claripalla* CHAO et SHI, 1980
  - *tuberocera* CHAO et SHI, 1980
  - *omega* ZIMIN, 1954

pullior **sp. nov.**
microchaeta ZIMIN, 1954
microchaetopsis **sp. nov.**
picta (MEIGEN, 1824)
nigricornis CHAO, 1979
perinealis PANDELLÉ, 1895
fissiglobula PANDELLÉ, 1895
zachvatkini ZIMIN, 1954
setifrons ZIMIN, 1954
saga RICHTER, 1974
pentheri (BISCHOF, 1906)
nonappendix CHAO et SHI, 1980
obscurellina MESNIL, 1971
dumonti MESNIL, 1971
jaroschevskyi ZIMIN, 1954

smirnovi-group
smirnovi ZIMIN, 1954
amicula MESNIL, 1957

Subgenus *Linnaemya* ROBINEAU-DESVOIDY, 1830
Bonnetia ROBINEAU-DESVOIDY, 1830
Micropalpus MACQUART, 1834
Tachinomima BRAUER et BERGENSTAMM, 1891
Bonellimyia TOWNSEND, 1919
Palpina MALLOCH, 1927
Xanthoerigone TOWNSEND, 1927a
Eugymnochaetopsis TOWNSEND, 1927b
Hemilinnaemyia VILLENEUVE, 1932
Eurysurstyla CHAO et SHI, 1980 **syn. nov.**

vulpina-group
comta (FALLÉN, 1810)
soror ZIMIN, 1954
vulpina (FALLÉN, 1810)
vulpinoides (BARANOV, 1932)
neavei CURRAN, 1934
latigena KUGLER, 1977

tessellans-group
tessellans (ROBINEAU-DESVOIDY, 1830)
impudica (RONDANI, 1859)
ambigua **sp. nov.**
siamensis **sp. nov.**
kanoi **sp. nov.**
ruficaudata **sp. nov.**
hybrida ZIMIN, 1965
ochracea HERTING, 1973

zimini CHAO, 1962a
oralis-group
speciosissima MESNIL, 1957
pallidohirta CHAO, 1962a
oralis (TOWNSEND, 1927)
pellex MESNIL, 1957
melancholica MESNIL, 1957
bella MESNIL, 1970
amicorum DRABER-MONKO et KOLOMYETZ, 1982
scutellaris (MALLOCH, 1927)
rohdendorfi CHAO, 1962a **syn. nov.**
lateralis (TOWNSEND, 1927b)
nigrohirta (MALLOCH, 1935) **syn. nov.**
atrisetosa **sp. nov.**
felis MESNIL, 1957
linguicera CHAO et SHI, 1980
atriventris-group
atriventris (MALLOCH, 1935)
montshadskyi ZIMIN, 1954 **syn. nov.**
steini JACENTKOVSKY, 1944
tuberculata **sp. nov.**
hirtipennis **sp. nov.**
persimilis **sp. nov.**
burmana **sp. nov.**
hirtiradia CHAO et SHI, 1980
sulensis **sp. nov.**
takanoi-group
takanoi MESNIL, 1957
paralongipalpis CHAO, 1962a

Unplaced species of genus *Linnaemya*
nigrifacies ENDERLEIN, 1934
majae ZIMIN, 1954
polychaeta ZIMIN, 1963
stackelbergi ZIMIN, 1954
ruficornis CHAO, 1962a
petiolata KUGLER, 1971

Acknowledgements Dr Monty WOOD, Biosystematics Research Institute, Agriculture Canada, Ottawa, critically reviewed the manuscript of this paper. Other specialists on the Tachinidae helped me in many ways, namely, Dr Roger CROSSKEY, British Museum (Natural History), London; Dr Benno HERTING, Staatliches Museum für Naturkunde, Stuttgart; Professor Chen-ming CHAO, Zoological Institute, Academia Sinica, Peking; Dr Curtis SABROSKY, U.S. Department of Agriculture, Washington, D. C.; Dr Vera RICHTER, Zoological Institute, Academy of Sciences, Leningrad. I wish to

