Beitr. Ent.	Berlin	ISSN 0005-805X
46(1996)1	S. 169-235	15.05.1996

A systematic study of the tribe Winthemiini from Japan[1]

(Diptera, Tachinidae)

With 138 figures

HIROSHI SHIMA

Zusammenfassung

Die japanischen Arten der Tribus Winthemiini (Unterfamilie Exoristinae) werden revidiert. Die vier Gattungen *Smidtia* (= *Timavia* **syn. nov.**, = *Smidtiola* **syn. nov.**), *Winthemia*, *Crypsina* und *Nemorilla* wurde aus Japan nachgewiesen. *Smidtia* besteht aus 13 Arten, fünf von ihnen werden neu beschrieben. *Winthemia* enthält 13 Arten, von denen vier neu sind. Von *Crypsina* ist eine Art bekannt und *Nemorilla* besteht in Japan aus vier Arten, von denen zwei neu sind. *Smidtia antennalis* **sp. n.**, *S. pauciseta* **sp. n.**, *S. trisetosa* **sp. n.**, *S. harai* **sp. n.**, *S. fukushii* **sp. n.**, *Winthemia mediocris* **sp. n.**, *W. ikezakii* **sp. n.**, *W. brevipennis* **sp. n.**, *W. miyatakei* **sp. n.**, *Nemorilla insulata* **sp. n.**, und *N. aquila* **sp. n.** werden beschrieben. *Winthemia hokkaidensis* BARANOV ist ein neues Synonym zu *W. venusta* (MEIGEN). Nachfolgende Kombinationen werden neu eingeführt: *Smidtia varipes* (MESNIL) **comb. n.**, *Smidtia verna* (KOCHA) **comb. n.**, *Smidtia japonica* (MESNIL) **comb. n.**, *Smidtia amoena* (MEIGEN) **comb. n.**, *Smidtia laeta* (MESNIL) **comb. n.**, *Smidtia gemina* (MESNIL) **comb. n.**, *Smidtia amurensis* (BORISOVA) **comb. n.** und *Smidtia orientalis* (BORISOVA) **comb. n.** Eine Hymenopterenart und 41 Lepidopterenarten werden als Wirte gemeldet.

Summary

Japanese species of the tribe Winthemiini, the subfamily Exoristinae, are revised. Four genera, *Smidtia* (= *Timavia* **syn. nov.**, =*Smidtiola* **syn. nov.**), *Winthemia*, *Crypsina* and *Nemorilla* are recognized in Japan. *Smidtia* is composed of 13 species, 5 of which are described as new, *Winthemia* of 13 species, 4 of which are new, *Crypsina* of 1 species and *Nemorilla* of 4 species, 2 of which are new: *Smidtia antennalis* **sp. n.**, *S. pauciseta* **sp. n.**, *S. trisetosa* **sp. n.**, *S. harai* **sp. n.**, *S. fukushii* **sp. n.**, *Winthemia mediocris* **sp. n.**, *W. ikezakii* **sp. n.**, *W. brevipennis* **sp. n.**, *W. miyatakei* **sp. n.**, *Nemorilla insulata* **sp.n.**, and *N. aquila* **sp. n.** *Winthemia hokkaidensis* BARANOV is synonymized with *W. venusta* (MEIGEN). The following new combinations are proposed: *Smidtia varipes* (MESNIL) **comb. n.**, *Smidtia verna* (KOCHA) **comb. n.**, *Smidtia japonica* (MESNIL) **comb. n.**, *Smidtia amoena* (MEIGEN) **comb. n.**, *Smidtia laeta* (MESNIL) **comb. n.**, *Smidtia gemina* (MESNIL) **comb. n.**, *Smidtia amurensis* (BORISOVA) **comb. n.**, and *Smidtia orientalis* (BORISOVA) **comb. n.** One hymenopterous and 41 lepidopterous host species are recorded.

[1] Contribution from Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University (No. 9).

DOI: 10.21248/contrib.entomol.46.1.169-235

I. Introduction

Members of the tribe Winthemiini are relatively distinct within the vast complex of exoristine Tachinidae in their morphological structures as well as ovipositing habit. They are characterized by a haired katepimeron, telescopic female terminalia which have no modified structures in post-abdominal terga, and macrooviparous habit. The tribe has been known from some 20 genera distributed in all major zoogeographical regions.

The tribe Winthemiini contains several commonly occurring species in Japan, so it is naturally or potentially important for control of agricultural and forestry insect pests. Female members of this tribe lay unincubated macrotype planoconvex eggs directly on host exoskeleton. Lepidopterous larvae usually serve as their hosts (HERTING, 1960; TSCHORSNIG & HERTING, 1994), but coleopterous, orthopterous and sawfly larvae are also recorded as hosts in North America (ARNAUD, 1982).

In the Old World the Winthemiini have usually been recognized to comprise 9 genera: *Ossidingia*, *Nemorilla*, *Rhaphiochaeta*, *Smidtia*, *Smidtiola*, *Timavia*, *Winthemia*, *Crypsina* and *Hemiwinthemia* (MESNIL, 1949; CROSSKEY, 1973, 1976, 1984; HERTING, 1984). Japanese species of this tribe have not been studied in detail. BARANOV (1939) first described a new species of *Winthemia* from Hokkaido; in his revisional work MESNIL (1949) recognized 1 species each of *Nemosturmia* and *Nemorilla* from Japan; TAKANO (1950) recorded 1 species each of *Winthemia* and *Nemorilla*; MESNIL (1957, 1967) described 1 new species each of *Smidtia* and *Nemosturmia* from Hokkaido; MESNIL & PSCHORN-WALCHER (1968) recorded 1 species of *Smidtia*, 2 of *Nemosturmia* and 1 of *Winthemia* from Honshu; KOCHA (1971) described 1 new species of *Smidtiola* from Hokkaido; HERTING (1984) recognized 10 species comprising 4 genera from Japan; SHIMA et al. (1992) added 2 species of *Winthemia* to the known fauna of Japan in their treatment of the Chinese species of the genus. Consequently, up to the present there have been recorded 13 species comprising 4 genera of the tribe from Japan.

The main purpose of this paper is to revise the Japanese species of the Winthemiini by providing diagnostic keys to genera and species, describing new species, revising host records and considering the hypothesized phylogenetic relationships among Old World genera. I recognize 4 genera of this tribe from Japan, treating *Timavia* and *Smidtiola* as junior synonyms of *Smidtia*. There are 13 species in each of *Smidtia* and *Winthemia*, 1 in *Crypsina* and 4 in *Nemorilla*. Five species of *Smidtia*, 4 of *Winthemia* and 2 of *Nemorilla* are described as new to science. Host records are revised for Japanese species on the basis of contemporary systematic study and 1 hymenopterous and 24 lepidopterous hosts are newly recorded in this study.

II. Material and methods

Material

Material has been studied mainly from my own collection in Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University (BLKU). Some other material including type specimens were borrowed from the following institutions:

Canadian National Collection of Insects, Ottawa (CNC)

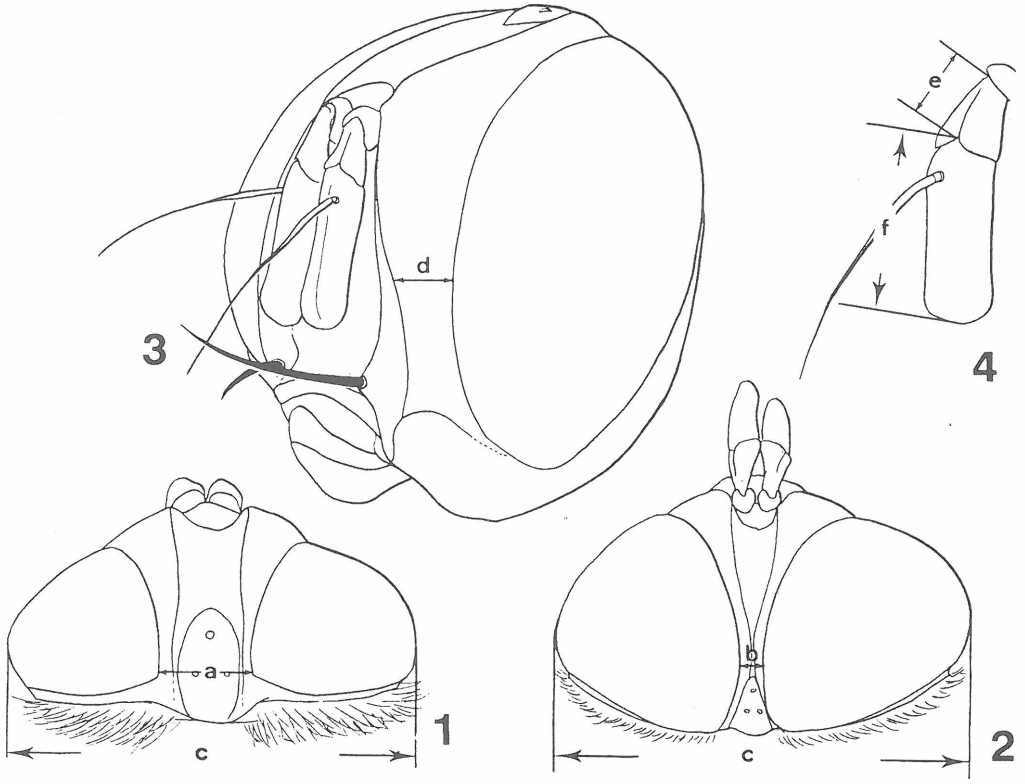
Department of Entomology, Natural History Museum, London (BMNH)

Department of Medical Entomology, National Institute of Health, Tokyo (NIH)

Department of Natural Sciences, Bishop Museum, Honolulu (BPBM)

DOI: 10.21248/contrib.entomol.46.1.169-235

Entomological Institute, Hokkaido University, Sapporo (EIHU)
Hyogo Prefectural Museum of Human and Nature, Sanda (HMHN)
Institut voor Systematiek en Populatiebiologie (Zoologisch Museum), Universiteit van Amsterdam, Amsterdam (ZMA)
Laboratory of Systematic Entomology, National Institute of Agro-Environmental Sciences, Tsukuba (NIAS)
Naturhistorisk Museum, Wien (NHW)
Projektgruppe Entomologie, Fachhochschule Eberswalde (Deutsches Entomologisches Institut), Eberswalde (DEI)
U.S. National Museum of Natural History, Washington D.C. (USNM).



Figs 1-4 *Winthemia* spp. Male head in dorsal view (1-2) and in anterolateral view (3) and antenna (4): **1** *ikezakii* **sp. n.**; **2** *orientalis*; **3-4** *miyatakei* **sp. n.** a: width of vertex; b: width of narrowest point of frons; c: head width; d: width of parafacial at middle height; e: length of pedicel; f: length of 1st flagellomere.

Measurements

The vertex was measured between compound eyes in comparison with width of the head in dorsal view (Fig. 1, a, c). In some species the frons becomes very narrow in front of ocellar triangle and then widened toward the vertex. In this case the narrowest part of the frons was measured in dorsal view and compared with the width of the head (Fig. 2, b, c). The widths of parafacial and gena were measured in their respective horizontal position, not in the position of head profile (Fig. 3, d; Shima, 1984, Fig. 1). The parafacial was measured at mid height

DOI: 10.21248/contrib.entomol.46.1.169-235

between the anterior eye margin and anterior margin of the parafacial (or posterior margin of facial ridge if facial ridge developed). The gena was measured between the lowest margin of the eye and the lowest part of the gena at the level of lowest subfacial seta. The eye was measured at the highest vertical length. The pedicel was measured from the top of the pedicel to the upper end of the incision and the 1st flagellomere from the upper end of the incision of pedicel to its own apex (Fig. 4, e, f). The distance between the bend of the wing vein M and wing margin were measured in direct extension along vein M from its bend to the wing margin (Fig. 5, d, e).

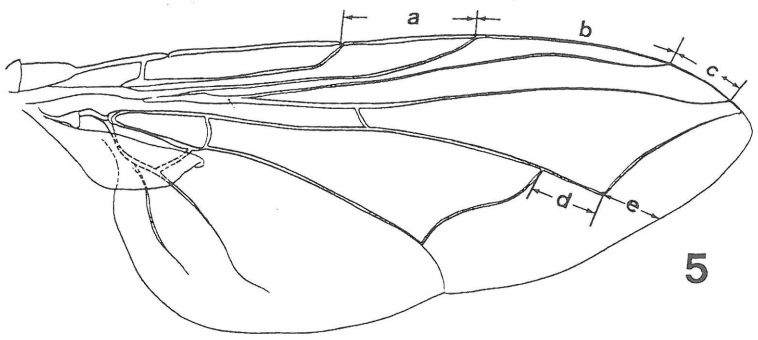


Fig. 5 *Crypsina prima*. Wing: a, b and c: 2nd, 3rd and 4th costal sectors, respectively; d; length of vein M from dm-cu crossvein to its bend; e: distance between bend of vein M and wing margin.

Terminology

Terminology mostly follows McAlpine (1981). The terms "tergum (terga)" and "sternum (sterna)" are adopted instead of "tergite (tergites)" and "sternite (sternites)", respectively. "Pollinose" and "pollinosity" are also used instead of "pruinose" and "pruinescens" mainly for practical reasons.

The following abbreviations of thoracic setae are used:

acr: acrostichal setae dc: dorsocentral setae ia: intra-alar setae sa: supra-alar setae ("pre-alar seta" is the first supra-alar seta).

For the position of the leg setae the following abbreviations are used:

ad: anterodorsal d: dorsal p: posterior pd: posterodorsal
pv: posteroventral v: ventral

In the description of the genitalia the terms dorsal and ventral are adopted in their morphological meaning.

Scientific names of host species mainly follow those in the checklist by the Entomological Laboratory, Kyushu University & Japan Wildlife Research Center (1989).

III. Systematics

Tribe Winthemiini

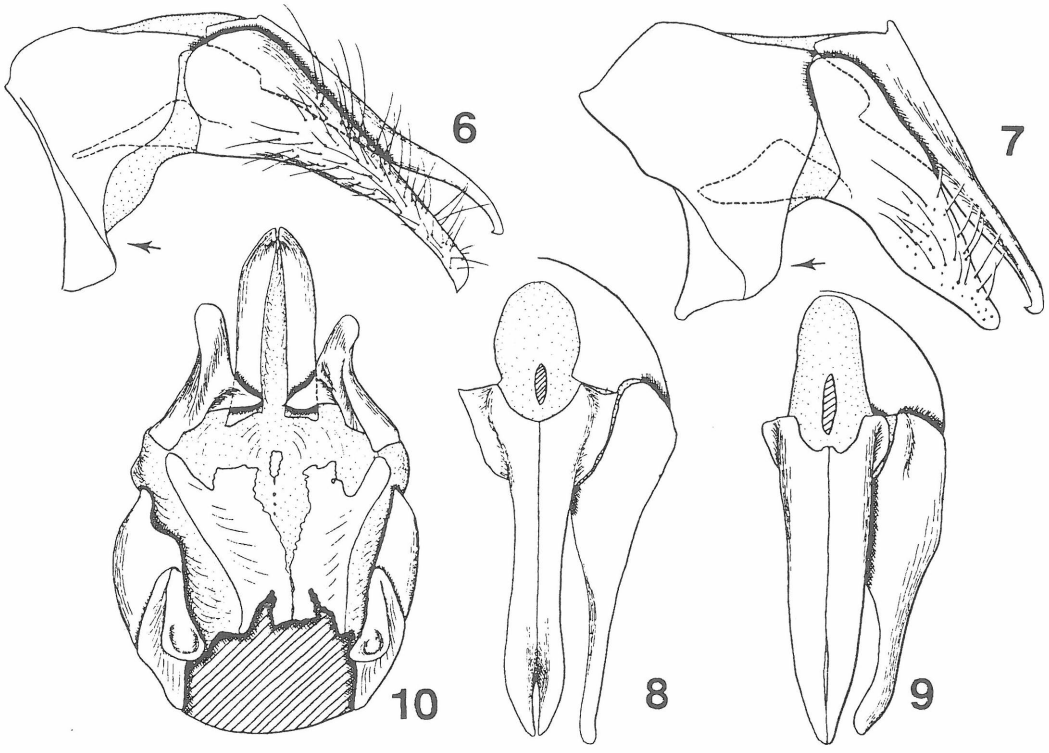
Winthemiiae TOWNSEND, 1913: 52. Type genus: *Winthemia* ROBINEAU-DESVOIDY, 1830.

General Characters:

Head usually dichoptic, frons sometimes very narrowed in male; frontal vitta widened anteriorly; reclinate orbital setae sometimes absent or only 1 seta developed in male; parafacial some-

DOI: 10.21248/contrib.entomol.46.1.169-233

times hairy; gena usually narrower than frons at level of base of antenna; face concave, lower margin not extending beyond vibrissal angle; occiput usually moderately bulged; antennal pedicel sometimes rather long; arista bare; palpus clavate; eye densely hairy. Postpronotal lobe with 5 setae, 3 basal setae set in a triangle or in a straight line; 2-3+3 acr; 3+3-5 dc (usually 3+4); 0-1+2-3 ia (usually 1+3); 3 sa, 1st seta (pre-alar) rather fine and subequal in length to 1st postsutural ia seta; proepisternum bare; 1-2+1 katepisternal setae; katepimeron haired; anatergite bare; scutellum large, with 1 pair of discal and 4-5 pairs of marginal setae. Wing usually hyaline, at most weakly and evenly tinged with pale yellow, usually short; calypter rather large, abutted to scutellum on inner margin, outer margin sometimes bent downward; 2nd costal sector bare below; vein M without fold or appendix. Hind coxa bare posteroventrally; fore tibia with 2 p setae. Abdomen ovate; syntergum 1+2 excavated to posterior margin. Male genitalia: Basilliform sclerite very wide; epiphallus present (except *Crypsina*). Female genitalia more or less elongate, telescopic; 6th tergum longitudinally divided into 2 hemitergites; 6th sternum normal, without any modification; 7th tergum divided into 2 hemitergites; 7th sternum narrow and simple, sometimes absent; 8th tergum of very small hemitergites.



Figs 6-9 *Smidtia* spp. Epandrium, surstylus and cerci in dorsal view (hairs on epandrium and cerci omitted) (6-7); same in dorsal view, hairs omitted (8-9): **6, 8** *varipes*; **7, 9** *conspersa*.
Fig. 10 *Rhaphiochaeta breviseta*. Dorsal armature of male genitalia in ventral view, showing a pair of broad basilliform sclerites.

DOI: 10.21248/contrib.entomol.46.1.169-235

Key to genera of Winthemiini from Japan

1. Postpronotal lobe with 5-6 setae, of which 3 basal setae are arranged nearly in a staight line; scutellum with 2-3 lateral scutellar setae; thorax and abdomen with very fine short and dense hairs, abdomen without strong setae in male, at most with weak and short setae on 4th and 5th terga in female; male face at vibrissal level strongly narrowed and elongate to lower margin, distance between vibrissal angle to lower margin of face as long as that between base of antenna and vibrissal angle; occiput with many very short fine black hairs, especially in male . . . . . *Crypsina* BRAUER et BERGENSTAMM
- Postpronotal lobe with 3 basal setae arranged in a triangle; lateral scutellar seta usually single; thorax and abdomen with rather fine short hairs, abdomen with strong setae at least on 4th and 5th terga in both sexes; face not narrowed and elongate below vibrissal angle; occiput at most with a row of fine black hairs or several black hairs on upper portion near vertex 2
2. 2+1 katepisternal setae; 5th abdominal tergum narrowed posteriorly, only slightly wider than long; male usually with 1 distinct reclinate orbital seta; occiput with or without black hairs; parafacial sometimes haired on upper 1/2 or more . . . . . *Smidtia* ROBINEAU-DESVOIDY
- Usually 1+1 katepisternal setae; 5th abdominal tergum short and broad, quadrate, distinctly more than twice as long as wide; male without distinct reclinate orbital setae; occiput without black hairs; parafacial bare or haired 3
3. Parafacial haired . . . . . *Winthemia* ROBINEAU-DESVOIDY
- Parafacial bare . . . . . *Nemorilla* RONDANI

Genus *Smidtia* ROBINEAU-DESVOIDY

Smidtia ROBINEAU-DESVOIDY, 1830: 183. Type species: *Smidtia vernalis* ROBINEAU-DESVOIDY, 1830 (= *Tachina conspersa* MEIGEN, 1824), by designation of Desmarest in d'Orbigny, 1848 (after EVENHUIS & THOMPSON, 1990).

Timavia ROBINEAU-DESVOIDY, 1863: 257. Type species: *Smidtia flavipalpis* ROBINEAU-DESVOIDY, 1847 (= *Tachina amoena* MEIGEN, 1824), by original designation. **Syn. nov.**

Omotoma LIOY, 1864: 1338. Type species: *Tachina amoena* MEIGEN, 1824, by subsequent designation of TOWNSEND, 1916.

Megalochaeta BRAUER et BERGENSTAMM, 1889: 87. Type species: *Megalochaeta eggeri* BRAUER et BERGENSTAMM, 1889 (= *Tachina conspersa* MEIGEN, 1824), by monotypy.

Homotoma BEZZI, 1907: 257. Preoccupied. Incorrect emendation of *Omotoma*.

Nemosturmia TOWNSEND, 1926: 34. Type species: *Nemosturmia pilosa* TOWNSEND, 1926 (= *Winthemia fumiferanae* TOTHILL, 1912, Nearctic species), by original designation. **Syn. nov.**

Smidtiola MESNIL, 1957: 7. Type species: *Smidtiola varipes* MESNIL, 1957, by monotypy. **Syn. nov.**

Although *Timavia* and *Smidtiola* have usually been treated as valid genera distinct from *Smidtia*, there are intermediate forms among them and I consider all of them to be included in one genus. WOOD (1987) synonymized *Timavia* with *Winthemia* and placed it as a subgenus of the latter. I think, however, there are distinct differences between *Timavia* (= *Smidtia*) and *Winthemia*. In the external features *Smidtia* is characterized by 1 reclinate orbital seta in male, 2+1 katepisternal setae and tapering apex of 5th abdominal tergum, although some variations may be seen in

DOI: 10.21248/contrib.entomol.46.1.169-235

specimens of some species. In the male genitalia this genus is characterized by the rather short, broad and apically curved epiphallus, weakly sclerotized dorsodistal expansion of the distiphallus and absence of the 6th abdominal tergum, and in the female genitalia by the presence of rather strongly sclerotized and broad 7th abdominal sternum and rather long 8th abdominal hemitergites (e.g. Figs. 47, 64).

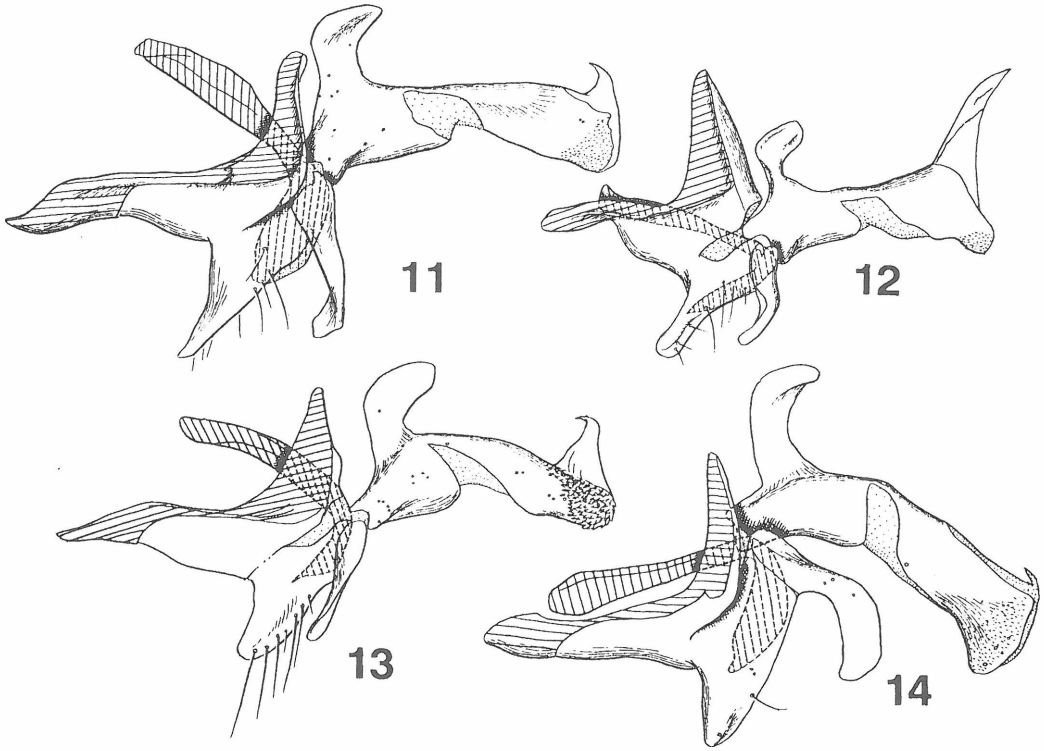


Fig. 11 *Rhaphiochaeta breviseta*. - **Figs 12-13** *Smidtia* spp.: **12** *varipes*; **13** *conspersa*. - **Fig. 14** *Ossidingia cruciata*. Hypandrium, gonopod, paramere and aedeagus in lateral view.

Smidtia, as here defined, has been known from 11 species in the Palearctic Region, 2 in northern part of the Oriental Region and 1 in South Africa. Members of this genus are sometimes very similar in general appearance, and it is possible that many more species will be found in eastern Palearctic and northern Oriental areas. *Tachina atriventris* WALKER, which CROSSKEY (1976) placed in *Timavia* and treated as a doubtful member of the Oriental fauna, has recently been considered as a representative of the North American genus *Diotrephes* REINHARD (WOOD, 1987). I think, however, this is a species of *Smidtia* and some New World genera of Winthemiini may be synonymized with *Smidtia* when studied in more detail.

Key to Japanese species of *Smidtia*

1. 3+3 dc setae 2
- 3+4 dc setae 4
2. Hind tibia with 3 preapical d setae; mid tibia with 2 strong submedian pv setae; parafacial

DOI: 10.21248/contrib.entomol.46.1.169-235

densely haired at least on anterior 1/2; facial ridge densely setulose on lower 3/4 . . . . . *trisetosa* **sp. n.**

- Hind tibia with 2 preapical d setae; mid tibia without submedian pv setae; parafacial at most haired on upper 1/2; facial ridge rather sparsely setulose on lower 1/2 3

3. Antenna with 1st flagellomere 2-2.3 times as long as pedicel in male, at most 2 times in female; parafacial sparsely haired . . . . . *pauciseta* **sp. n.**

- First flagellomere about 4 times as long as pedicel in male; parafacial rather densely haired (female unknown) . . . . . *magnicornis* MESNIL

4. Basicosta reddish yellow; occiput with a complete row of black setulae behind postocular setae; abdomen usually with strong median discal setae at least on 4th tergum; antennal pedicel reddish in male and female; tibiae reddish yellow 5

- Basicosta black; upper occiput usually without a row of black setulae, rarely with an irregular row of fine black hairs or several fine black hairs near vertex; abdomen usually without median discal setae on intermediate terga, at most with rather fine setae on 4th in female; pedicel and tibiae usually darker in male 7

5. Facial ridge with only several hairs just above vibrissae; parafacial with rather dense long hairs on upper 1/2-2/3; 3rd abdominal tergum without median discal seta, 4th usually with 2 strong median discal setae . . . . . *japonica* (MESNIL)

- Facial ridge with short setae at least on lower 1/2 6

6. Parafacial with several fine and short hairs just below lowest frontal seta; antenna with 1st flagellomere about 4 times as long as pedicel in male (female unknown) . . . . . *antennalis* **sp. n.**

- Parafacial with short fine hairs on upper 1/2; 1st flagellomere 2.5-3 times as long as pedicel in male, about 2 times in female . . . . . *verna* (KOCHA)

7. 2+3 acr setae; 0+3 ia setae; tibiae reddish brown, at least on median portion of mid and hind tibiae; upper occiput with an irregular row of fine black hairs; male hind tibia with a rather sparsely set row of fine and long hair-like ad setae; male with fine inner vertical, ocellar and reclinate orbital setae that are only slightly stronger than hairs around vertex; male antennal pedicel short, 1st flagellomere falling short of lower margin of face by about length of pedicel (female unknown) . . . . . *fukushii* **sp. n.**

- 3+3 acr setae; 1+3 ia setae; tibiae brown-black; upper occiput without a row of black hairs, at most with several black hairs near vertex; hind tibia with a rather closely set row of well developed ad setae; inner vertical, ocellar and reclinate orbital setae strong and well distinguishable from other hairs (except *orientalis*); male pedicel rather long, 1st flagellomere falling short of lower margin of face by 1/2-3/5 length of pedicel 8

8. Palpus black, apex sometimes narrowly pale brown especially in female; frons at the narrowest point 0.18-0.21 of head width in male, vertex 0.29-0.3 of head width in female; parafacial only sparsely haired on upper 2/3 . . . . . *gemina* (MESNIL)

- Palpus reddish yellow, at most darkened basally; frons narrower in male 9

9. Gena wide, about 1/4 of eye height; upper occiput with several fine black hairs near vertex; 5th abdominal tergum broadly black on mid dorsal longitudinal portion, male abdominal dorsum thinly grayish white pollinose on anterior 3/5 of 3rd tergum and 2/3 of 4th; frons at the narrowest point 0.15-0.17 of head width in male, vertex 0.28-0.31 of head width in female . . . . . *amurensis* (BORISOVA)

- Gena narrower, 1/5-1/6 of eye height; upper occiput without black hairs; 5th abdominal tergum more or less densely pollinose except apex and narrow mid dorsal longitudinal

DOI: 10.21248/contrib.entomol.46.1.169-235

line, abdomen more densely pollinose in male and female 10

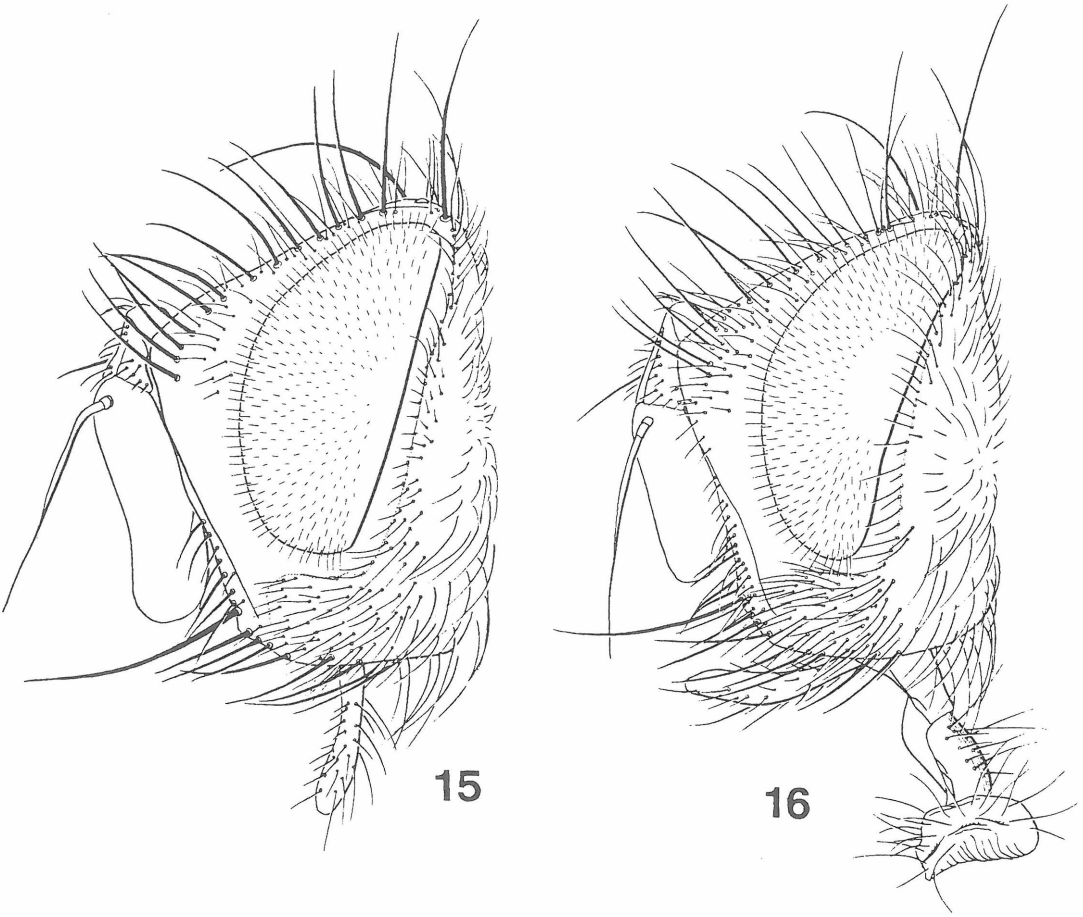
10. Male with fine and hair-like inner vertical, ocellar and reclinate orbital setae that are only slightly stronger than hairs around vertex; frons narrow, 0.07- 0.08 of head width at the narrowest point in male; 2nd and 3rd abdominal terga each with 1-2 marginal setae in addition to 2 regular strong median marginal setae (female unknown) . . . . . *orientalis* (BORISOVA)

- Inner vertical, ocellar and reclinate orbital setae strong, quite distinct from frontal hairs in male; frons wider in male; 2nd and 3rd abdominal terga each usually with 2 strong median marginal setae 11

11. Head dull yellowish white pollinose; frons at the narrowest point 0.13-0.17 of head width and gena about 1/5 of eye height in male (female unknown) . . . . . *harai* **sp. n.**

- Head densely whitish pollinose; frons at the narrowest point 0.1-0.12 of head width in male, 0.28-0.3 in female, gena about 1/6 of eye height in male and female . . . . . *amoena* (MEIGEN) & *laeta* (MESNIL)

(see section on *S. laeta* for separation of these species)



Figs 15-16 *Smidtia* spp. Male head in profile: **15** *antennalis* **sp. n.**; **16** *pauciseta* **sp. n.**

DOI: 10.21248/contrib.entomol.46.1.169-235

1. *Smidtia antennalis* sp. n.
(Figs 15, 17, 23, 29)

Male: Head densely grayish white pollinose, fronto-orbital plate darkened posteriorly; antenna brown-black, pedicel and base of 1st flagellomere reddish; palpus yellowish. Vertex 0.22-0.23 of head width; frontal vitta subequal in width to fronto-orbital plate at middle; parafacial 2/3-5/6 as wide as 1st flagellomere at middle height; gena 0.37-0.4 of eye height. Inner vertical seta 2/3-4/7 of eye height; outer vertical seta undeveloped; reclinate orbital seta about 3/4 as long as inner vertical seta; ocellar seta strong, subequal in length to reclinate orbital seta; 11-12 frontal setae, lowest seta nearly level with apex of pedicel; fronto-orbital plate with fine and rather dense hairs; parafacial almost bare, several hairs present just below lowest frontal seta; facial ridge with short setae on lower 1/2; occiput with a row of fine black hairs. Antenna long and stout, apex almost reaching to lower margin of face; 1st flagellomere about 3 times as long as wide, about 4.5 times as long as pedicel. Arista with 2nd aristomere wider than long. Palpus about 2/3 as long as 1st flagellomere of antenna.

Thorax black in ground color, scutellum reddish on apical 2/3; dorsum rather dense grayish white pollinose, 5 rather broad longitudinal vittae present on scutum, median vitta absent on postsutural scutum; pleura grayish pollinose. 3+3 acr setae; 3+4 dc setae; apical scutellar setae rather strong, crossing each other and suberect, subequal in length to lateral seta; distance between bases of 2 subapical scutellar setae about 1.5 times that between subapical and basal setae of corresponding side.

Wing hyaline, slightly tinged with dull yellow basally and along veins; basicosta pale brown to brown; lower calypter whitish. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 2:3.5:1.5; length of vein M from dm-cu crossvein to its bend about 1.5 times distance between the bend and wing margin.

Legs black; tibiae reddish yellow, darkened basally and apically; pulvilli yellowish. Mid tibia with 3 strong ad setae; hind tibia with a sparsely set row of ad setae. Claws and pulvilli long.

Abdomen black, side of 2nd and 3rd terga narrowly reddish; dorsum densely grayish white pollinose, with tessellate appearance; mid dorsal longitudinal vitta absent. Hairs long dense erect and black; 2nd tergum with 2 strong median marginal and 1-2 lateral marginal setae; 3rd tergum with 2 median discal, 2 median marginal and 2 lateral marginal setae, all setae very strong, a row of 4-5 rather strong suberect setae present on each side of median marginal setae; 4th tergum with 2 strong median discal and a row of strong marginal setae; 5th tergum with an irregular row of strong discal setae and a regular row of rather weak margin-al setae.

Male genitalia: Anteroventral portion of epandrium very narrow and elongate; dorsal arms of hypandrium long and broad on dorsal portion, closely associated with each other; cerci in dorsal view nearly parallel-sided, weakly narrowed apically, in lateral view flat and almost straight, apex weakly hooked ventrally; surstylus long and narrow, in lateral view not much narrowed posteriorly but rather parallel-sided, with short and dense hairs.

Female: Unknown.

Body length, 8.8-9.2 mm; wing length, 7.7-8.2 mm.

Distribution: Japan (Honshu, Kyushu).

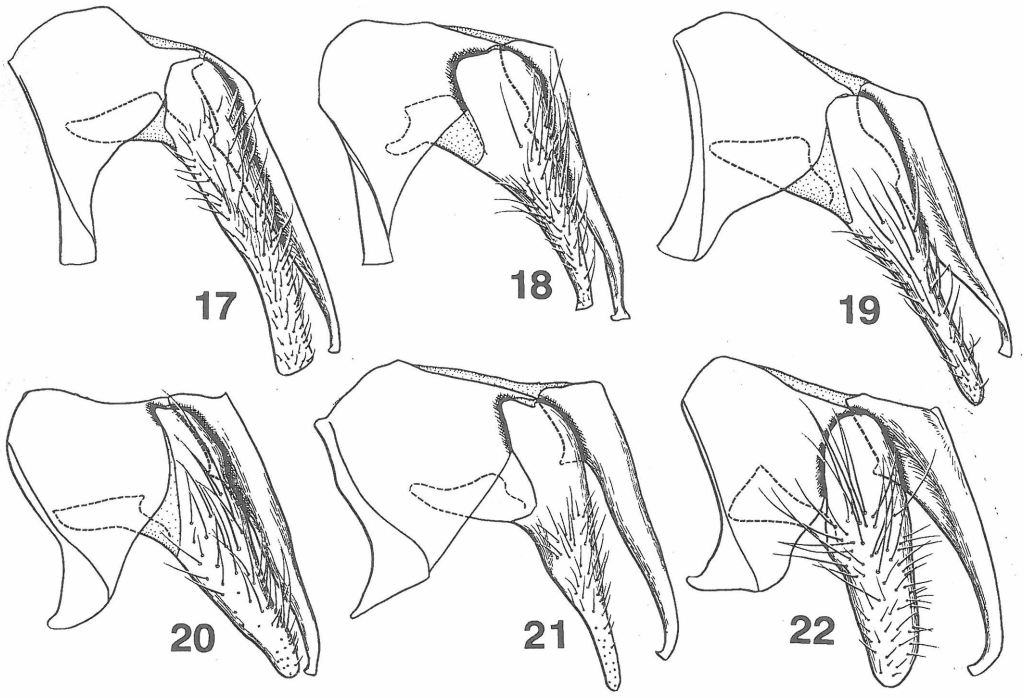
Holotype male, Honshu, Aomori, Hirosaki City, Zatoishi, 15.v.1989, S. Fukushi (BLKU).

Paratype: KYUSHU: 1 male, Miyazaki, Shiiba, Okawachi, 800-1,100 m, 24.v. 1974, H. Shima (BLKU).

Remarks: This species has similar features to those of the Burmese species *Smidtia varipes*

DOI: 10.21248/contrib.entomol.46.1.169-235

(MESNIL) (comb. nov.), but is easily distinguished from it by the long and stout antenna, black hairs on the abdomen and grayish white pollinose body.



Figs 17-22 *Smidtia* spp. Epandrium, surstylus and cerci in lateral view (hairs on epandrium and cerci omitted): **17** *antennalis* **sp. n.**; **18** *pauciseta* **sp. n.**; **19** *verna*; **20** *magnicornis*; **21** *trisetosa* **sp. n.**; **22** *japonica*.

2. *Smidtia pauciseta* sp. n.
(Figs 16, 18, 24, 30, 35, 36)

Closely resembling *S. conspersa* (MEIGEN), but differing as follows.

Male: Vertex narrow, frons at the narrowest point 0.16-0.18 of head width; parafacial sparsely haired on upper 1/2; gena about 1/3 of eye height; arista thickened on basal 2/5, 2nd aristomere short, at most as long as wide; 3+3 acr setae. Male genitalia: Anteroventral portion of epandrium very narrow; dorsal arms of hypandrium long and broad on dorsal portion, fused with each other mid-dorsally; cerci in dorsal view nearly parallel-sided from basal 1/4 to apical 1/6, apical portion evenly narrowed, in lateral view flat, weakly curved ventrally, apex distinctly hooked dorsally and ventrally; surstylus in lateral view long-triangular in shape, with long and dense hairs.

Female: Vertex 0.32-0.35 of head width; parafacial very sparsely fine-haired on upper 1/2, well narrowed below, about 1/2 as wide as 1st flagellomere at middle height; 1st flagellomere broadly reddish; 2nd aristomere short; 3+3 acr setae; mid and hind tibiae reddish especially

DOI: 10.21248/contrib.entomol.46.1.169-235

near middle; claws and pulvilli short. Female genitalia: rather elongate; intersegmental membrane between 6th and 7th segments distinctly longer than 6th sternum; several hairs present on both sides of membrane behind 7th hemitergites.

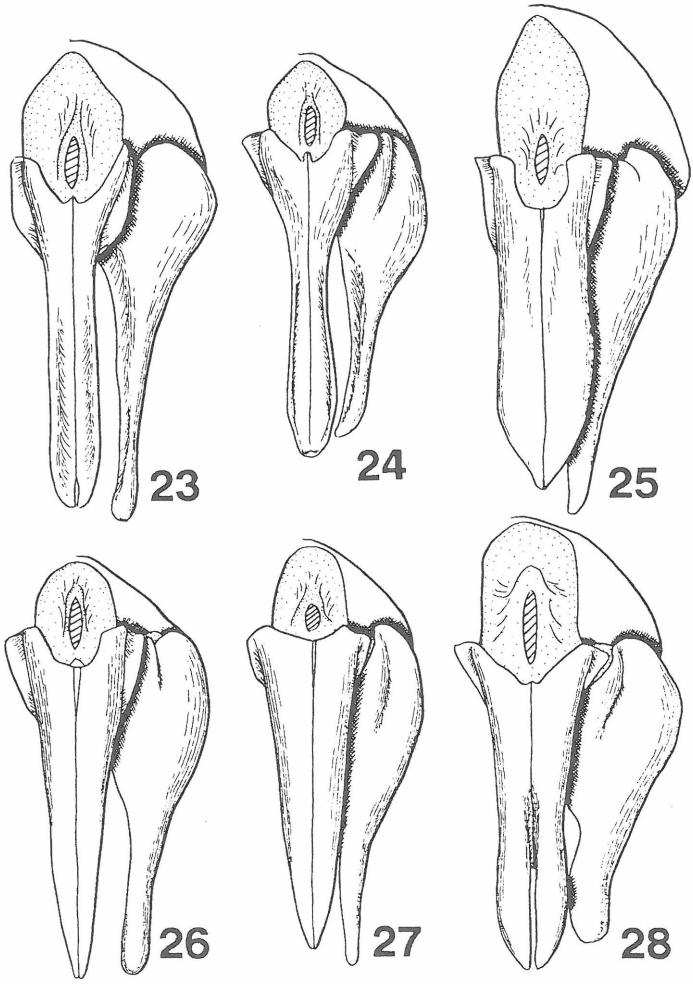
Body length, 6.2-7.8 mm; wing length, 5.5-7.1 mm.

Distribution: Japan (Hokkaido, Honshu).

Holotype male, Hokkaido, Nopporo, 3.vi.1973, M. Suwa (EIHU).

Paratypes: HOKKAIDO: 1 female, Ashorobuto, 30.vi.1967, T. Saigusa; 1 female, Mt. Upepesanke, 20.vii.1967, A. Nakanishi; HONSHU: 1 male, Nagano, Shimashima, 23.v.1975, A. Nakanishi & J. Emoto (Malaise trap)(all in BLKU); 1 female, Ishikawa, Komatsu, Sunodani, 12.v.1973, H. Kurahashi (NIH).

Remarks: In general appearance this species resembles *S. conspersa*, but the structure of the male genitalia seems to show a closer relationship to *S. antennalis*.



Figs 23-28 *Smidtia* spp. Epandrium, surstylus and cerci in dorsal view (hairs omitted): **23** *antennalis* **sp. n.**; **24** *pauciseta* **sp. n.**; **25** *verna*; **26** *magnicornis*; **27** *trisetosa* **sp. n.**; **28** *japonica*.

DOI: 10.21248/contrib.entomol.46.1.169-235

3. *Smidtia verna* (KOCHA) comb. n.
(Figs 19, 25, 31, 37)

Smidtiola verna KOCHA, 1971: 292.

This species was originally described from Hokkaido, and I have seen specimens from Kyushu. Although this species is not recorded from Honshu in this study, it must occur there, too. HERTING (1984) did not treated this species in his catalog and later HERTING & DELY-DRASKOVITS (1993) erroneously cited this species as originally described in *Timavia*.
KOCHA (1971) placed this species in *Smidtiola*, but in general appearance this species seems to have intermediate features between *Smidtiola* and *Smidtia* in MESNIL's sense. Description of this species was given in detail by KOCHA (1971), and here are added some characteristics of the male and female genitalia.
Male genitalia: Anteroventral portion of hypandrium very narrow and long; dorsal arms of hypandrium long, closely associated with each other; cerci in dorsal view rather broad and parallel-sided from base to apical 1/5, in lateral view narrowed and flattened to apex; surstylus in lateral view narrow and long, blunt apically, with dense long hairs; distiphallus weakly widened to apex in lateral view, dorsodistal portion rather narrow.
Female genitalia: Very narrow and long, especially elongate in intersegmental area between 7th and 8th segments; 8th hemitergite and 8th sternum very narrow and long.
Distribution: Japan (Hokkaido, Kyushu).
Type material examined. Holotype male of *Smidtiola verna* KOCHA, Hokkaido, Maruyama, 1.v.1968, T. Kocha (EIHU).
Other specimens examined. KYUSHU: 2 males, Fukuoka, Mts. Sefuri, Mizunashi, 24.iv.1984, H. Shima; 1 female, Fukuoka, Mt. Sefuri, 13.v.1986, H. Shima; 1 female, Fukuoka, Mt. Kusenbu, 25.iv.1986, H. Shima; 1 male, Mt. Kusenbu, 6.v.1988, H. Shima (all in BLKU).
Remarks: In general appearance this species resembles *S. antennalis*, but may be distinguished from it by the shorter antenna and densely haired upper 1/2 of parafacial. The female of this species is characterized by very long female genitalia.