express my cordial appreciation for their generosity. I am grateful to my colleagues, Professors T. SAIGUSA and A. NAKANISHI and Mr O. YATA for their kind help and critical discussion during this study. My special thanks are also due to the following entomologists, in addition to those named above, for the loan and gift of the material and for facilitating literature: Dr H. ELSASSER, Ludwig-Boltzmann Institut, Graz; the late Dr J. L. GRESSITT, Bishop Museum, Honolulu; Dr B. LINDEBERG, Zoological Museum of the University, Helsinki; the late Dr G. MORGE, Institut für Pflanzenschutzforschung Kleinmachnow, Eberswalde; Dr F. J. RADOVSKY, Bishop Museum, Honolulu; Dr P. W. SCHAEFER, U.S. Department of Agriculture, Delaware; Professor S. TAKAGI and Dr M. SUWA, Hokkaido University, Sapporo; Professor S. TAKANO, Sapporo; Professor S. FUKUSHI, Hirosaki University, Hirosaki; Dr K. BABA, Niigata; Professor R. KANO and Dr S. SHINONAGA, Tokyo Medical and Dental University, Tokyo; Dr Y. KUROSAWA, National Science Museum, Tokyo; Dr H. KURAHASHI, National Institute of Health, Tokyo; Mr K. HARA, Saitama Museum of Natural History, Saitama; Mr J. EMOTO, Nanzan University, Nagoya; the late Mr I. HIURA and Mr Y. MIYATAKE, Osaka Museum of Natural History, Osaka; Dr K. NISHIDA, Kobe Medical Research Institute, Kobe; Messrs K. YAMAGISHI, K. OHARA, S. HASHIMOTO and T. GOTO, Kyushu University, Fukuoka; Dr K. KANMIYA, Kurume University, Kurume; Mr Y. IKEZAKI, Nagasaki Nishi Highschool, Nagasaki; Dr K. KUSIGEMATI, Kagoshima University, Kagoshima; Mr A. TANAKA, Kagoshima Agricultural Experiment Station, Kagoshima; Dr H. TANAKA, Kagoshima; Mrs M. YAFUSO, University of the Ryukyus, Naha. I am also greatly indebted to Professor Emeritus T. SHIRÔZU, Kyushu University, Professor Y. HIRASHIMA, Kyushu University, and Professor A. NAGATOMI, Kagoshima University, for their constant guidance and encouragement.

References

BARANOV, N. (1932) Larvaevoridae (Ins. Dipt.) von Sumatra I. *Misc. Zool. Sumatr.*, 68: 1-3.

*BISCHOF, J. (1906) Neuropteren und Dipteren. Ergebnisse einer naturwissenschaften reise zum Erdschias-Dagh (Kleinasien) 1.Zoologische Teil. (ed. PENTHEL, A. und E. ZEDERBAUER) *Ann. Naturhist. Hofmus., Wien*, 20: 170-179.

BRAUER, F. & J.E. BERGENSTAMM (1891) Die Zweiflügler des Käiserlichen Museum zu Wien V. Vorarbeiten zu einer Monographie der Muscaria Schizometopa (Exclusive Anthomyidae). Pars II. *Denkschr. Akad. Wiss. Wien*, 58: 305-446.

BROOKS, A.R. (1944) A review of the North American species of *Linnaemya* sens. lat. (Diptera, Tachinidae). *Can. Ent.*, 76: 193-206.

CHAO, C. (1962a) Notes on tachinid (Larvaevoridae) fauna of China. I. Genus *Linnaemyia* R.-D. *Acta Ent. Sinica*, 11: 83-98 (in Chinese with Russian Key).

—— (1962b) Tachinid (Diptera, Larvaevoridae) parasites of army worms in China. *Acta Ent. Sinica*, 11 *Suppl.*: 32-44 (in Chinese with Russian summary).

—— (1979) New species of Tachinidae (Diptera) from Mount Tomuer, Xinjiang, China. *Entomotaxon.*, 1: 79-82 (in Chinese with English summary).

—— & Y-S. Shi (1980) Notes on Chinese Tachinidae: Genus *Linnaemya* R.-D. (II). *Acta zootaxon. Sinica* 5: 264-272.