4. *Smidtia magnicornis* MESNIL
(Figs 20, 26, 32)

Smidtia magnicornis MESNIL, 1967: 40.

This species was originally described from a male obtained in Hokkaido, and I have seen another male from Honshu. As MESNIL (1967) mentioned, this species seems to be closely allied to *S. conspersa*, and the structure of the male genitalia also seem to show the close relationship between these two species. Description of this species was given by MESNIL (1967) in detail.
Male genitalia: Cerci in dorsal view evenly narrowed posteriorly, in lateral view flat, apex weakly bent ventrally; surstylus in lateral view evenly narrowed to blunt apex, with dense and long hairs.
Distribution: Japan (Hokkaido, Honshu).
Type material examined. Holotype male of *Smidtia magnicornis* MESNIL, Sapporo, Mt. Moiwa, 16.v.1966, S. Takano (CNC).

DOI: 10.21248/contrib.entomol.46.1.169-235

Other specimen examined. HONSHU: 1 male, Yamanashi, Kanayama, 1,100-1,500 m, 19.vi. 1975, J. Emoto (Malaise trap) (BLKU).

5. *Smidtia trisetosa* sp. n.
(Figs 21, 27, 33, 45)

Male: Head grayish white pollinose, upper portion of fronto-orbital plate darkened, gena and occiput grayish; antenna brown-black; palpus reddish yellow, weakly darkened at base. Vertex 0.16-0.18 of head width; frontal vitta subequal in width to fronto-orbital plate at middle; parafacial well narrowed below, subequal in width to 1st flagellomere at middle height; gena wide, 0.28-0.3 of eye height. Hairs fine long dense and black; inner vertical setae fine hair-like, about 1/2 of eye height, crossing each other; ocellar seta and reclinate orbital seta fine hair-like, slightly shorter than inner vertical seta; 8-10 fine hair-like frontal setae; profrons and anterior 1/2-1/3 of parafacial with very dense long hairs; facial ridge with dense long fine hairs on lower 1/2; vibrissa nearly level with lower margin of face; genal dilation with long dense hairs; occiput with 2-3 rows of fine black hairs. Antenna long, falling short of lower margin of face by about 1/2 length of pedicel; 1st flagellomere about 3 times as long as pedicel. Arista with 2nd aristomere about 2 times as long as wide. Palpus subequal in length to 1st flagellomere of antenna.

Thorax black in ground color, scutellum reddish brown on apical 1/2-1/3; dorsum thinly grayish pollinose, 4 narrow longitudinal vittae visible when seen from behind; postpronotal lobe and pleural region rather densely grayish white pollinose. Hairs long fine dense and black; all setae fine and rather hair-like; 2-3+3 acr; 3+3 dc; 0+3 ia; preapical scutellar seta fine long and hair-like; lateral scutellar seta very fine, slightly longer than apical seta; apical scutellar setae fine, 1.2-1.3 times as long as scutellum, crossing each other and suberect; subapical scutellar setae rather close to each other, distance between their bases only slightly more than that between subapical and basal setae of corresponding side.

Wing narrow in shape, weakly tinged with brown; basicosta black. Second costal sector about 1/2 as long as 3rd, slightly longer than 4th; vein M from dm-cu crossvein to its bend about 1.5 times distance between the bend and wing margin.

Legs black; pulvilli dull yellowish. Mid-tibia with 3 ad, 3 pd, 2 pv and 1 v setae; hind tibia with a row of sparsely set ad setae, submedian one strong, 3-4 pd and 3 v setae; 3 strong preapical d setae present on hind tibia. Claws and pulvilli elongate.

Abdomen black, narrowly reddish on side of 2nd and 3rd terga; dorsum of 3rd tergum thinly grayish white pollinose on anterior 1/2, the pollinosity dense on side; 4th tergum rather densely grayish white, somewhat dull yellowish, pollinose on dorsum of anterior 2/3, and 5th tergum pollinose on anterior 3/4; a broad mid dorsal longitudinal vitta distinct on 4th and 5th terga. Hairs long dense and erect, strong and bristle-like on mid dorsal portion of intermediate terga; 2nd tergum with 2 strong median marginal and 2-3 lateral marginal setae; 3rd tergum with 4 median marginal and 3-4 lateral marginal setae, 4th with a row of long marginal setae, and 5th with rows of discal and marginal setae mixed with many erect strong hairs.

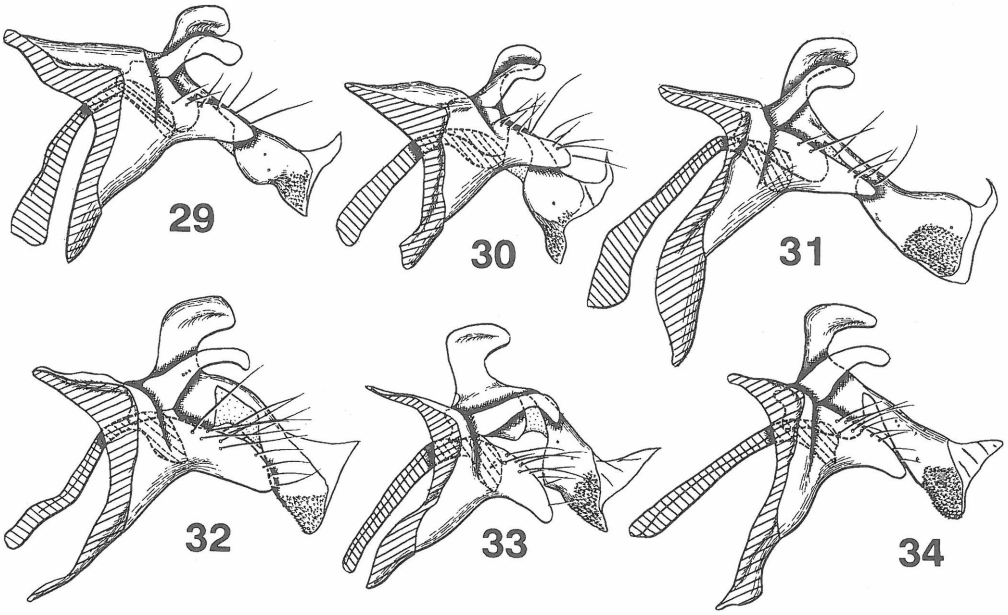
Male genitalia: Cerci in dorsal view slender, evenly tapering to apex, in lateral view straight, weakly curved ventrally at apex; surstylus in lateral view narrow, tapering to apex, with short hairs.

Female: Unknown.

Body length, 8.0-8.7 mm; wing length, 7.5-8.4 mm.

DOI: 10.21248/contrib.entomol.46.1.169-235

Distribution: Japan (Shikoku, Kyushu).
Holotype male, Shikoku, Ehime, Omogokei, 5-6.iv.1974, S. Shinonaga (BLKU).
Paratypes: SHIKOKU: 1 male, same data as holotype; KYUSHU: 1 male, Kumamoto, Mt. Shira-tori, 18.iv.1981, I. Otsuka (all in BLKU).
Remarks: This species is peculiar in having strong submedian pv setae on the mid tibia, 3 preapical d setae on the hind tibia and very dense hairs on the parafacial. In general appearance this species resembles members of the genus *Phryno,* but the structure of the male genitalia apparently shows the characteristics of *Smidtia*.
This species seems to be allied to *S. conspersa*, but is much more specialized in weak head and thoracic setae and in the chaetotaxy of the legs.



Figs 29-34 *Smidtia* spp. Hypandrium, gonopod, paramere and aedeagus in lateral view: **29** *antennalis* **sp. n.**; **30** *pauciseta* **sp. n.**; **31** *verna*; **32** *magnicornis*; **33** *trisetosa* **sp. n.**; **34** *japonica.*

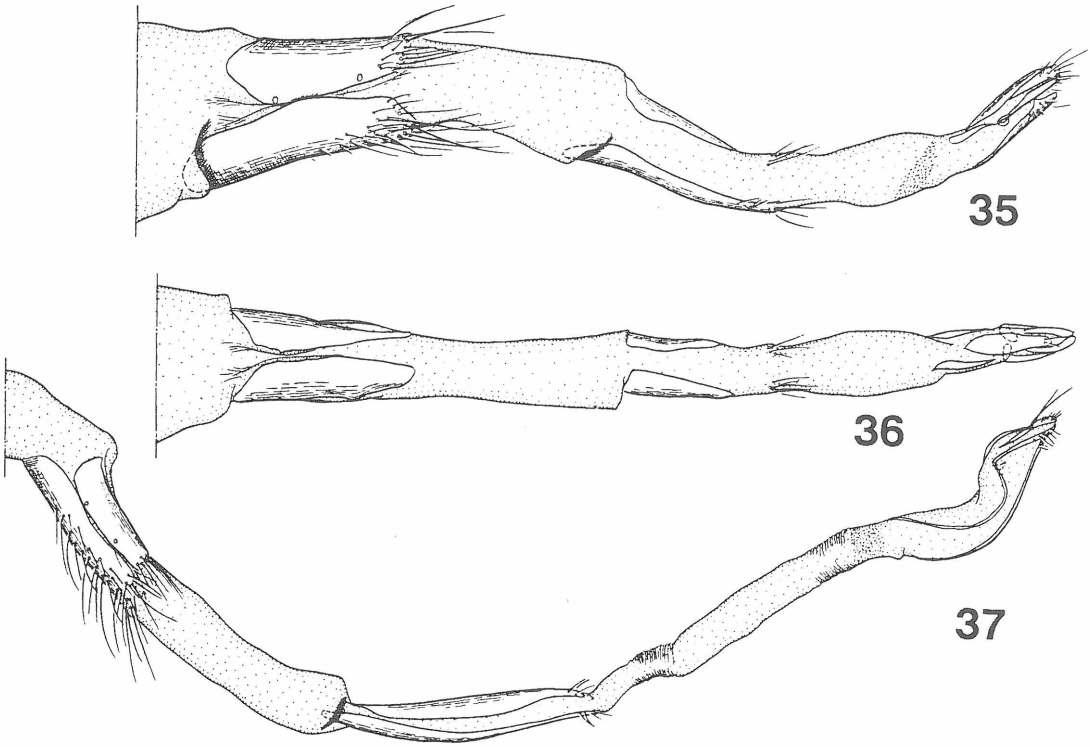
6. *Smidtia japonica* (MESNIL) comb. n.
(Figs 22, 28, 34, 60)

Nemosturmia japonica MESNIL, 1957: 9.

This species has intermediate characters between *Smidtiola* and *Timavia* in MESNIL's sense, such as a row of black setulae on the occiput, the haired parafacial on its upper 1/2 and almost bare facial ridge except for several setulae just above the vibrissa. The male genitalia of this species are rather peculiar among members of this genus in having rather well separated cerci on the apical portion. The holotype male and another male specimen seem to have been reared at the same time in Mitaka, Tokyo, from a sawfly species. This is the first record of a sawfly as a host of the Winthemiini in the Old World (this host record was not mentioned by MESNIL in his description of *japonica*). Detailed description of this species was given by MESNIL (1957).

DOI: 10.21248/contrib.entomol.46.1.169-235

Male genitalia: Cerci in dorsal view nearly parallel-sided from base to posterior 1/5, separated from each other on apical 1/3, in lateral view curved ventrally at apical 1/5; surstylus in lateral view broad, weakly narrowed posteriorly, with dense and long hairs on basal portion.
Female: Differing from male as follows: Frons wide, vertex 0.31-0.34 of head width; all head setae strong, outer vertical seta and 2 reclinate and proclinate orbital setae developed; parafacial rather sparsely haired on upper 1/2; antennal pedicel long, 1st flagellomere only 2 times as long as pedicel; claws and pulvilli short; thorax and abdomen more densely whitish pollinose than in male. Female genitalia: Rather short; 7th hemitergite small; 7th sternum short and small; several hairs present on both sides of weakly sclerotized area behind 7th hemitergites and on ventral weakly sclerotized area behind 7th sternum.
Distribution: Japan (Honshu, Kyushu, Tsushima).
Host: HYMENOPTERA: Cimbycidae: *Palaeocimbex carinulata* (KONOW)[Mitaka, Honshu].



Figs 35-37 *Smidtia* spp. Female genitalia in lateral view (35, 37) and dorsal view (36): **35-36** ***pauciseta*** **sp. n.; 37** ***verna***.

Type material examined. Holotype male of *Nemosturmia japonica* MESNIL, Mitaka, 2.vi.1949 (L), 21.iv.1950 (A), T. Okutani (CNC).
Other specimens examined. HONSHU: 1 male, same data as holotype, with host data, *Palaeocimbex carinulata* (KNW)(EIHU); 1 male, Saitama, Minano, 29.iv.1972, K. Hara; 1 male, Yamanashi, Amarisawa, 11.v.1974, A. Nakanishi; 1 male, Wakayama, Susami, Mirozu, 12.iv. 1972, K. Yamagishi (all in BLKU); TSUSHIMA: 1 male, Hitakatsu, 27.v.1968, H. Shima; 1 male, Sasuna, 26.v.1968, M. Honda; KYUSHU: 1 male, Fukuoka, Mt. Kusenbu, 21.v.1990,

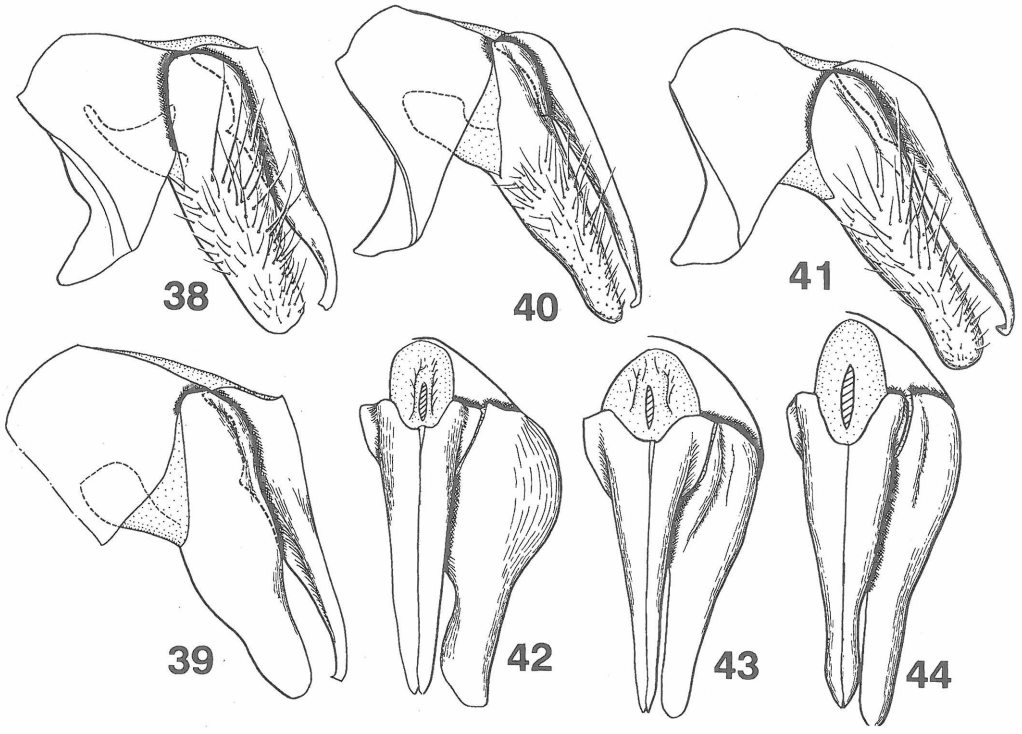
DOI: 10.21248/contrib.entomol.46.1.169-235

H. Shima; 1 female, Kumamoto, Mt. Ichifusa, 800-1,300 m, 26.v.1974, H. Shima; 1 male, Miyazaki, Shiiba Vill., Okawachi, 800-1,100 m, 24.v.1974, H. Shima (all in BLKU).

7. *Smidtia amoena* (MEIGEN) comb. n.
(Figs 38, 39, 42, 62, 63, 64, 65)

Tachina amoena MEIGEN, 1824: 264.
Tachina delitescens WALKER, 1853: 73.
Tachina certans WALKER, 1853: 74.
Chetolyga pilifera RONDANI, 1859: 110.

This species is widely distributed in the Palearctic Region. This is the most common species of this genus in Japan and seems to have at least two generations a year. Many males are sometimes observed hovering under trees in the morning from May to June. Two lepidopterous species have been recorded previously as hosts of this species in Japan, and here are added 2 other species.



Figs 38-44 *Smidtia* spp. Epandrium, surstylus and cerci in lateral view (hairs on epandrium and cerci omitted) (38-41) and in dorsal view (hairs omitted) (42-43): **38** *amoena* from Japan; **39** *amoena* from Europe; **40** *laeta;* **41** *harai* **sp. n.**; **42** *amoena* from Japan; **43** *laeta*; **44** *harai* **sp. n.**

Males of Japanese specimens identified as this species differ from European specimens of *amoena* in having narrower frons (0.1-0.12 of head width at the narrowest point) and narrower gena (1/5-1/6 of eye height), and the male genitalia are also slightly different in the shape of the

DOI: 10.21248/contrib.entomol.46.1.169-255

surstylus (Figs 38, 39). I treat here, however, this common Japanese species as conspecific with European *S. amoena*.

Male: Head densely white pollinose, fronto-ortibal plate reflecting somewhat grayish with direction of light, gena and upper occiput grayish pollinose; antenna brown-black, base of 1st flagellomere sometimes reddish yellow; palpus reddish yellow, darkened at base. Frons at the narrowest point 0.1-0.12 of head width; frontal vitta about 2 times as wide as fronto-orbital plate at middle; parafacial rather weakly narrowed below, about 3/5 as wide as 1st flagellomere at middle height; gena narrow, 0.17-0.19 of eye height. Hairs fine long dense and black; inner vertical setae fine, about 1/3 of eye height, converging apically; ocellar seta and reclinate orbital seta slightly shorter than inner vertical seta; 11-13 frontal setae, lowest seta nearly level with middle of pedicel; parafacial with dense fine and rather long hairs at least on upper 2/3; facial ridge with several fine hairs just above vibrissa; vibrissa nearly level with lower margin of face; genal dilation with long dense hairs; occiput without black hairs. Antenna falling short of lower margin of face by about 1/2 length of pedicel; 1st flagellomere 1.8-2 times as long as pedicel. Arista with 2nd aristomere slightly longer than wide. Palpus slightly longer than 1st flagellomere of antenna.

Thorax black in ground color, scutellum reddish yellow except narrow basal portion, rather thinly grayish white pollinose; 5 longitudinal black vittae distinct on dorsum. Hairs long fine dense and black; all setae strong; 3+3 acr; 3+4 dc; 1+3 ia; preapical scutellar seta rather strong; lateral scutellar seta slightly shorter than apical seta; apical scutellar setae about 1.5 times as long as scutellum, crossing each other suberectly; distance between bases of subapical scutellar setae about 1.5 times that between subapical and basal setae of corresponding side.

Wing only slightly tinged with pale brown at base; basicosta black. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1:2:1; vein M from dm-cu crossvein to its bend about 1.5 times distance between the bend and wing margin.

Legs black; pulvilli dull yellowish. Mid-tibia with 3-4 ad, 2 pd and 1 v setae; hind tibia with a row of rather closely set ad setae, submedian one strong, 2-3 pd and 3-4 v setae; 2 preapical d setae present on hind tibia. Claws and pulvilli elongate.

Abdomen black, narrowly reddish on side of 2nd and 3rd terga; dorsum rather densely grayish white or pale yellowish white pollinose, with tessellate appearance, posterior portion of each tergum shining black; a narrow mid dorsal longitudinal vitta distinct on 3rd to 5th terga. Hairs long dense fine and erect; 2nd tergum with 2 strong median marginal and 1 lateral marginal setae; 3rd tergum with 2 strong median marginal and 3-4 lateral marginal setae, 1-2 rather strong setae sometimes present in addition to 2 median marginal setae; 4th tergum with a row of strong marginal setae, and 5th with rows of fine discal and marginal setae mixed with many erect strong hairs.

Male genitalia: Cerci in dorsal view weakly narrowed to apex, in lateral view weakly bent ventrally on apical 1/6; surstylus broad, in lateral view very weakly narrowed to rounded apex, with long and dense hairs on mid-dorsal portion.

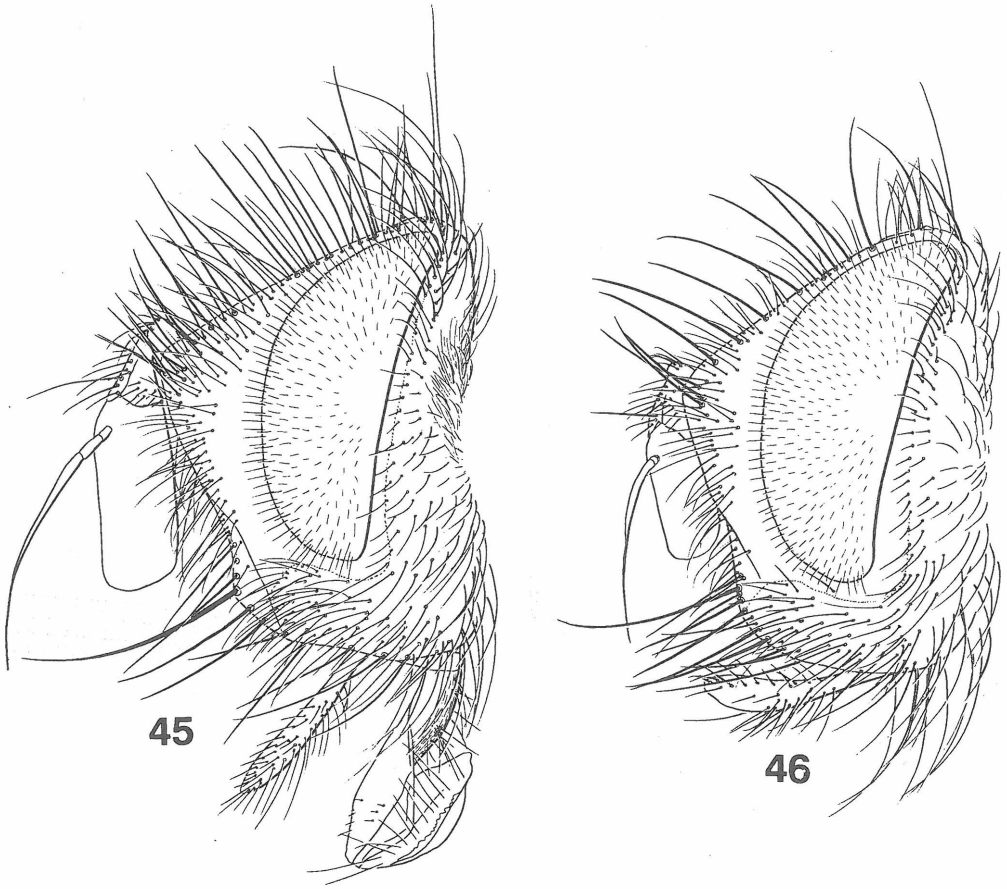
Female: Differing from male as follows: Head more whitish pollinose; frons wide, vertex 0.28-0.31 of head width; frontal vitta at most 1.5 times as wide as fronto-orbital plate at middle; parafacial more strongly narrowed below; all head setae strong, inner vertical seta slightly less than 2/3 of eye height; outer vertical seta about 2/3 as long as inner seta; ocellar seta slightly shorter than outer vertical seta; 2 reclinate and proclinate orbital setae; 6-8 frontal setae; antenna falling short of lower margin of face by about 1/3 length of pedicel. Thorax more densely

DOI: 10.21248/contrib.entomol.46.1.169-235

whitish pollinose; hairs shorter. Claws and pulvilli short. Abdomen more densely whitish or grayish white pollinose, posterior portion of each tergum more narrowly black; hairs strong and short. Female genitalia: 6th tergum rather long, sometimes narrowly divided into 2 hemitergites; 7th hemitergites short, with a few hairs on membrane behind the hemitergites; 7th sternum with several hairs on posterior portion.

Distribution: Japan (Hokkaido, Honshu, Kyushu, Tsushima); Europe northwards to England, S. Norway, S. Sweden and Leningrad; Transcaucasia, Khazakhstan, Tadzhikstan, S. Siberia; China.

Hosts: LEPIDOPTERA: Arctiidae: *Arctia caja phaeosoma* (BUTLER)[Hokkaido] (TAKANO, 1950, as *Winthemia amoena*); Geometridae: *Tristrophis veneris* (BUTLER) [Hokkaido]; Noctuidae: *Celaena leucostigma* (HÜBNER) [Obihiro, Hokkaido]; Notodontidae: *Drymonia dodonides* (STAUDINGER) [Sasayama, Honshu] (SHIMA, 1973, as *Nemosturmia amoena*).



Figs 45-46 *Smidtia* spp. Male head in profile; **45** *trisetosa* **sp. n.**; **46** *fukushii* **sp. n.**

Type material examined. Holotype male of *Tachina delitescens* WALKER, England (BMNH); holotype female of *Tachina certans* WALKER, England (BMNH).

DOI: 10.21248/contrib.entomol.46.1.169-235

Other specimens examined. 150 males 39 females from the following localities (all in BLKU): HOKKAIDO: Mts. Taisetu: Yukomanbetsu, Ten'ninkyo; Nukabira; Ashoro; Mt. Yubari; Mt. Apoi; HONSHU: Aomori: Mt. Bonju; Hirosaki, Zatoishi; Mt. Iwaki: Saitama: Moroyama; Yoshida; Kamikawa; Arakawa; Ogano; Minano; Ryokami; Tokigawa; Misato; Yorii: Niigata, Deya: Nagano: Shimashimadani; Shigakogen; Karuizawa: Yamanashi: Kanayama; TSUSHIMA: Mt. Ariake; Mt. Matsunashi; Kuwa; Sumo; KYUSHU: Fukuoka: Minami Park; Mt. Aburayama; Mt. Inunaki; Mt. Kusenbu; Mt. Sefuri: Mts. Kuju: Yoshibu; Mt. Kuroiwa: Kumamoto: Naidaijin, 650-800 m; Momiki-Gokanosho: Mts. Kirishima: Jingu-Yunono; Yunono: Is. Yaku, Miyanoura.

8. *Smidtia laeta* (MESNIL) comb. n.
(Figs 40, 43, 66)

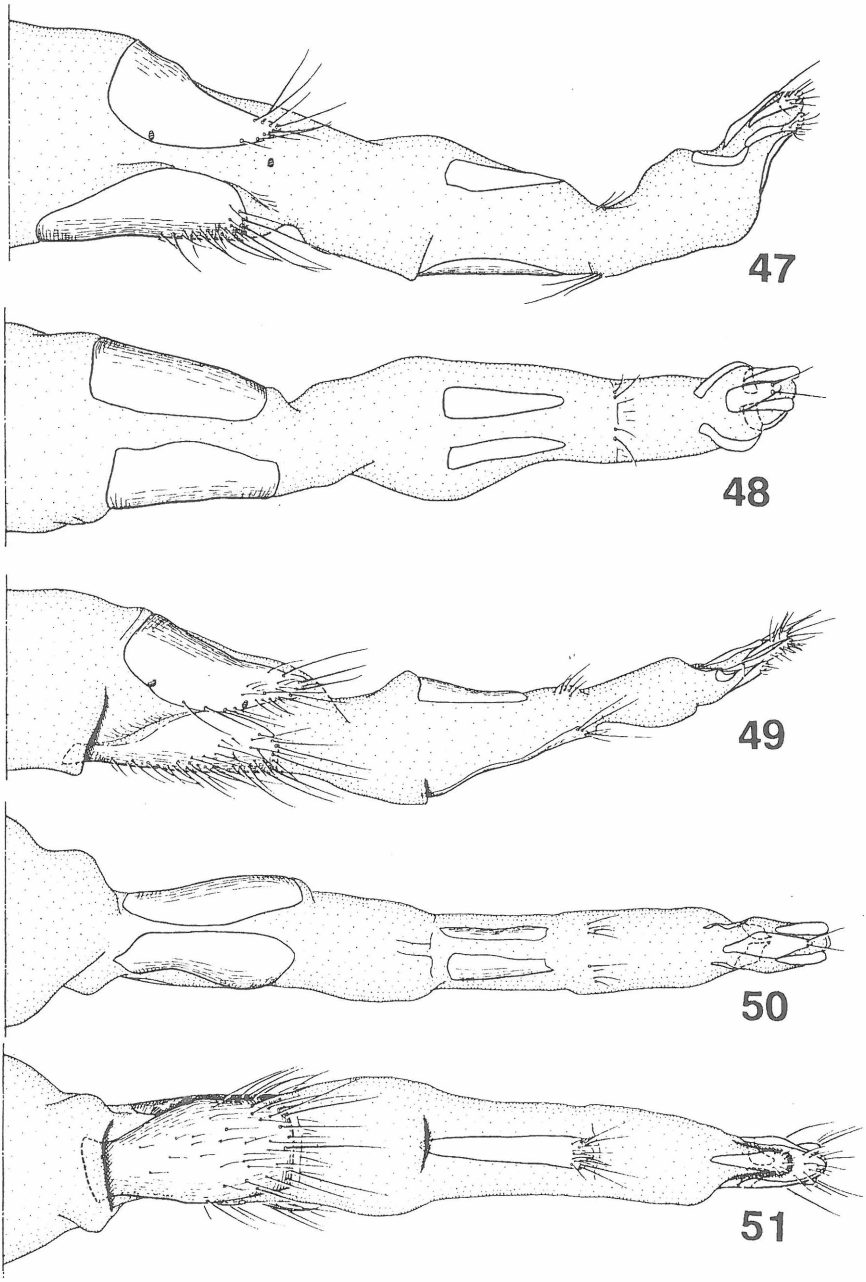
Nemosturmia laeta MESNIL, 1963: 5.

This species very closely resembles *S. amoena*, but in general has narrower frons, more yellowish pollinose head and more thinly pollinose abdomen than *amoena*. The width of frons, however, seems to vary significantly from individual to individual in both *amoena* and *laeta*, and differences in the color and density of pollinosity of the head and abdomen are rather minor, so these species can be distinguished with certainty only by the shape of the male cerci. I have seen some female which may belong to this species, but the identification of them is left for further study. Diagnostic characters of this species were given by MESNIL (1963).
Male genitalia: Resembling *amoena*; cerci in dorsal view very narrow, evenly narrowed to apex, in lateral view nearly straight, weakly bent ventrally at apex; surstylus in lateral view narrower than in *amoena*, evenly narrowed to blunt apex.
Distribution: Japan (Hokkaido, Honshu); Europe (France).
Type material examined. Holotype male of *Nemosturmia laeta* MESNIL, France, nr. Versaille, La Colle Sr Choud, 21.v.1939 (CNC).
Other specimens examined. HONSHU: 9 males, Nagano, Shimashimadani, 22-24.v.1975, A. Nakanishi & J. Emoto (Malaise trap)(BLKU).

9. *Smidtia harai* sp. n.
(Figs 41, 44, 67)

Very closely resembling *S. amoena* but differing as follows.
Male: Head dull yellowish white pollinose; vertex wide, frons at the narrowest point 0.13-0.17 of head width; gena wide, about 0.2 of eye height; parafacial more densely haired than in *amoena*; abdominal hairs longer and stronger than in *amoena*, long hairs on 4th abdominal tergum more than 1/2 length of 4th tergum. Male genitalia: Closely resembling *amoena*; cerci more distinctly narrowed to apex in dorsal view, in lateral view nearly straight and apex angularly bent ventrally; surstylus with dense long hairs, in lateral view narrower than in *amoena*.
Female: Unknown.
Body length, 7.3-12.3 mm; wing length, 7.0-9.2 mm.
Distribution: Japan (Honshu).
Holotype male, Honshu, Nagano, Karuizawa, Kutsukake, 9.vii.1966, H. Shima (BLKU).

DOI: 10.21248/contrib.entomol.46.1.169-235



Figs 47-51 *Smidtia* spp. Female genitalia in lateral view (47, 49), dorsal view (most hairs omitted) (48, 50) and ventral view (51): **47-48** *conspersa*; **49-51** *gemina*.

Paratypes: HONSHU: 1 male, Mt. Hakkoda, Okiagetani, 3.viii.1985, S. Fukushi; 1 male, Saitama, Mitsumine, 23.vii.1974, K. Hara; 6 males, same locality as holotype, 9-11.vii.1960, H. Shima; 1 male, same data as holotype except for collector, M. Honda; 1 male, Karuizawa,

DOI: 10.21248/contrib.entomol.46.1.169-235

Nagahinata, 12.vii.1966, H. Shima; 3 males, Nagano, Shimashimadani, 4-5.vii.1966, H. Shima (all in BLKU).

Remarks: This species very closely resembles *S. amoena* and *laeta* in general appearance, and differs from them mainly in its wider frons and gena. The male genitalia of this species also only slightly differ from those of *amoena* and *laeta* in the shape of the cerci. I think, however, these differences are enough to treat these species as distinct from each other. I have seen some females with a broader gena than the female of *amoena*, but the identification of them is left for further study.

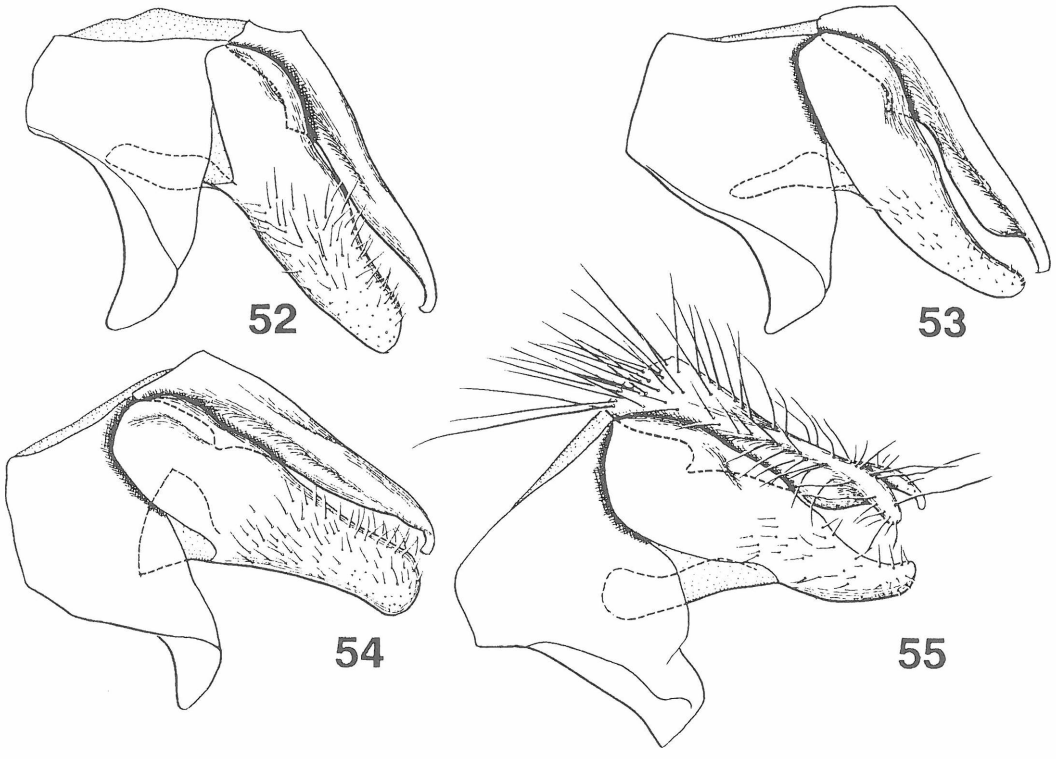
10. *Smidtia gemina* (MESNIL) comb. n.

(Figs 49, 50, 51, 52, 56, 68)

Nemosturmia gemina MESNIL, 1949: 75.

This species was originally described from China, and has also been collected in Japan. This species is peculiar among members of this genus in its black palpus.

Male genitalia: Cerci in dorsal view broad, nearly parallel-sided from basal 1/6 to 5/6, narrowed apically, in lateral view nearly straight, weakly curved ventrally at apex; surstylus broad, in lateral view weakly narrowed to blunt apex, with short and dense hairs on apical 1/2.



Figs 52-55 *Smidtia* spp. Epandrium, surstylus and cerci in lateral view (hairs on epandrium and cerci omitted except in 55): **52** *gemina*; **53** *amurensis*; **54** *orientalis*; **55** *fukushii* **sp. n.**

DOI: 10.21248/contrib.entomol.46.1.169-235

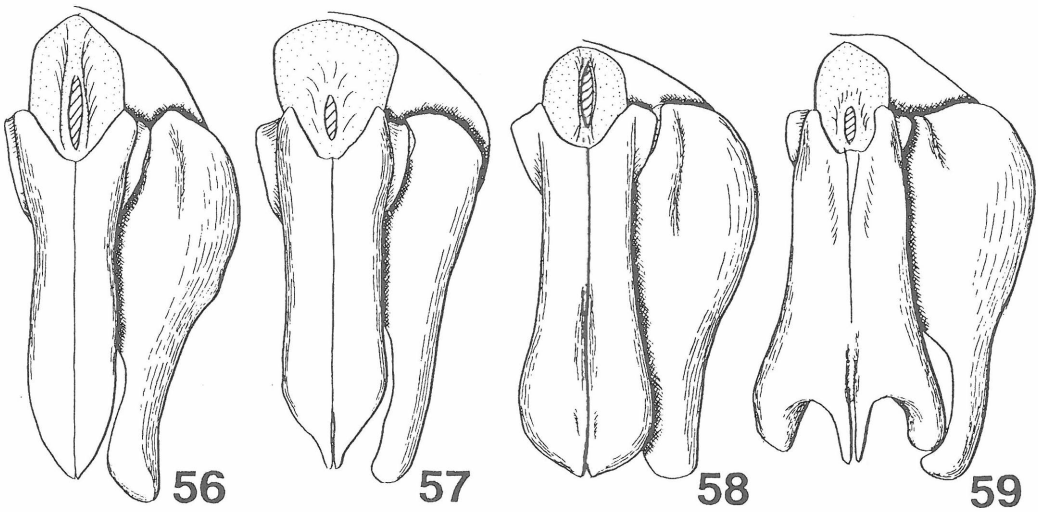
Female: Differing from male as follows: Frons wide, vertex 0.27-0.29 of head width; outer vertical seta and 2-3 reclinate and 2 proclinate orbital setae developed; apex of palpus sometimes narrowly reddish brown; claws and pulvilli short. Female genitalia: Resembling *amoena*, but 6th tergum more broadly separated into 2 hemitergites, 7th hemitergites and sternum smaller.
Distribution: Japan (Honshu, Tsushima, Kyushu); Korea, China.
Specimens examined. HONSHU: 1 male, Tokyo, Mt. Takao, 8.vi.1971, R. Kano; 1 male, Niigata, Okutadami, 26.vii.1955, Y. Ohmori; 1 male, Niigata, Sado, Ryotsu, Akadamasugiike, 22.vii.1970, K. Baba; 1 female, Yamanashi, Amarisawa, 5.v.1975, T. Saigusa; 1 male, Ishikawa, Nomidani, 27.v.1977, I. Togashi (all in BLKU); 1 male, Kanazawa, Nodayama, ix.1964, H. Kurahashi (NIH); 1 male, Wakayama, Kozagawa, 14-20.v.1964, T. Kumata (EIHU); 1 male, Shimane, Mt. Sambe, 16.vi.1964, K. Buei (BLKU); TSUSHIMA: 1 female, Mt. Tatsura, 23.v.1968, H. Shima; KYUSHU: 1 female, Fukuoka, Aburayama, 15.viii.1987, H. Shima; 1 male, Fukuoka, Mt. Inunaki, 28.v.1982, H. Shima; 1 female, Fukuoka, Kuroki, 9.viii.1979, H. Shima; 1 male, Kagoshima, Lake Imuta , 16.v.1965, H. Shima (all in BLKU).

11. *Smidtia amurensis* (BORISOVA) comb. n.
(Figs 53, 57, 69, 72, 73, 74)

Nemosturmia amurensis BORISOVA, 1962: 326.

Closely resembling *S. amoena*, but differing as follows.
Male: Fronto-orbital plate dark grayish; vertex wide, frons at the narrowest point 0.15-0.17 of head width; gena wide, 0.25-0.27 of eye height; antenna falling short of lower margin of face by only about 1/2 length of pedicel, 1st flagellomere about 2 times as long as pedicel; upper occiput with an irregular row of fine black hairs near vertex; scutellum dark reddish on at most apical 2/3, sometimes reddish only on median portion; wing with cells br, bm and cup more or less distinctly brownish tinged; wing vein M from dm-cu crossvein to its bend about 2 times distance between the bend and wing margin; abdominal dorsum thinly grayish white pollinose on anterior 3/5 of 3rd tergum and 2/3 of 4th; 5th abdominal tergum thinly grayish white pollinose on side, median portion broadly black.
Male genitalia: Cerci resembling those of *gemina*, in lateral view more distinctly narrowed apically; surstylus in lateral view weakly curved dorsally, with very fine short hairs.
Female: Differing from female of *S. amoena* as follows: Gena wide, 0.26-0.29 of eye height; antennal pedicel about 1/2 as long as 1st flagellomere; occiput with several fine black hairs near vertex; wing distinctly tinged with brown as in male; dorsum of 5th abdominal tergum broadly black on median longitudinal portion. Female genitalia: 6th tergum reduced to 2 small hemitergites which are at most 2/3 as long as 6th sternum; 7th hemitergites still smaller, without hair. Body length, 6.9-11.5 mm; wing length, 6.3-10.2 mm.
Distribution: Japan (Hokkaido, Honshu); Far East Russia (Amur).
Specimens examined. HOKKAIDO: 1 male 1 female, Nukabira, 4.vii.1986, H. Shima (BLKU); 1 male 1 female (in copula), Mts. Daisetsu, Ten'ninkyo, 9-13.vii.1986, H. Shima; 1 female, Mts. Daisetsu, Yukomanbetsu, 10-13.vii.1986, H. Shima; 1 male, Ashoro, Berabonai, 5.vii. 1986, M. Abe; HONSHU: 1 male, Niigata, Mikuni Pass, 13.vii.1966, Y. Miyatake; 1 male, Gifu, Ontake, Nigorigo-onsen, 9.vii.1969, A. Nagatomi (all in BLKU).
Remarks: This species was described from Amur, Far East Russia. I have found specimens corresponding well to the original description of this species from Hokkaido and Honshu, Japan.

DOI: 10.21248/contrib.entomol.46.1.169-235



Figs 56-59 *Smidtia* spp. Epandrium, surstylus and cerci in dorsal view (hairs omitted): **56** *gemina*; **57** *amurensis*; **58** *orientalis*; **59** *fukushii* **sp. n.**

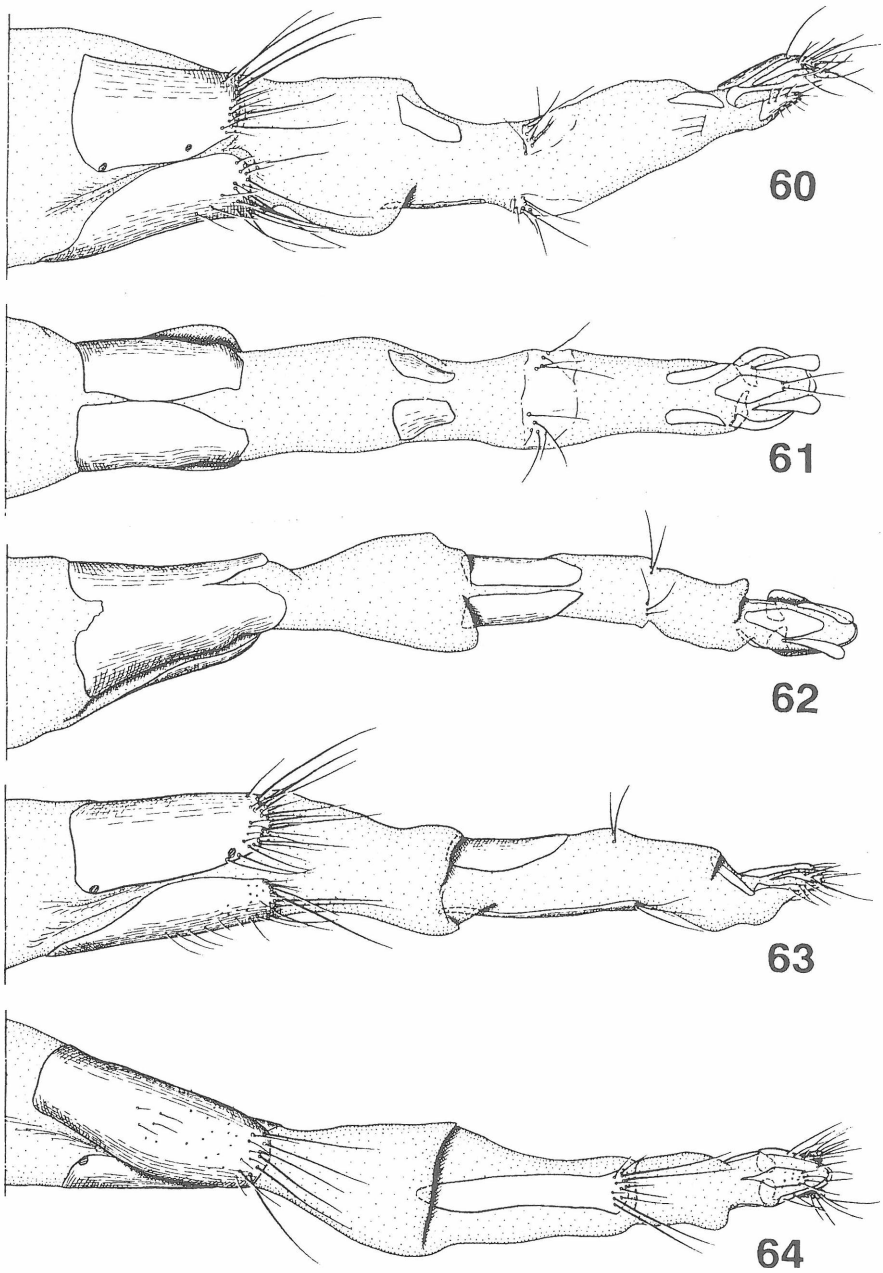
This species closely resembles *S. amoena, laeta* and *harai*, but may be distinguished from them by the broad gena, presence of fine black hairs on the upper occiput near the vertex, broadly black abdominal apex and dark male abdomen. The male genitalia of this species are also different from those of *amoena* in the broad and parallel-sided cerci.