CROSSKEY, R.W. (1973) A conspectus of the Tachinidae (Diptera) of Australia, including keys

to the supraspecific taxa and taxonomic and host catalogues. *Bull. Br. Mus. (Nat.Hist.) Ent. Suppl.*, 21.

——— (1976) A taxonomic conspectus of the Tachinidae (Diptera) of the Oriental Region. *Bull. Br. Mus. (Nat. Hist.) Ent. Suppl.*, 26.

——— (1980) Family Tachinidae. *Catalogue of the Diptera of the Afrotropical Region* (ed.R.W. CROSSKEY): 822-885. Br. Mus. (Nat. Hist.), London.

CURRAN, C.H. (1925) Three new Nearctic Tachinidae (Dipt.). *Ent. News*, 36: 13-18.

——— (1934) African Tachinidae I. *Amer. Mus. Novit.*, 751: 1-25.

DEAR, J.P. & R.W. CROSSKEY (1982) A taxonomic review of the Tachinidae (Insecta, Diptera) of the Philippines. *Steenstrupia*, 8: 105-155.

DRABER-MONKO, A. & N. KOLOMYETZ (1982) Neue paläarktische Raupenfliegen (Diptera, Tachinidae). *Ann. Zool.*, 36: 385-390.

EMDEN, F.I.Van (1960) Keys to the Ethiopian Tachinidae. III. Macquartiinae. *Proc. Zool. Soc. Lond.*, 134: 313-487.

ENDERLEIN, G. (1934) Entomologische Ergebnisse der Deutsch-Russischen Altai-Pamir-Expedition 1928 (III). *Deut. Ent. Zeit.*, 1933: 129-146.

*FALLÉN, C. F. (1810) Forsok att bestamma de i sverige funne Flugarter, Son kunna foras till slagtet Tachina. *Kongliga Sven. Vet.-Akad. Handl.*, (2): 253-287.

HERTING, B. (1961) Beiträge zur Kenntnis der europäischen Raupenfliegen (Dipt., Tachinidae). *Stutt. Beitr. Naturk.*, (65): 1-12.

——— (1973) Ergebniss der zoologischen Forschungen von Dr. Z. KASZAB in der Mongolei. 327. Tachinide (Diptera). *Stutt. Beitr. Naturk.*, A (259): 1-39.

——— (1983) Neue oder wenig bekannte Tachiniden (Diptera). *Stutt. Beitr. Naturk.*, A (364): 1-8.

——— (1984) Catalogue of Palearctic Tachinidae (Diptera). *Stutt. Beitr. Naturk.* A (369): 1-228.

JACENTKOVSKY, D (1946) Raupenfliegen (Tachinoidea, Diptera) des Steinitzer Waldes. *Sbor. Ent. Od. Nard. Mus. Prag.* 21-22, 1944: 380-395.

KUGLER, J. (1971) Tachinidae of Israel IV. Description of ten new species. *Israel Journ.Zool.*, 20: 69-88.

——— (1977) Neue Tachinidae aus Israel. *Stutt. Beit. Naturk.* A (301): 1-14.

MACQUART, J. (1834) Insectes Dipteres du nord de la France. Athericeres: Creophiles, Oestrides, Myopaires, Conopsaires, Scenopiniens, Cephalopsides. *Mem. Soc. Roy. Sci.Agr. Arts Lille*, 1833: 137-368.

*——— (1843) Dipteres exotiques nouveaux ou peu connus. *Mem. Soc. Roy. Sci. Agr. Arts Lille*, 1843: 162-460.

MALLOCH, J. R. (1927) Exotic Muscaridae (Diptera) XX. *Ann. Mag. Nat. Hist.*, (9) 20: 385-424.

——— (1935) Exotic Muscaridae (Diptera) XL. *Ann. Mag. Nat. Hist.*, (10) 16: 573-597.

MEIGEN, J. W. (1824) Systematische Beschreibung der bekannten europaischen Zweiflügligen Insekten 4. Hamm.