12. *Smidtia orientalis* (BORISOVA) comb. n.
(Figs 54, 58, 70)

Nemosturmia orientalis BORISOVA, 1962: 328.

Closely resembling *S. amoena*, but differing as follows.
Male: Frons narrow, 0.07-0.08 of head width at the narrowest point; all head setae fine, hairs long and dense; inner vertical seta 1/3-2/7 of eye height; ocellar and reclinate orbital setae fine, shorter than inner vertical seta, only slightly longer than postocellar seta; 16-18 frontal setae, upper ones hair-like; parafacial with dense and long hairs; abdomen with fine hairs; 2nd and 3rd abdominal terga each with 2-4 rather strong marginal setae in addition to strong median marginal setae.
Male genitalia: Cerci in dorsal view broad, widened apically and rather rounded at apex, in lateral view bent ventrally at apex; surstylus broad, in lateral view weakly narrowed posteriorly, with short and dense hairs on dorsodistal portion.
Female: Unknown.
Body length, 10.9-11.2 mm; wing length, 9.4-9.5 mm.
Distribution: Japan (Honshu); Far East Russia (Primorye).
Specimens examined. HONSHU: 2 males, Nagano, Shimashimadani, 23.v.1975, A. Nakanishi & J. Emoto (Malaise trap) (BLKU).

DOI: 10.21248/contrib.entomol.46.1.169-235

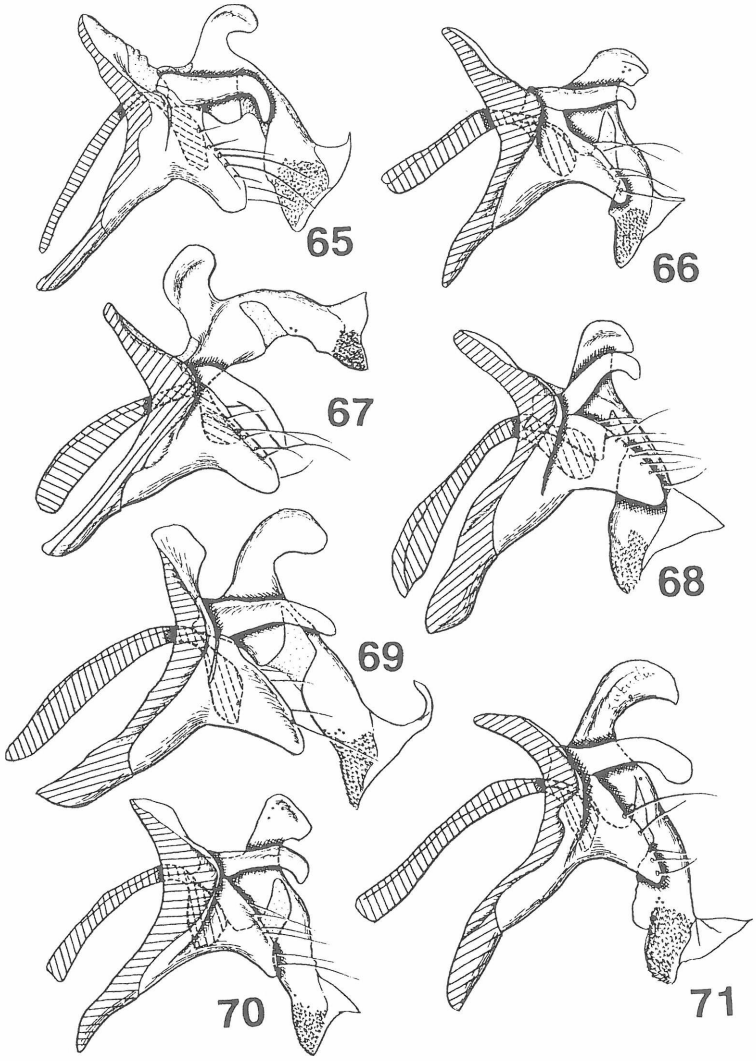


Figs 60-64 *Smidtia* spp. Female genitalia in lateral view (60, 63), dorsal view (most hairs omitted) (61-62) and ventral view (64): **60-61** *japonica*; **62-64** *amoena*.

Remarks: This species is peculiar in the broad cerci of the male genitalia, although in general appearance closely resembles *S. amoena* and related species mentioned above. This species may be distinguished from them by weak head setae and very narrow vertex in the male. This

DOI: 10.21248/contrib.entomol.46.1.169-235

species was originally described from Primorye, Far East Russia, and is here recorded from Honshu.



Figs 65-71 *Smidtia* spp. Hypandrium, gonopod, paramere and aedeagus in lateral view: **65** *amoena*; **66** *laeta*; **67** *harai* **sp. n.**; **68** *gemina*; **69** *amurensis*; **70** *orientalis*; **71** *fukushii* **sp. n.**

13. *Smidtia fukushii* sp. n.

(Figs 46, 55, 59, 71)

Resembling *S. amoena*, but differing as follows.

Male: Gena wide, 0.28-0.32 of eye height; all head setae fine; inner vertical setae crossing or converging each other, about 2/5 of eye height, only slightly longer than hairs around vertex; ocellar seta subequal in length to inner vertical seta and slightly longer than reclinate orbital

DOI: 10.21248/contrib.entomol.46.1.169-235

seta; lowest frontal seta nearly level with base of pedicel; parafacial hairs dense and long; occiput rather strongly bulged, with an irregular row of fine black hairs behind row of postocular setae; antenna with pedicel and base of 1st flagellomere broadly reddish, pedicel short, 1/2-2/5 as long as 1st flagellomere, 1st flagellomere falling short of lower margin of face by about length of pedicel.

Thorax with rather fine setae and long hairs; 2+3 acr setae; 0+3 ia setae; discal scutellar seta fine and hair-like, sometimes indistinct.

Wing long and wide, tinged with pale brown along veins, distinctly tinged along r-m crossvein; basal node of vein R4+5 with only 1 fine setula or none; relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1:2:1; vein M from dm-cu crossvein to its bend about 2 times distance between the bend and wing margin.

Legs with tibiae pale brownish or yellowish brown on median portion; hind tibia with a row of fine hair-like ad setae, submedian seta strong.

Abdominal dorsum thinly whitish pollinose on 3rd tergum which contrasts with densely pollinose 4th tergum, densely grayish white pollinose on anterior 3/4 of 4th tergum and on almost entire 5th, apex of 5th tergum narrowly black; hairs long and dense, long hairs on mid dorsal area of 4th tergum about 4/5 as long as 4th tergum.

Male genitalia: Cerci in dorsal view broad, tripartite apically, with many long hairs; surstylus in lateral view narrowed apically and weakly curved dorsally, with only minute hairs.

Female: Unknown.

Body length, 9.7-11.6 mm; wing length, 9.0-11.0 mm.

Distribution: Japan (Honshu).

Holotype male, Honshu, Akita, Oga Pen., Mt. Shinzan, 4.v.1989, S. Fukushi (BLKU).

Paratypes: HONSHU: 3 males, same data as holotype (BLKU).

Remarks: This species is distinct in having fine setae and long and dense hairs on the body, densely pollinose dorsum of 4th and 5th abdominal terga which contrasts with thinly pollinose 3rd tergum, pale brownish tibiae, and long and wide wing.

Genus *Winthemia* ROBINEAU-DESVOIDY

Winthemia ROBINEAU-DESVOIDY, 1830: 173. Type species: *Musca quadripustulata* FABRICIUS, 1794, by designation of Desmarest in d'Orbigny, 1849 (after EVENHUIS & THOMPSON, 1990).

Dorbinia ROBINEAU-DESVOIDY, 1847: 272. Type species: *Dorbinia ludibunda* ROBINEAU-DESVOIDY, 1847 (= *Musca quadripustulata* FABRICIUS, 1794), by subsequent designation of ROBINEAU-DESVOIDY, 1863

Eversmannia ROBINEAU-DESVOIDY, 1863: 181. Type species: *Eversmannia ruficauda* ROBINEAU-DESVOIDY, 1863 (= *Nemoraea erythrura* MEIGEN, 1824), by original designation.

Arge ROBINEAU-DESVOIDY, 1863: 182. Preoccupied by *Arge* SCHRANK, 1802. Type species: *Arge terminalis* ROBINEAU-DESVOIDY, 1863 (= *Musca quadripustulata* FABRICIUS, 1794), by original designation.

Dorbinia of TOWNSEND, 1941: 99 (nec ROBINEAU-DESVOIDY), 1847. Misidentification of *Dorbinia ludibunda* ROBINEAU-DESVOIDY, 1863.

Dorbiniella MESNIL, 1949: 85. As subgenus. New name for *Dorbinia* of TOWNSEND, 1941 (nec ROBINEAU-DESVOIDY, 1847)

The genus *Winthemia* has well been recognized by the haired parafacial, absence of reclinate orbital setae in the male, rather quadrate or semicircular head shape, usually 1+1 katepisternal

DOI: 10.21248/contrib.entomol.46.1.169-235

setae, and broadly truncated apex of the 5th abdominal tergum. In the male genitalia this genus is characterized by having long epiphallus and narrowly and backwardly curved dorsal membranous apex of distiphallus. In the female genitalia this genus is characterized by the reduction of the 7th abdominal sternum and 8th hemitergites (e.g. Figs 93, 119).

The genus *Winthemia* is widely distributed and very diverse in the world. Members of this genus are sometimes very similar to each other and difficult to identify species especially in females. Diagnostic keys are available for 8 European species (TSCHORSNIG & HERTING, 1994), 11 Chinese species (SHIMA et al., 1992), 12 Oriental and Australasian species (CANTRELL, 1989) and 26 North American species (GUIMARAES, 1972; SABROSKY, 1973), but there still seem to remain many difficulties in identifying species and problems with the identities of some described species.

Key to Japanese species of Winthemia

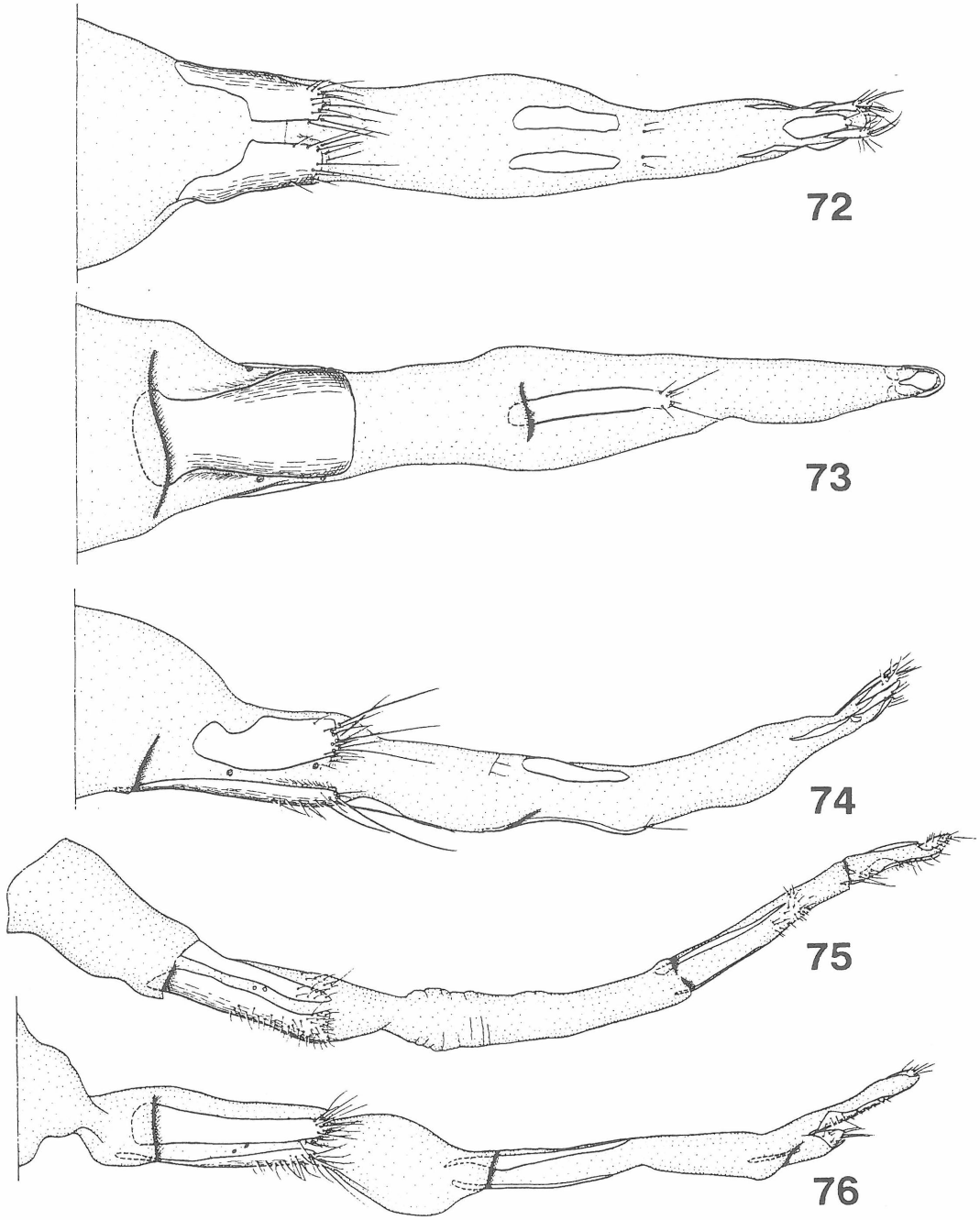
1. Anepisternum with dense and apically frizzled pale yellowish white hairs behind row of anepisternal setae 2
- Anepisternum without pale yellowish hairs 6
2. Males 3
- Females (female of *remittens* unknown) 5
3. Second and 3rd abdominal terga each with strong median marginal setae; abdomen without distinct hair fascicles on venter of 4th and 5th terga; vertex wide, slightly wider than 1/4 of head width . . . . . *marginalis* SHIMA, CHAO et ZHANG
- 2nd and 3rd abdominal terga without median marginal setae; venter of 4th and 5th abdominal terga each with a pair of broad hair fascicles of dense and long hairs; vertex narrow, 1/5 of head width or much narrower 4
4. Claws and pulvilli short, fore claw and pulvillus at most as long as 5th tarsomere; 1+1 katepisternal setae . . . . . *mallochi* BARANOV
- Claws and pulvilli distinctly longer than 5th tarsomere; usually 2+1 katepisternal setae . . . . . *remittens* (WALKER)
5. Vertex about 2/7 of head width; parafacial mostly with black hairs; prosternum with whitish hairs mixed with several black ones; abdominal apex black . . . . . *marginalis* SHIMA, CHAO et ZHANG
- Vertex about 1/4 of head width; parafacial hairs mostly whitish; prosternum with fine whitish hairs; abdominal apex usually reddish . . . . . *mallochi* BARANOV & *sumatrana* (TOWNSEND)
6. Males 7
- Females (females of *brevipennis* and *ikezakii* unknown) 16
7. Abdomen with a pair of hair fascicles at least on venter of 4th tergum 8
- Abdomen without hair fascicles 13
8. Hair fascicles present only on venter of 4th abdominal tergum, small and roundish; vertex narrow, less than 1/6 of head width . . . . . *sumatrana* (TOWNSEND)
- Hair fascicles present on both 4th and 5th terga, larger, though sometimes sparse; vertex wider, about 1/5 of head width or more 9
9. Vertex about 0.2 of head width; thorax dark brown in ground color, thinly grayish white pollinose on dorsum . . . . . *angusta* SHIMA, CHAO et ZHANG
- Vertex wider, 0.22-0.27 of head width; thorax more densely pollinose 10

DOI: 10.21248/contrib.entomol.46.1.169-235

10. Thorax and abdomen densely golden yellowish pollinose . . . . . *venustoides* (MESNIL)
- Thorax and abdomen grayish white or pale yellowish white pollinose 11
11. Parafacial narrower than 1st flagellomere at middle height; gena about 0.18 of eye height . . . . . *miyatakei* **sp. n.**
- Parafacial wider than 1st flagellomere at middle height; gena wide, about 0.2 of eye height 12

12. Vertex about 0.27 of head width; vibrissa inserted above level of lower margin of face by about 1/2 length of pedicel; thorax pale yellowish white pollinose on dorsum; wing short, about 1.5 times as long as abdomen . . . . . *brevipennis* **sp. n.**
- Vertex about 0.23-0.25 of head width; vibrissa nearly level with lower margin of face; thoracic dorsum grayish white pollinose; wing longer, about 1.8 times as long as abdomen . . . . . *ikezakii* **sp. n.**
13. Mid tibia with 3 strong ad setae; 3rd abdominal tergum with 2-4 strong median marginal setae; thorax rather thinly grayish white pollinose on dorsum . . . *cruentata* (RONDANI)
- Mid tibia with only 1 ad setae; 3rd abdominal tergum usually without median marginal seta; thoracic dorsum very thinly dark grayish pollinose or thinly grayish white pollinose 14
14. First flagellomere shorter than 2 times length of pedicel; vertex 0.22-0.24 of head width; 5th abdominal tergum densely whitish pollinose on anterior 2/3-3/4 . *venusta* (MEIGEN)
- 1st flagellomere about 2.5 times as long as pedicel; vertex 0.19-0.21 of head width 15
15. Thorax broadly blackish dorsally, postpronotal lobe, notopleural area and supra-alar area dark golden yellow or grayish yellow pollinose, no distinct longitudinal vittae; 5th abdominal tergum rather thinly whitish pollinose on anterior 1/2; gena narrow, 0.13-0.15 of eye height; lower calypter brownish . . . . . *speciosa* (EGGER)
- Thoracic dorsum rather densely pale brownish yellow or yellowish gray pollinose on presutural area and broadly on supra-alar area, with 4 broad longitudinal vittae; 5th abdominal tergum densely whitish pollinose on anterior 3/4; gena wider, 0.18-0.19 of eye height; lower calypter whitish . . . . . *mediocris* **sp. n.**
16. Mid tibia with 2-3 ad setae; abdominal apex more or less reddish . . . . . *cruentata* (RONDANI)
- Mid tibia with only 1 ad seta 17
17. Body golden yellow or yellowish pollinose 18
- Pollinosity whitish or at most pale yellowish white 19
18. Antenna with 1st flagellomere about 3 times as long as pedicel, and about 2 times as long as wide . . . . . *speciosa* (EGGER)
- 1st flagellomere about 3.5 times as long as pedicel, and about 2.5 times as long as wide . . . . . *venustoides* (MESNIL)
19. Abdomen broadly reddish brown in ground color; 5th abdominal tergum entirely pale yellowish white pollinose; 1st flagellomere about 2.5 times as long as pedicel . . . . . *angusta* SHIMA, CHAO et ZHANG
- Abdomen broadly black in ground color; 5th abdominal tergum not pollinose and exposing black ground color on apical 1/2; 1st flagellomere at most 2 times as long as pedicel . . . . . *venusta* (MEIGEN)

DOI: 10.21248/contrib.entomol.46.1.169-235



Figs 72-74 *Smidtia amurensis*. - **Fig. 75** *Crypsina prima*. - **Fig. 76** *Nemorilla floralis*. Female genitalia in dorsal view (72), ventral view (most hairs omitted) (73) and lateral view (74-76).

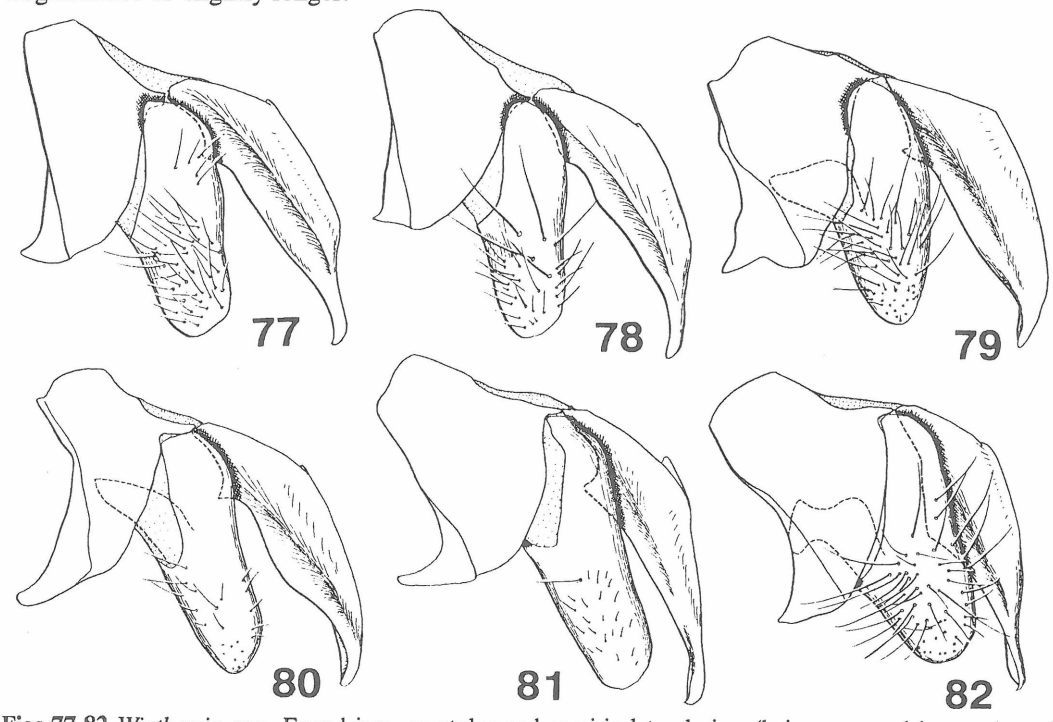
DOI: 10.21248/contrib.entomol.46.1.169-235

1. *Winthemia venusta* (MEIGEN)
(Figs 77, 78, 83, 84, 93, 94)

Tachina venusta MEIGEN, 1824: 327.
Chaetolyga cilitibia RONDANI, 1859: 109.
Winthemia hokkaidensis BARANOV, 1939: 110. **Syn. nov.**

This is one of the most common species of *Winthemia* in Japan and northern and central China, though it is said to be difficult to find in Europe (MESNIL, 1949). Adults are found from May to September, but most abundant in mid summer.