MESNIL , L. P. (1957) Nouveaux tachinaires d'Orient (Deuxieme série). *Mem. Soc. Roy. Ent. Belg.*, 28: 1-80.

——— (1963) Nouveaux tachinaires de la region palearctique principalment de l'URSS et du Japon. *Bull. Inst. Roy. Sci. nat. Belg.*, 39 (24): 1-56.

——— (1970) Description de nouveaux tachinaires de l'ancien monde, et notes synonymique (Diptera, Tachinidae). *Mushi*, 44: 89-123.

——— (1971) Larvaevorinae (Tachininae). *Die Fliegen der Paläarktischen Region* (ed. E.LINDNER), 64g: 997-1024.

——— (1972) Larvaevorinae (Tachinidae). *Die Fliegen der Paläarktischen Region* (ed. E.LINDNER), 64g: 1025-1064.

——— & H. PSCHORN-WALCHER (1968) A preliminary list of Tachinidae (Diptera) from Japan. *Mushi*, 41: 149-174.

PANDELLÉ, L. (1895) Études sur les Muscides de France. II (suite). *Rev. Ent.*, 14: 287-351.

RICHTER, V. (1974) Some tachinids from Mongolian People's Republic. *Nacekom. Mongol.*, (2): 396-426 (in Russian).

ROBINEAU-DESVOIDY, J. B. (1830) Essai sur les Myodaires. *Mem. pres. div. Sav. Acad. Roy. Sci. Inst. France*, 2: 1-813.

——— (1863) Histoire naturelle des Dipteres des environs de Paris 1. Paris.

RONDANI, C. (1859) Dipterologiae Italicae prodromus 3. Parmae.

SABROSKY, C. W. & P. H., ARNAUD, Jr. (1965) Family Tachinidae (Larvaevoridae). *A Catalog of the Diptera of America North of Mexico* (ed. A. STONE *et al.*): 961-1108. U. S. Dept. Agr., Washington, D.C.

SCHAEFER, P. W. & H. SHIMA (1981) Tachinidae parasitic on the Lymantriidae in Japan. *Kontyû*, 49: 367-384.

SHIMA, H. (1984) The genus *Paradrino* from Japan and the Indo-Australasian Region. *Int. Journ. Ent.*, 26: 143-156.

TAKANO, S. (1957) Tachinidae. *Iconographia Insectorum Japonicum.* Edita Secunda Reformata. (ed. T. ISHII *et al.*): 1699-1716 (in Japanese). Hokuryukan, Tokyo.

TOWNSEND, C.H.T. (1914) New muscoid flies, mainly Hystricidae and Pyrrhosiinae from the Andean Montanya. *Ins. Insc. Menstr.*, 2: 29-32.

——— (1916) Designations of muscoid genotypes with new genera and species. *Ins. Insc. Menstr.* 4: 4-12.

——— (1919) New muscoid genera, species and synonymy (Diptera). *Ins. Insc. Menstr.*, 6: 157-182.

——— (1927a) Fauna sumatrensis. Diptera Muscoidea III. *Supplta Ent.*, 16: 56-76.

——— (1927b) New muscoid flies in the collection of the Deutsches Entomologisches Institut in Berlin. *Ent. Mitt.*, 16: 277-287.

VILLENEUVE, J.(1932) Descriptions de Myodaires superieurs (Larvaevoridae) nouveaux de Formose. *Bull. Soc. Ent. Fr.*, 37: 268-272.

ZIMIN, L.S. (1954) Species of the genus *Linnaemyia* ROBINEAU-DESVOIDY (Diptera, Larvaevoridae) in the fauna of USSR. *Trud. Zool. Inst. Akad. Nauk SSSR*, 15: 258-282 (in Russian).

——— (1963) Parasitic Diptera of the subtribe Linnaemyina in Palearctic area. *Trud. Vses. Nauch.-Issled. Inst. Zats. Rast.*, 17: 186-215 (in Russian).

——— (1965) New parasitic flies of the tribe Tachinini (Diptera, Larvaevoridae) from the USSR. *Ent. Obozr.*, 44: 946-950 (in Russian).

*Not directly seen.