Male: Fronto-orbital plate and upper parafacial densely yellowish pollinose, upper fronto-orbital plate sometimes black, lower portion of parafacial and face whitish pollinose, genal dilation and occiput grayish or dull yellowish gray pollinose; antenna brown-black, narrowly reddish on basal portion of 1st flagellomere; palpus reddish yellow. Vertex 0.2-0.22 of head width; frontal vitta only slightly wider than fronto-orbital plate at middle; parafacial subequal in width to 1st flagellomere; gena 0.16-0.18 of eye height. Outer vertical seta about 2/3 as long as inner seta; 12-14 frontal setae, lowest seta nearly level with apex of pedicel; parafacial with 3-4 rows of fine short black hairs; vibrissa nearly level with lower margin of face. Antenna falling short of lower margin of face by about 1/2 length of pedicel; 1st flagellomere about 1.8-2 times as long as pedicel, about 2.5 times as long as wide. Palpus rather weakly clavate, about as long as 1st flagellomere or slightly longer.



Figs 77-82 *Winthemia* spp. Epandrium, surstylus and cerci in lateral view (hairs on epandrium and cerci omitted): **77** *venusta* from Hokkaido; **78** *venusta* from Kyushu; **79** *mediocris* **sp. n.**; **80** *speciosa*; **81** *venustoides*; **82** *cruentata*.

DOI: 10.21248/contrib.entomol.46.1.169-235

Thorax black in ground color, reddish yellow or pale brownish on scutellum; dorsum broadly black or thinly dark brownish pollinose, postpronotal lobe and notopleural and intra-alar regions rather densely grayish white pollinose, pleura thinly grayish white pollinose; broad median and rather narrow outer longitudinal black vittae visible on dorsum when seen from behind. Hairs fine dense and black.

Wing hyaline, slightly tinged with pale brown on anterior portion; lower calypter pale yellowish white. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1.5:2.5:1; vein M from dm-cu crossvein to its bend slightly longer than distance between the bend and wing margin.

Legs black, pulvilli pale brownish. Mid tibia with 1 ad and 2 pd setae, the latter rather short; hind tibia with a rather closely set row of ad setae, without strong submedian seta among them. Claws and pulvilli very long.

Abdomen broadly black in ground color, reddish on side of 3rd and 4th terga and sometimes on apex of 5th; dorsum densely and broadly white or pale yellowish white pollinose, black on syntergum 1+2 and narrow posterior portion of each 3rd to 5th terga; venter thinly whitish pollinose. Hairs dense fine short and recumbent on 3rd and 4th terga, suberect on 5th; 3rd tergum usually without median marginal setae; venter without hair fascicle.

Male genitalia: Cerci in lateral view rather flat, in dorsal view narrowly separated from each other on apical 1/6-1/7; surstylus in lateral view nearly parallel-sided or weakly narrowed posteriorly, with rather long and dense hairs.

Female: Differing from male as follows: Fronto-orbital plate and narrow upper parafacial densely pale yellowish white pollinose, lower parafacial, face, gena and occiput whitish pollinose; vertex 0.29-0.32 of head width; inner and outer vertical and ocellar setae distinctly stronger than in male; 1 reclinate and 2 proclinate orbital setae present; 8-10 frontal setae; hairs on fronto-orbital plate and parafacial sparser; parafacial slightly narrower than 1st flagellomere; 1st flagellomere 2-2.2 times as long as pedicel, about 2.3 times as long as wide; palpus clavate, yellowish; thoracic dorsum densely pale yellowish white pollinose, with 5 longitudinal black vittae, median vitta sometimes disappearing, pleura rather thinly grayish white pollinose; hind tibia with a row of ad setae more sparsely set than in male and a strong submedian seta; claws and pulvilli short; 2nd and 3rd abdominal terga each with 2 strong median marginal setae; 5th abdominal tergum black on posterior 1/3. Female genitalia: 6th hemitergite strongly narrowed on posterior 1/2; 7th hemitergite short and narrow; 7th sternum absent; 8th hemitergite indistinct; epiproct with a pair of very fine apical hairs.

Distribution: Japan (Hokkaido, Honshu, Kyushu); Palearctic.

Hosts: LEPIDOPTERA, Geometridae: *Ascotis selenaria cretacea* (BUTLER) [Ishikawa, Honshu] (TOGASHI, 1985); Notodontidae: *Stauropus fagi persimilis* BUTLER [Ishikawa, Honshu], *Torigea straminea* (MOORE) [Hakone, Honshu].

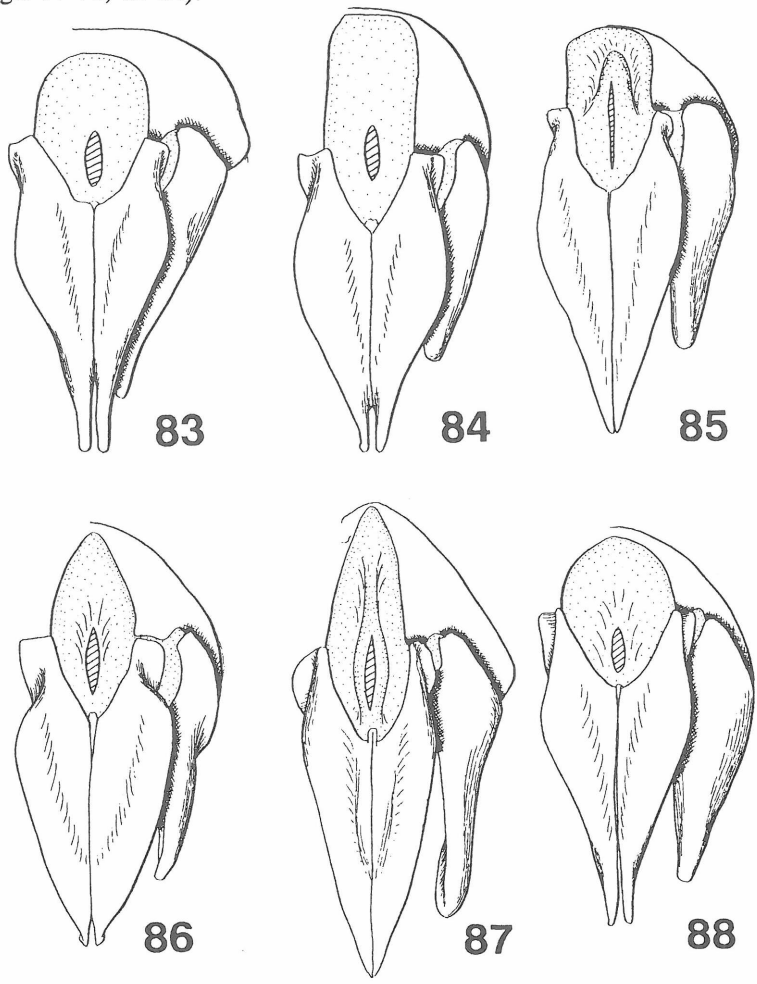
Type material examined. Holotype female of *Winthemia hokkaidensis* BARANOV, Hokkaido, Sapporo, 10.ix.1923, S. Takano (USNM).

Other specimens examined. 151 males 38 females from the following localities: HOKKAIDO: Shibecha; Nukabira; Ashoro; Shotoshibetsu; Aizankei; Ten'ninkyo; Mt. Antaroma; Obihiro; Mt. Apoi; HONSHU: Aomori: Shimokita; Natsudomari Pen.; Mt. Iwaki; Hirosaki City; Aomori City: Saitama: Yorii; Mitsumine; Chichibu; Ogose; Ryokami; Moroyama; Mt. Buko (all in BLKU); Hakone (NIAS): Nagano: Shimashimadani; Kamikochi: Ishikawa: Itaodani; Tsurugi: Niigata: Kurokawa; KYUSHU: Fukuoka: Mt. Aburayama; Mt. Inunaki; Mt. Wakasugi; Mt. Kusenbu: Nagasaki: Mt. Tara; Hirado Is.; Matsuura: Kagoshima: Mt. Kirishima; Kagoshima

DOI: 10.21248/contrib.entomol.46.1.169-235

City; Cape Sata; Is. Yaku (all in BLKU).

Remarks: In Hokkaido there seems to occur two forms of this species, i.e. usual form with densely pollinose abdomen and apparently dark form: the dark form has a grayish white pollinose head and thinly grayish white pollinose abdomen in both sexes; males sometimes bear 2-4 weak but distinct median marginal setae on the 3rd abdominal tergum; the male vertex is also slightly wider than in usual form. I treat both as conspecific, because I can find no distinct difference in the male genitalia of both forms. The dark form is mainly found in early July. Among specimens from Hokkaido and Kyushu there is a slight difference in the shape of the male cerci (Figs. 77-78, 83-84).



Figs 83-88 *Winthemia* spp. Epandrium, surstylus and cerci in dorsal view (hairs omitted): **83** *venusta* from Hokkadio; **84** *venusta* from Kyushu; **85** *mediocris* **sp. n.**; **86** *speciosa*; **87** *venustoides*; **88** *cruentata*.

2. *Winthemia mediocris* sp. n.

(Figs 79, 85, 89, 99)

Resembling *W. venusta*, but differing as follows.

DOI: 10.21248/contrib.entomol.46.1.169-235

Male: Head whitish pollinose, fronto-orbital plate pale yellowish white and darkened toward vertex; vertex 0.2-0.21 of head width; frontal vitta about 2 times as wide as fronto-orbital plate at middle; antenna reddish on apical portion of pedicel and basal 1/2-1/3 of 1st flagellomere, 1st flagellomere about 2.8 times as long as pedicel; thoracic dorsum rather densely pale brownish gray or grayish pollinose on postpronotal lobe, presutural area and broad supra-alar area of postsutural scutum, very thinly brownish pollinose on median and posterior portion of postsutural scutum, with 5 broad longitudinal vittae, outer vitta distinctly wider than pollinose portion between inner and outer vittae on postsutural area; abdomen broadly reddish yellow in ground color, densely whitish pollinose.

Male genitalia: Cerci in dorsal view rather evenly narrowed from basal 1/2 to apex, in lateral view weakly curved ventrally at apex; surstylus broad and rounded apically, with many long hairs; distiphallus rather narrow in lateral view.

Female: Unknown.

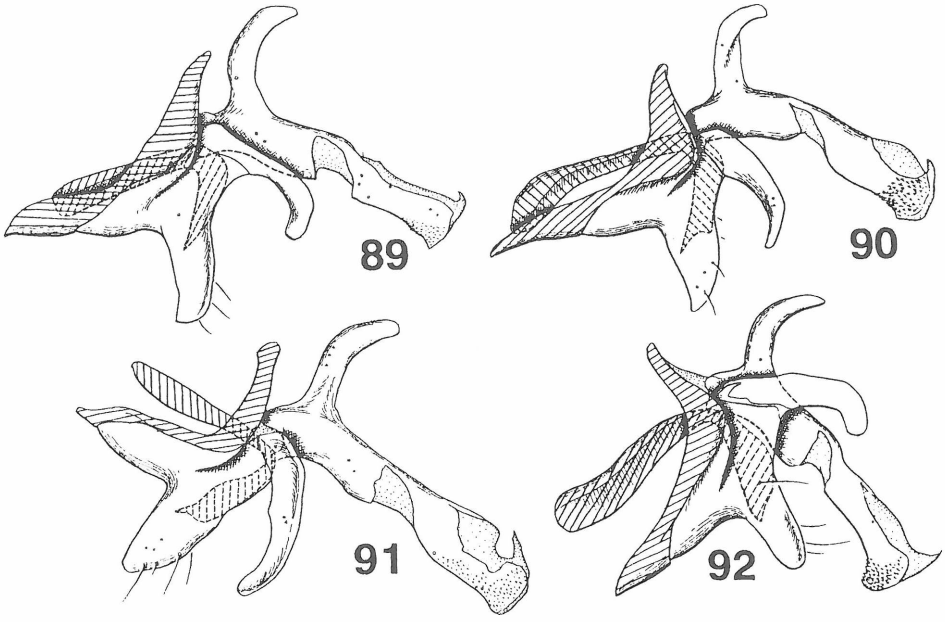
Body length, 9.0-9.2 mm; wing length, 7.2-7.4 mm.

Distribution: Japan (Hokkaido, Honshu).

Holotype male, Hokkaido, Ashoro, Berabonai, 24.vii.1967, H. Shima (BLKU).

Paratype: HONSHU: 1 male, Yamanashi, Kanayama, 21.vii.1970, M. Honda (BLKU).

Remarks: This species seems to be intermediate in many characters between *W. venusta* and *W. speciosa*. It is easily distinguished from these two species by the well pollinose thoracic dorsum.



Figs 89-92 *Winthemia* spp. Hypandrium, gonopod, paramere and aedeagus in lateral view: **89** *mediocris* **sp. n.**; **90** *speciosa*; **91** *venustoides*; **92** *cruentata*.

3. *Winthemia speciosa* (EGGER)
(Figs 80, 86, 90)

Nemoraea speciosa EGGER, 1861: 209.
Winthemia speciosissima MESNIL, 1948: 95.

DOI: 10.21248/contrib.entomol.46.1.169-235

Male: Fronto-orbital plate densely yellowish pollinose, upper 1/3-1/4 black, parafacial, face and occiput whitish pollinose, genal dilation grayish pollinose; antenna brown-black, narrowly reddish on basal portion of 1st flagellomere; palpus yellow. Vertex about 0.2 of head width; frontal vitta about 2 times as wide as fronto-orbital plate at middle; parafacial 2/3 as wide as 1st flagellomere at middle height; gena about 0.16 of eye height, outer vertical seta about 2/3 as long as inner seta; 12-13 frontal setae, lowest seta inserted slightly below level of middle of pedicel; parafacial with 2-3 rows of fine short black hairs; vibrissa inserted slightly above level of lower margin of face. Antenna falling short of lower margin of face by about 5/6 length of pedicel; 1st flagellomere about 2.3-2.5 times as long as pedicel, 3 times as long as wide. Palpus rather clavate, about as long as 1st flagellomere.

Thorax black in ground color, reddish brown on scutellum; dorsum broadly black, dark brownish pollinose on postpronotal lobe, notopleural and intra-alar regions, posterior 1/4 of postsutural scutum and pleura; longitudinal vittae indistinct.

Wing hyaline, slightly tinged with pale brown on anterior portion; lower calypter pale brownish. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1.5:2:1; vein M from dm-cu crossvein to its bend slightly shorter than 1.5 times distance between the bend and wing margin.

Legs black, pulvilli pale brownish. Mid tibia with 1 ad and 2 pd; hind tibia with a closely set row of ad setae, without strong submedian seta among them. Claws and pulvilli very long.

Abdomen broadly black in ground color, reddish on side of 3rd and 4th; dorsum very densely silvery white or pale yellowish white pollinose, the pollinosity thinner on 5th tergum; narrow posterior portion of 4th tergum and posterior 1/2-1/3 of 5th black; venter thinly grayish white pollinose. Hairs dense fine short and suberect on 3rd and 4th terga, erect on 5th; 2nd and 3rd terga without median marginal setae; venter without hair fascicle.

Male genitalia: Cerci in dorsal view broad and rather rounded, narrowly separated from each other on apical portion; surstylus only with several fine short hairs; epiphallus rather small; distiphallus with distinct spinules on apical portion.

Female: Differing from male as follows: Head densely yellowish or golden yellowish pollinose, lower parafacial, face, gena and occiput pale yellowish white; vertex 0.3-0.32 of head width; frontal vitta only slightly wider than fronto-orbital plate at middle; inner and outer vertical and ocellar setae very strong; 1 reclinate and 2 proclinate orbital setae present; 8-10 frontal setae; hairs on fronto-orbital plate and parafacial sparser; vibrissa nearly level with lower margin of face; parafacial slightly more than 1/2 width of 1st flagellomere at middle height; 1st flagellomere broadly reddish at basal portion and broader than in male, about 3 times as long as pedicel and about 2 times as long as wide; palpus more strongly clavate, yellowish; thoracic dorsum densely yellowish pollinose, with 4 rather narrow longitudinal black vittae, pleura densely yellowish white pollinose; hind tibia with a row of ad setae more sparsely set than in male and a strong submedian seta; claws and pulvilli short; abdomen broadly reddish yellow in ground color, black on mid dorsal longitudinal area, dorsum densely yellowish pollinose; 2nd and 3rd abdominal terga each with 2 strong median marginal setae.

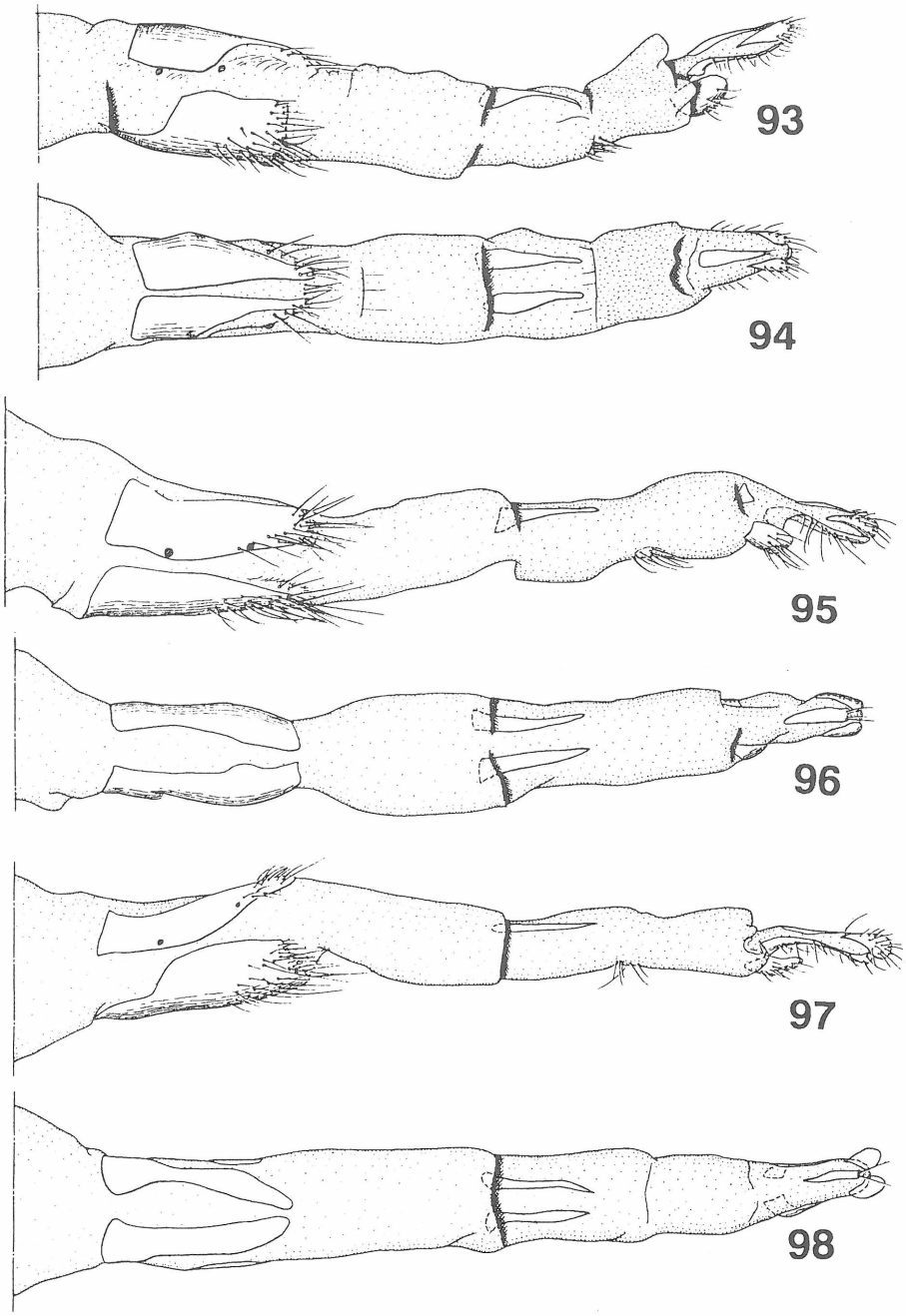
Distribution: Japan (Honshu); Europe, Mongolia.

Type material examined. Holotype male of *Winthemia speciosissima* MESNIL, Bois St. Martin, Versailles, France, 27.viii.1936 (CNC).

Other specimens examined. HONSHU: 1 male, Aomori, Nishimeya, Tashiro, 16.vii.1972, S. Fukushi; 1 male, Niigata, Murakami, 16.vii.1966, Y. Miyatake; 1 male, Niigata, Mt. Atema, 14.vii.1976, M. Honda; 1 male, Ishikawa, Oshimizu-machi, Sogo, 13.viii.1990, I. Togashi; 1

DOI: 10.21248/contrib.entomol.46.1.169-235

female, Kanazawa City, Tsukiura, 9.ix.1990, I. Togashi; 1 male, Nara, Yamatokamiichi, 21.vi.1964, S. Shinonaga (all in BLKU).



Figs 93-98 *Winthemia* spp. Female genitalia in lateral view (93, 95, 97) and dorsal view (most hairs omitted in 96 and 98) (94, 96, 98): **93-94** *venusta*; **95-96** *venustoides*; **97-98** *cruentata*.

DOI: 10.21248/contrib.entomol.46.1.169-235

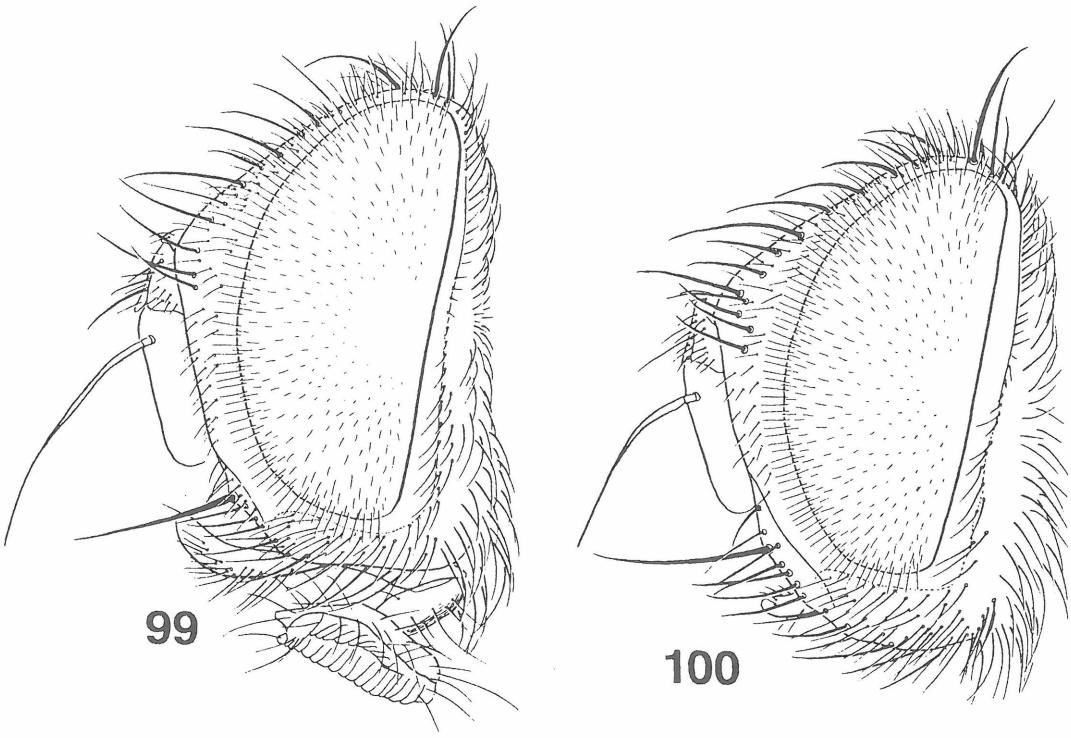
Remarks: The male of this species may be easily distinguished from other species by the antenna with long 1st flagellomere and very densely silvery white or pale yellowish white pollinose abdomen which contrasts with the black thorax. The female, however, closely resembles *W. venustoides* MESNIL and is only slightly different in the length of the antenna as mentioned in the key.

4. *Winthemia venustoides* MESNIL
(Fig. 81, 87, 91, 95, 96)

Winthemia venustoides MESNIL, 1967: 39.

This species was originally described from Hokkaido, and I have seen specimens from several localities in Honshu and Kyushu and from China.

Male: Head yellowish or golden yellowish pollinose, paler on parafacial and face; antenna brown, reddish on basal portion of 1st flagellomere; palpus yellow. Vertex 0.21-0.25 of head width; parafacial subequal in width to 1st flagellomere; gena about 1/5 of eye height. Outer vertical seta fine; 10-12 frontal setae; parafacial with 2-3 rows of fine short black hairs on anterior portion; vibrissa nearly level with lower margin of face. Antenna falling short of lower margin of face by about 4/5 length of pedicel; 1st flagellomere about 3 times as long as pedicel. Palpus clavate, nearly as long as 1st flagellomere.



Figs 99-100 *Winthemia* spp. Male head in profile: **99** *mediocris* **sp. n.**; **100** *ikezakii* **sp. n.**

DOI: 10.21248/contrib.entomol.46.1.169-235

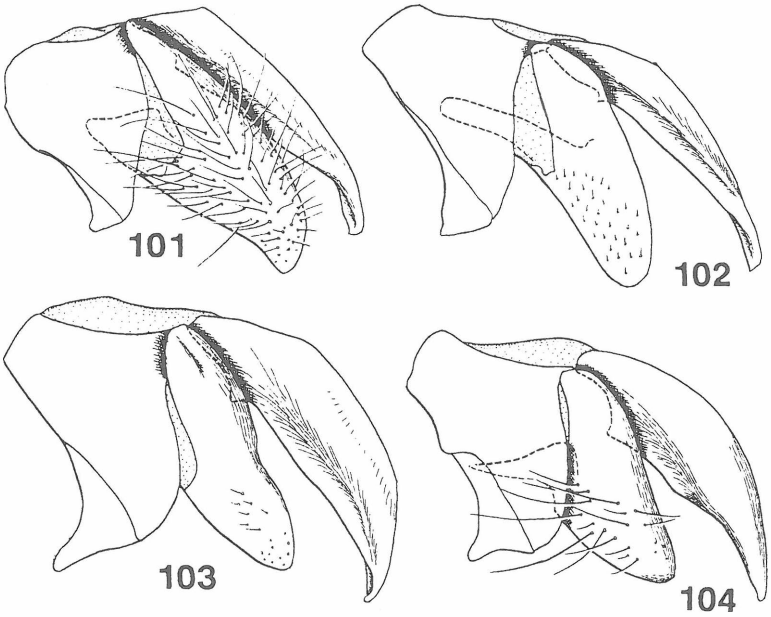
Thorax black in ground color, reddish yellow on scutellum; dorsum densely yellowish or pale grayish yellow pollinose, pleura grayish white pollinose; 4 longitudinal black vittae present on dorsum, inner vitta distinctly narrower than pollinose portion between inner and outer vittae.
Wing hyaline, slightly tinged with pale brown on anterior portion. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 2:3:1.5; bend of vein M about equidistant between dm-cu crossvein and wing margin.
Legs black, pulvilli pale brownish. Mid tibia with 1 ad and 2 pd setae, the latter short and sometimes indistinct; hind tibia with a closely set row of ad setae, without strong submedian seta among them. Claws and pulvilli very long.
Abdomen broadly reddish yellow in ground color, black on mid dorsal longitudinal portion of syntergum 1+2 to 4th tergum, narrow posterior portion of 4th and entire 5th except apex; dorsum densely yellowish or golden yellow pollinose, venter thinly whitish pollinose on narrow anterior portion of 3rd and 4th terga. Hairs dense fine and short; 2nd and 3rd terga without median marginal setae; venter of 4th and 5th terga each with a pair of broad hair fascicles of dense and long hairs.
Male genitalia. Cerci in dorsal view evenly tapering to apex, in lateral view nearly straight; surstylus rather broad in lateral view, with sparse fine short hairs; epiphallus weakly curved posteriorly near middle; distiphallus with very fine spinules.
Female: Differing from male as follows: Parafacial and face whitish pollinose contrasting with yellow or golden yellow pollinose fronto-orbital plate; vertex 0.28-0.31 of head width; inner and outer vertical and ocellar setae distinctly stronger than in male; 1 reclinate and 2 proclinate orbital setae present; 8-10 frontal setae; parafacial almost 3/5 as wide as 1st flagellomere; 1st flagellomere about 3.5 times as long as pedicel; palpus strongly clavate; mid tibia with 2-3 strong p setae; hind tibia with a row of ad setae more sparsely set than in male and a strong submedian seta; claws and pulvilli short; 2nd and 3rd abdominal terga each with 2 strong median marginal setae; abdominal venter without hair fascicles. Female genitalia: 6th hemitergite rather broad; 7th hemitergite small; ventral area of 7th hemitergites very weakly sclerotized, with several hairs; 8th hemitergite very small, triangular; epiproct with several fine hairs.
Body length, 6.6-13.5 mm; wing length, 5.2-9.6 mm.
Distribution: Japan (Hokkaido, Honshu, Kyushu); China (Beijing).
Type material examined. Holotype male of *Winthemia venustoides* MESNIL, Tsukisappu nr. Sapporo, Hokkaido, 19.viii.1961 (CNC).
Other specimens examined. HOKKAIDO: 1 male, Shibecha, Shirarutoro, 1.viii.1967, M. Honda (BLKU); 1 female, Obihiro, Inada, 5.ix.1949, S. Takano (EIHU); 1 female, Kamuikotan, 8.viii.1964, K. Kusigemati (BLKU); HONSHU: 1 female, Mt. Iwaki, 13.ix.1981, S. Fukushi; 1 female, Aomori, Asamushi, 18.x.1980, S. Fukushi; 1 male, Niigata, Kurokawa, 9.viii.1967, K. Baba ; 2 females, Saitama, Moroyama, 12.vii.1981, 6.ix.1979, N. Tamaki (all in BLKU); 2 males, Mt. Asama, 11.viii.1976, H. Kurahashi (BLKU, NIH); KYUSHU: 1 male 6 females, Fukuoka, Aburayama, 24.vii.1991, 5.viii.1989, 15.viii.1987, 8.x.1988, 13.x.1988, H. Shima (BLKU).

5. *Winthemia cruentata* (RONDANI)
(Figs 82, 88, 92, 97, 98)

Chaetolyga cruentata RONDANI, 1859: 106.
Winthemia lingusti STEIN, 1924: 59.

DOI: 10.21248/contrib.entomol.46.1.169-235

Japanese specimens of this species seem darker in the body color than specimens from Europe. This species has been known as a gregarious parasitoid of *Sphinx ligustri* in Europe, and I have seen specimens reared from a sphingid larva and a noctuid larva in Japan. Detailed redescription of this species is given by MESNIL (1949).



Figs 101-104 *Winthemia* spp. Epandrium, surstylus and cerci in lateral view (hairs on epandrium and cerci omitted): **101** *ikezakii* **sp. n.**; **102** *brevipennis* **sp. n.**; **103** *miyatakei* **sp. n.**; **104** *mallochi*.

Male genitalia: Cerci in lateral view flat, in dorsal view broad at base and narrowed posteriorly, narrowly separated from each other on apical portion; surstylus in lateral view broad, rounded apically, with dense long hairs; distiphallus with rather distinct spinules on apical portion.
Female genitalia: 6th hemitergite rather narrow; 7th hemitergite very small; 7th sternum absent, several hairs present on membrane of ventral area of 7th segment; 8th tergum very weak, sometimes indistinct.
Distribution: Japan (Hokkaido, Honshu, Kyushu); Palearctic Region.
Hosts: LEPIDOPTERA, Noctuidae: *Autographa gamma* (LINNÉ) (KANEKO & KONISHI, 1995) [Sapporo, Hokkaido]; Sphingidae: *Sphinx constricta* BUTLER [Kurume, Kyushu].
Specimens examined: HOKKAIDO: 4 males, Ashoro, Berabonai, 5.vii.1986, H. Shima; 1 male 3 females, Berabonai, 21-24.vii.1967, H. Shima; 1 male, Ashorobuto, 29.vii.1967, M. Honda; 1 female, Mt. Taisetsu, Aizankei, 5.viii.1967, A. Nakanishi; 1 female, Hitsujigaoka, Sapporo, 8.x.1992 emg., ex *Autographa gamma* larva, J. Kaneko; HONSHU: 1 male, Hirosaki City, Zatoishi, 16.viii.1980, S. Fukushi; 2 males, Niigata, Jigami, 9.viii.1972, K. Baba; 1 male, Saitama, Mt. Buko, 24.vii.1971, K. Hara; 1 male, Saitama, Yokose, 25.vii.1971, K. Hara; 1 male, Saitama, Kamisaka, 19.v.1973, K. Hara; 1 male, Saitama, Otaki, 16.vi.1974, K. Hara; 1 female, Saitama, Moroyama, 14.x.1979, N. Tamaki; 1 male, Nagano, Shimashimatani, 22.v.1975, A. Nakanishi; 2 females, Yamanashi, Kanayama, 24.vii.1986, 24.vii.1970, H.

DOI: 10.21248/contrib.entomol.46.1.169-235

Shima, M. Honda; KYUSHU: 2 males, Fukuoka, Mt. Aburayama, 14.v.1989, 23.vi.1990, H. Shima; 2 males 2 females, Fukuoka, Kurume, 8-19.xi.1984 emg. ex *Sphinx constricta* larva, N. Gyotoku; 5 males 1 female, Kumamoto, Naidaijin, 650-800 m, 10.v.1967, H. Shima (all in BLKU).

6. *Winthemia angusta* Shima, CHAO et ZHANG
(Figs 113, 114)

Winthemia angusta SHIMA, CHAO et ZHANG, 1992: 220.

This species is rather widely distributed throughout China and Japan. For details see SHIMA et al. (1992).

Female genitalia: Rather short and broad, intersegmental membrane between 6th and 7th segments short; 7th tergum reduced to a pair of small triangular sclerites, without hair; 7th sternum absent; epiproct rather broad, with a pair of setulae.

Distribution: Japan (Honshu, Kyushu); China.

Hosts: LEPIDOPTERA: Sphingidae; *Dolbina tancrei* STAUDINGER [Kobe, Honshu], *Smerinthus planus* WALKER [Kobe, Honshu] (SHIMA, et al. 1992).

7. *Winthemia ikezakii* sp. n.
(Figs 100, 101, 105, 109)

Male: Head whitish pollinose, fronto-orbital plate pale yellowish gray; antenna black, apex of pedicel and base of 1st flagellomere reddish. Vertex 0.23-0.25 of head width; frontal vitta about 1.5 times as wide as fronto-orbital plate at middle; parafacial 1.3-1.5 times as wide as 1st flagellomere at middle height; gena about 1/5 of eye height. Inner vertical seta strong; outer vertical seta developed, slightly shorter than ocellar seta; 11-13 frontal setae, lowest seta nearly level with apex of pedicel, a row of several setae present outside the row of frontal setae near base of antenna; fronto-orbital plate with dense black hairs; parafacial with 2-3 rows of rather sparse black hairs on anterior 1/2; vibrissa nearly level with lower margin of face. Antenna falling short of lower margin of face by about length of pedicel; 1st flagellomere about 2.5 times as long as pedicel.

Thorax rather densely grayish white pollinose; dorsum with 4 longitudinal vittae, inner vitta slightly narrower than pollinose portion between inner and outer vittae on postsutural scutum. All hairs black; anepisternum with rather dense apically frizzled hairs behind row of anepisternal setae.

Wing hyaline; lower calypter white, slightly tinged with pale brown. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1.5:2:1; bend of vein M about equidistant between dm-cu crossvein and wing margin.

Legs black; pulvilli pale brownish. Mid tibia with 1 ad seta; hind tibia with a closely set row of ad setae, without strong submedian seta; claws and pulvilli long.

Abdomen black in ground color, broadly reddish on side and venter of 2nd to 4th terga; dorsum of 3rd to 5th terga rather densely grayish white pollinose, posterior 1/6 of 3rd tergum, 1/5 of 4th and 1/3 of 5th black; venter of syntergum 1+2 and 3rd tergum thinly whitish pollinose.

DOI: 10.21248/contrib.entomol.46.1.169-235

Hairs dense fine and recumbent on syntergum 1+2 to 4th tergum, suberect on 5th; no median marginal seta on 2nd and 3rd terga; venter of 4th and 5th terga each with a pair of broad hair fascicles of dense and long hairs.

Male genitalia: Cerci long, in dorsal view rather narrow and weakly tapering to apex, narrowly separated from each other on apical 1/4 portion, in lateral view weakly bent ventrally; surstylus in lateral view broad, narrowed to apex, with dense fine long hairs; distiphallus rather narrow in lateral view.

Female: Unknown.

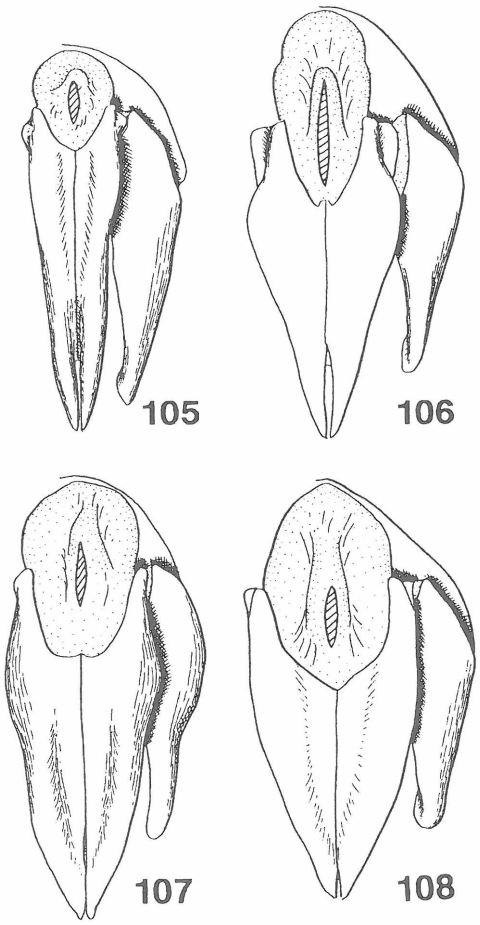
Body length, 10.5-10.7 mm; wing length, 7.9-8.1 mm.

Distribution: Japan (Kyushu).

Holotype male, Kyushu, Nagasaki, Matsuura, 5.vi.1966, Y. Ikezaki (BLKU).

Paratype: KYUSHU: 1 male, same as holotype except date, 8.vi.1966 (BLKU).

Remarks: This is a distinct species well separable from the other species by rather densely pollinose abdomen, broad vertex, parafacial and gena and broad hair fascicles on venter of 4th and 5th abdominal terga in the male.



Figs 105-108 *Winthemia* spp. Epandrium, surstylus and cerci in dorsal view (hairs omitted): **105** *ikezakii* **sp. n.**; **106** *brevipennis* **sp. n.**; **107** *miyatakei* **sp. n.**; **108** *mallochi*.

DOI: 10.21248/contrib.entomol.46.1.169-235

8. *Winthemia brevipennis* sp. n.
(Figs 102, 106, 110)

Male: Closely resembling *W. ikezakii*, but differing as follows: Head pale yellowish white pollinose, more yellowish on fronto-orbital plate; vertex wide, about 0.27 of head width; no additional row of setae outside row of frontal setae; vibrissa inserted above level of lower margin of face by about 1/2 length of pedicel; 1st flagellomere about 3 times as long as pedicel; thoracic dorsum pale yellowish gray pollinose, with 5 longitudinal vittae, middle vitta very narrow; wing short, about 1.5 times as long as abdomen; abdomen broadly reddish, black on anterior and mid dorsal portions of syntergum 1+2, mid dorsal longitudinal portion of 3rd tergum, mid dorsal and posterior 1/3 of 4th, anterior 1/2 of 5th; abdominal dorsum pale yellowish gray pollinose on anterior 2/3 of 3rd tergum, 3/4 of 4th and 1/2 of 5th. Male genitalia: Resembling *venustoides*; cerci in lateral view flat, in dorsal view rather well separated from each other on apical portion; surstylus in lateral view rather long and broad, rounded apically, with very fine short hairs; distiphallus with very fine spinules.
Female: Unknown.
Body length, ca. 12.3 mm; wing length, ca. 8.5 mm.
Distribution: Japan (Honshu).
Holotype male, Honshu, Saitama, Ogose, 1.viii.1977, T. Nambu (BLKU).
Remarks: This species seems to be closely allied to *W. ikezakii* and *miyatakei*, but is distinct in having shorter wings in comparison with body length.

9. *Winthemia miyatakei* sp. n.
(Figs 109, 107, 111)

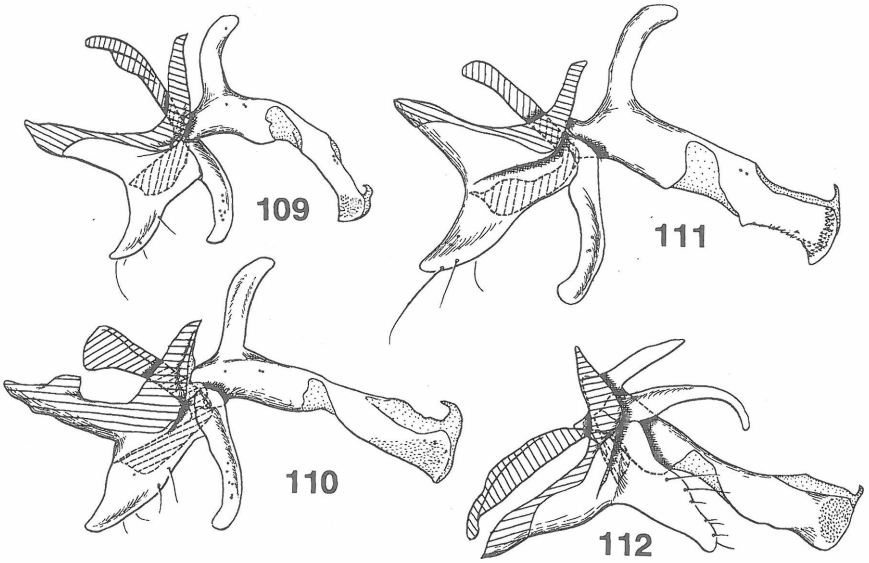
Male: Closely resembling *W. ikezakii*, but differing in the following points: Vertex narrower, about 0.22 of head width; frontal vitta only slightly wider than fronto-orbital plate; parafacial about 3/5 as wide as 1st flagellomere at middle height; gena narrower, about 0.18 of eye height; antenna falling short of lower margin of face by about 3/5 length of pedicel, 1st flagellomere about 3 times as long as pedicel. Male genitalia: Cerci in dorsal view broad, evenly narrowed to apex, narrowly separated from each other at apex, in lateral view weakly curved ventrally near apex; surstylus short, in lateral view narrowed to apex, with several very short fine hairs; distiphallus with rather strong spinules on apical and ventral portion.
Female: Unknown.
Body length, ca. 7.5 mm; wing length, ca. 6.1 mm.
Distribution: Japan (Kyushu).
Holotype male, Kyushu, Oita, Usa Shrine, 27.ix.1966, Y. Miyatake (BLKU).

10. *Winthemia remittens* (WALKER)

Eurygaster remittens WALKER, 1859: 125.

A male specimen obtained in Kyushu, which I tentatively identify here as *W. remittens*, slightly differs from the type specimen of *remittens* in the more whitish and broadly pollinose thorax and abdomen. Additional specimens from Kyushu may make further discussion possible on the true identity of this specimen.

DOI: 10.21248/contrib.entomol.46.1.169-235



Figs 109-112 *Winthemia* spp. Hypandrium, gonopod, paramere and aedeagus in lateral view: **109** *ikezakii* **sp. n.**; **110** *brevipennis* **sp. n.**; **111** *miyatakei* **sp. n.**; **112** *mallochi*.

The female of *W. remittens* is unknown. It is possible that the female of this species closely resembles that of *W. sumatrana* and *W. mallochi*. The redescription of *W. remittens* is given below based on the type specimen and other specimens from China and Southeast Asia.

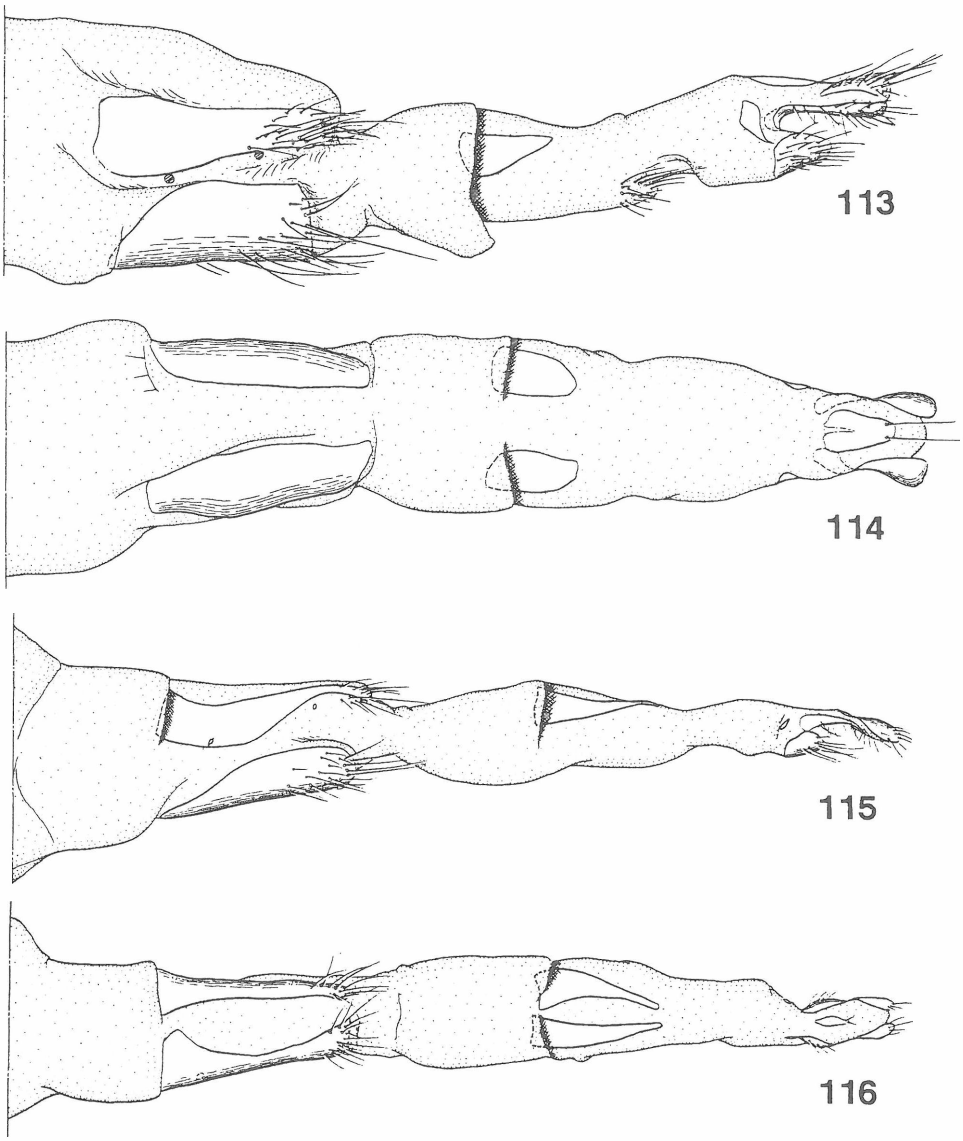
Male: Head whitish pollinose, fronto-orbital plate grayish; antenna brown-black, base of 1st flagellomere narrowly reddish; palpus reddish yellow, basal 1/2 darkened. Vertex 0.19-0.21 of head width; frontal vitta about 2 times as wide as fronto-orbital plate at middle; parafacial about 3/5 as wide as 1st flagellomere at middle height; gena about 0.1 of eye height. Inner vertical seta about 2/7 of eye height; outer vertical seta undeveloped; 9-12 frontal setae, lowest seta slightly below level of middle of pedicel; parafacial rather densely hairy, sometimes white hairs present especially on lower portion; vibrissa nearly level with lower margin of face. Antenna falling short of lower margin of face by about 2/3 length of pedicel; 1st flagellomere 2.5-3 times as long as pedicel.

Thorax rather thinly whitish, or grayish white, pollinose; 4 narrow longitudinal vittae present, inner vitta distinctly narrower than pollinose portion between inner and outer vittae on post-sutural scutum; scutellum broadly reddish brown in ground color. Prosternum with pale yellowish white hairs mixed with several black ones; 1- 2+1 katepisternal setae (usually 2+1); proepimeron with several pale yellowish hairs; anepisternum with dense long apically frizzled pale yellowish hairs behind row of anepisternal setae; anepimeron, katepimeron and upper portion of katepisternum usually with pale yellowish white hairs.

Wing hyaline, weakly tinged with pale brownish on anterior portion; lower calypter pale yellowish white. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 3:4:2; bend of vein M about equidistant between dm-cu crossvein and wing margin.

Legs black; pulvilli dull yellowish white. Mid tibia with 1 ad seta; hind tibia with a rather closely set row of ad setae; claws and pulvilli long.

DOI: 10.21248/contrib.entomol.46.1.169-235



Figs 113-116 *Winthemia* spp. Female genitalia in lateral view (113, 115) and dorsal view (most hairs omitted in 114) (114, 116): **113-114** *angusta*; **115-116** *mallochi*.

Abdomen broadly black in ground color, side of 3rd tergum, anterolateral portion of 4th and apex of 5th reddish; 3rd tergum rather densely whitish pollinose on anterior 2/5, 4th on 1/2 to 3/5 and 5th on 2/5; venter rather thinly whitish pollinose on anterior portion of 3rd and 4th terga, thinly so on 2nd. First sternum with pale yellowish hairs; median marginal seta absent on 2nd and 3rd terga; 5th tergum with rows of discal and marginal setae, the former close to the latter; venter of 4th and 5th terga each with a pair of rather broad hair fascicles of long and dense hairs.

DOI: 10.21248/contrib.entomol.46.1.169-235

Female: Unknown.
Body length, 7.9-12.2 mm; wing length, 6.3-8.7 mm.
Distribution: Japan (Kyushu); China (Yunnan, Hainan), Laos, Thailand, Singapore, Indonesia (Sulawesi), Philippines (Luzon, Basilan, Mindanao).
Type material examined. Holotype male of *Eurygaster remittens* WALKER, Celebes [Sulawesi], Makassar [Ujung Pandang], iv.1868, A. R. Wallace (BMNH).
Other specimen examined: KYUSHU, 1 male, Kumamoto Pref., Haki, vii.1978, H. Shima (BLKU).

11. *Winthemia mallochi* BARANOV
(Figs 104, 108, 112, 115, 116)

Winthemia mallochi BARANOV, 1932: 46.

Japanese specimens here determined as this species seem to be slightly different from the type specimen. They have slightly narrower frons and more whitish fronto-orbital plate than the type specimen. I think, however, that they are conspecific and that these differences may be included in individual variation. The epiphallus of the male genitalia of *W. mallochi* characteristically arises from the anterior margin of the basiphallus and this character state is also found in Japanese specimens (Fig. 112).
Male: Closely resembling *W. remittens*, but differing as follows: Parafacial narrow, about 1/2 as wide as 1st flagellomere at middle; gena about 1/12 of eye height; outer vertical seta strong, about 2/3 as long as inner seta; antenna falling short of lower margin of face by about length of pedicel; claws and pulvilli short, shorter than 5th tarsomeres. Male genitalia: Closely resembling *remittens*; cerci in dorsal view broad, narrowly but distinctly separated from each other at apical portion; epiphallus rather short, arising from anterior margin of basiphallus; aedeagus not expanded laterally on its mid dorsal portion.
Female: Differing from male as follows: Vertex wide, 0.26-0.29 of head width; all head setae strong; 1 reclinate and 2 proclinate orbital setae present; 1st flagellomere about 3.5 times as long as pedicel; pollinosity on thorax and abdomen denser; thoracic pleura more extensively covered with pale yellowish white hairs; 2nd and 3rd abdominal terga each with a pair of median marginal setae; abdominal venter without hair fascicle. Female genitalia: Resembling *sumatrana*; 6th hemitergite narrowed posteriorly; 7th hemitergite rather short, long triangular; 7th sternum absent; 8th hemitergite very small; epiproct small, with a pair of minute apical hairs.
Body length, 8.2-9.4 mm; wing length, 5.8-6.7 mm.
Distribution: Japan (Honshu, Kyushu); Taiwan, India.
Host: LEPIDOPTERA, Notodontidae: *Phalera assimilis* (BREMER et GREY) [Oita, Kyushu].
Type material examined: Holotype male of *Winthemia mallochi* BARANOV, Sokutu, Formosa, ix.12, H. Sauter (DEI).
Other specimens examined: HONSHU, 1 male, Hyogo Pref., Kinosaki-gun, Kasumi Beach, 1.xi.1991, K. Higuchi (HMHN); KYUSHU: 5 males 7 females, Kyushu, Oita, Kamizutsumi, 17.xi.1981, ex *Phalera assimilis* larva, A. Miyata (BLKU).
DOI: 10.21248/contrib.entomol.46.1.169-235

12. *Winthemia sumatrana* (TOWNSEND)
(Figs 117, 118, 119)

Pseudokea sumatrana TOWNSEND, 1927: 69.
Pseudokea neowinthemioides TOWNSEND, 1928: 394.
Winthemia diversa MALLOCH, 1930: 348.
?*Winthemia albidopilosa* MESNIL, 1949: 83.

In addition to the usual sexual dimorphism observed in many *Winthemia* species, such as differences in the width of the vertex, development of the head setae, and color and density of the pollinosity of the thorax and abdomen, the color of the hairs is different in sexes of this species: the male lacks pale hairs on the body, but the female bears pale yellowish white hairs on the parafacial, thoracic pleura and the 1st abdominal sternum. In this respect this species closely resembles *W. mallochi* and probably the female *W. remittens*, too, though the female of *remittens* is unknown. The identification of the females of *remittens*, *mallochi* and *sumatrana* must rely on reared specimens with corresponding males, until the discriminative features among these species are found. For this reason I cannot determine with certainty if *W. albidopilosa*, known only from a female, is the same as *W. sumatrana* as treated by CROSSKEY (1976). This species is distributed mainly in tropical and subtropical Asia, and in Japan it is known only from the Ryukyus. An acraeid butterfly has been known as a host of this species from Taiwan (SHIMA et al., 1992) and 3 lepidopterous hosts are added here from the Ryukyus.

Male: Head whitish pollinose; frontal vitta black; antenna and arista brown black, base of 1st flagellomere narrowly reddish; palpus reddish yellow, darkened basally. Vertex 0.16-0.19 of head width; frontal vitta about 2.5 times as wide as fronto-orbital plate at middle; parafacial about 1/2 as wide as 1st flagellomere at middle height; gena about 1/8 of eye height. Hairs black, dense and rather long on parafacial; inner vertical seta about 2/5 of eye height; outer vertical seta undeveloped; 12-13 frontal setae, lowest seta slightly below level of middle of pedicel; ocellar seta rather strong, about 2/3 as long as inner vertical seta; parafacial densely haired on its whole length; vibrissa nearly level with lower margin of face. Antenna with 1st flagellomere 3-3.3 times as long as pedicel and slightly longer than palpus.

Thorax black in ground color, scutellum broadly reddish brown on apical portion; dorsum thinly grayish, somewhat brownish, pollinose; 4 rather broad longitudinal vittae present on presutural area of scutum, 5 on postsutural scutum, middle one narrow; pleura rather densely grayish pollinose. Anepisternum with long fine apically frizzled brown hairs behind anepisternal setae; anepimeron and katepimeron with apically frizzled brownish hairs.

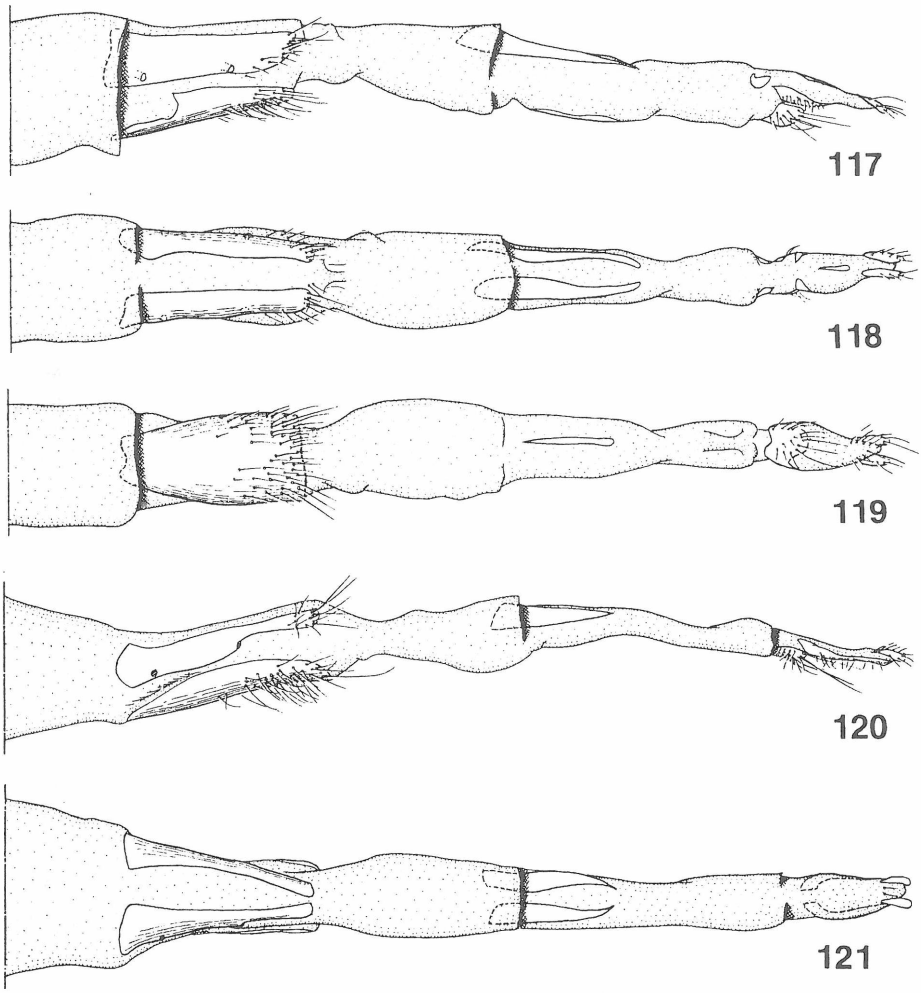
Wing hyaline, calypter pale yellowish white. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 2:2.5:1; vein M from dm-cu crossvein to its bend about 1.5 times distance between the bend and wing margin.

Legs black; pulvilli pale brown. Mid tibia with 1 ad seta; hind tibia with a row of closely set ad setae, without strong submedian seta among them; claws and pulvilli long.

Abdomen broadly reddish brown on posterolateral portion of syntergum 1+2, side of 3rd tergum and anterolateral portion of 4th; apex of 5th tergum narrowly reddish; dorsum of 3rd tergum rather thinly pale yellowish white pollinose on anterior 1/2-1/3, 4th tergum rather densely pale yellowish white pollinose on anterior 2/3-3/5, and 5th tergum thinly pollinose on anterior 1/2-1/3; venter thinly whitish pollinose on anterior 1/2 of 3rd and 4th terga. Hairs fine dense and suberect; 2nd and 3rd terga without median marginal setae; 4th tergum with a row of

DOI: 10.21248/contrib.entomol.46.1.169-235

6 marginal setae; 5th tergum with regularly set rows of discal and marginal setae, the former weaker than the latter; venter of 4th tergum with a pair of small roundish hair fascicles; venter of 5th tergum with long and dense hairs but without hair fascicle.



Figs 117-121 *Winthemia* spp. Female genitalia in lateral view (117, 120), dorsal view (most hairs omitted in 121) (118, 121) and ventral view (119): **117-119** *sumatrana*; **120-121** *marginalis*.

Female: Differing from male as follows: Antenna with pedicel and basal portion of 1st flagellomere broadly reddish; palpus yellowish; vertex 0.23-0.24 of head width; frontal vitta about 2 times as wide as fronto-orbital plate; all head setae strong; outer vertical seta about 1/2 as long as inner vertical seta; 2 reclinate orbital setae present, anterior seta fine; 2 strong proclinate orbital setae; 6-8 frontal setae; parafacial with pale yellowish white hairs; genal dilation with pale yellowish white hairs on anterior portion; thorax densely grayish white pollinose; thoracic pleura extensively covered with dense pale yellowish white hairs, anepisternum with apically frizzled pale yellowish white hairs behind row of anepisternal setae; claws and pulvilli short;

DOI: 10.21248/contrib.entomol.46.1.169-235

2nd abdominal tergum with 2 rather short median marginal setae, 3rd with 2 strong median marginal setae; 4th abdominal tergum without hair fascicle; 5th abdominal tergum more narrowly truncated at apex than in male. Female genitalia: 6th hemitergite long rectangular in shape; 7th hemitergite long triangular; 7th sternum very narrow; epiproct without apical hair.
Body length, 8.5-10.6 mm; wing length, 6.6-8.1 mm.
Distribution: Japan (Ryukyus); China, Thailand, Indonesia, Philippines, Papua New Guinea.
Hosts: LEPIDOPTERA: Danaidae: *Anosia chrysippus chrysippus* (LINNÉ) [Amami Oshima, Ryukyus]; Hesperiidae: *Erionota torus* EVANS [Okinawa, Ryukyus]; Lymantriidae: *Lymantria mathura aurora* BUTLER [Okinawa, Ryukyus] (SCHAEFER & SHIMA, 1981, as *W.* sp.); Zygaenidae: *Histia flabellicornis ultima* HERING [Okinawa, Ryukyus].
Type material examined. Holotype male of *Pseudokea sumatrana* TOWNSEND, Gunung Singalang (Sumatra Westkust) 1,600 m, viii.1925, E. Jacobson (ZMA); holotype male of *Pseudokea neowinthemioides* TOWNSEND, Cagayan, Mindanao, Baker (USNM); holotype female of *Winthemia albidopilosa* MESNIL, Sude Flores, 13.vi.1927, Rensch (CNC).
Other specimens examined. RYUKYUS: 2 males 1 female, Amami-oshima, Akaogi, 9.xi.1972, ex *Anosia chrysippus* pupae, M. Wakabayashi; 1 male, Okinawa, Miyazato, 23.vii.1978, ex *Erionoa torus* pupa, Suzuki; 1 male 5 females, Okinawa, Koza, 6.vi.1969, ex *Lymantria mathura aurora*, Azuma; 3 males 3 females, Okinawa, Shuri, 10.xi, 9.xii. 1972, ex *Histia flabellicornis ultima*, Y. Oshiro (all in BLKU).

13. *Winthemia marginalis* Shima, CHAO et ZHANG
(Figs 120, 121)

Winthemia marginalis SHIMA, CHAO et ZHANG, 1992: 223.

This is a rather large *Winthemia* and distributed in China and Japan. See SHIMA et al. (1992) for detailed data and description.
Female genitalia: Rather long and slender, longer than abdomen; 7th tergum separated into 2 long-triangular hemitergites, without hair; 7th sternum absent; epiproct absent, a pair of fine setulae present on area of epiproct.
Distribution: Japan (Honshu, Tsushima, Kyushu); China.

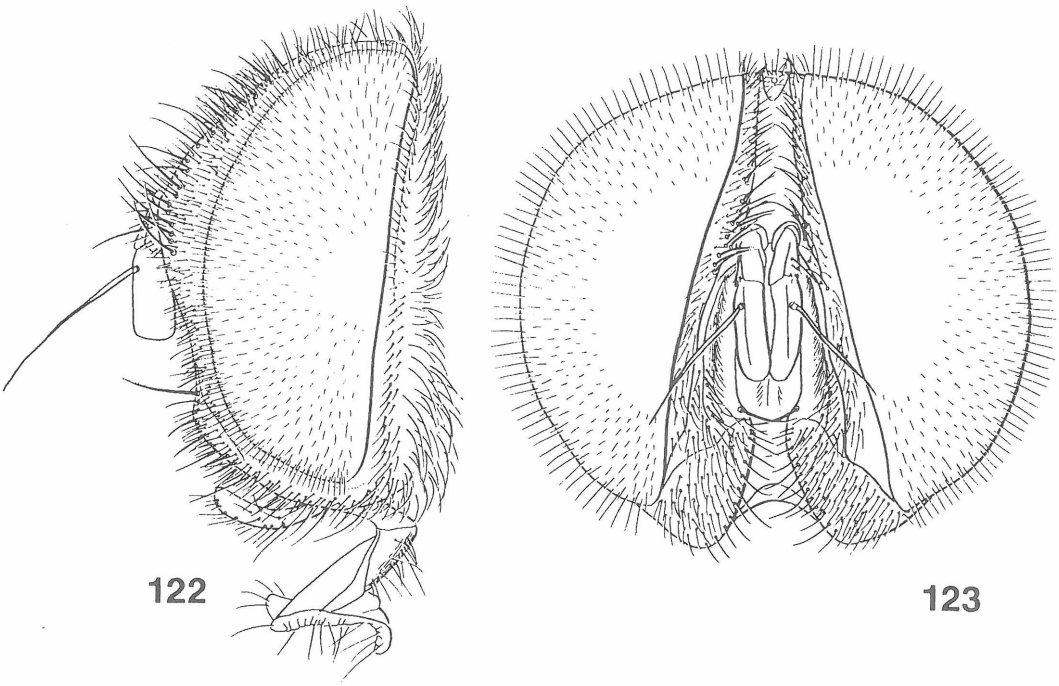
Genus *Crypsina* BRAUER et BERGENSTAMM

Crypsina BRAUER et BERGENSTAMM, 1889: 97. Type species: *Crypsina prima* BRAUER et BERGENSTAMM, 1889, by original designation and monotypy.
Amplipila CURRAN, 1927: 446. Type species *Amplipila versicolor* CURRAN, 1927 (= *Crypsina prima* BRAUER & BERGENSTAMM, 1889), by original designation.

In general features this genus resembles *Winthemia*, but differs in the strongly narrowed and elongate face below vibrissal angle in the male, fine black hairs on the occiput, short antenna, 3 basal setae of 5-6 postpronotal setae arranged in a nearly straight line, 2 lateral scutellar setae and very fine and dense hairs on the thorax and abdomen. The male genital structure of this genus is, however, much more different from that of *Winthemia*, and I therefore treat it as a distinct genus. In this genus the male 6th abdominal tergum is entire and relatively long, bearing many hairs on posterior portion, and the epiphallus is absent. The female genitalia of *C. prima* are elongate.

DOI: 10.21248/contrib.entomol.46.1.169-235

This genus has been known only from the type species from Queensland, Australia, and the same species is found in Japan and China.



Figs 122-123 *Crypsina prima*. Male head in profile (122) and frontal view (123).

1. *Crypsina prima* BRAUER et BERGENSTAMM
(Figs 75, 122, 123, 124, 129, 134)

Crypsina prima BRAUER et BERGENSTAMM, 1889: 97.
Amplipila versicolor CURRAN, 1927: 446.
Winthemia sp.: SHIMA et al., 1992: 227.

Male: Head densely dark brownish pollinose, postocular area dull yellowish gray and occiput grayish brown; frontal vitta black; antenna and arista reddish yellow to reddish brown; palpus reddish brown. Vertex 0.11-0.15 of head width; frontal vitta subequal in width to fronto-orbital plate at middle; parafacial 3/4-5/8 as wide as 1st flagellomere at middle height; face strongly narrowed to lower margin below level of vibrissae, distance between vibrissal angle to lower margin of face about 1.5 times as long as pedicel; gena 1/8-1/10 of eye height. All head hairs black; inner and outer vertical setae undeveloped; ocellar seta indistinct; 14-18 fine and short frontal setae, upper setae very fine, lowest seta nearly level with base of arista; fronto-orbital plate, parafacial and genal dilation densely covered with fine short hairs; postocular setae rather close to posterior eye margin; occiput with 2-3 irregular rows of fine black hairs and dull yellowish pile. Antenna falling short of level of vibrissal angle by about 4/5 length of pedicel; 1st flagellomere 2-2.5 times as long as pedicel; arista thickened on basal 1/4. Palpus slightly longer than 1st flagellomere.

DOI: 10.21248/contrib.entomol.46.1.169-235

Thorax dark brown, postpronotal lobe, posterior triangular portion of postsutural scutum and scutellum reddish; rather dense grayish brown pollinosity visible on scutum when seen from behind; scutellum thinly whitish gray pollinose; scutum with 4 distinct narrow longitudinal vittae; pleura dark grayish pollinose. All thoracic hairs black; hairs on scutum short, erect and very dense, on scutellum slightly sparser and longer; hairs on posterolateral portion of postpronotal lobe, proepimeron, anepisternum and anepimeron dense long and frizzled apically; 3+4-5 acr; 3+4 dc; 0+2 ia; 2-3 lateral scutellar setae.

Wing hyaline, tinged with brown from wing base to level of bm-cu crossvein; basicosta black; calypter brownish. Wing short, about 1.5 times as long as abdomen; relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1.5:2:0.8; vein M from dm-cu crossvein to its bend about 1.2 times as long as distance between the bend and wing margin.

Legs usually black, median portions of mid and hind tibiae sometimes narrowly reddish brown; pulvilli dull yellowish. Hind femur with a closely set row of fine ad setae; mid tibia with 2-3 (usually 2) ad setae and 2-3 fine hair-like pd setae; hind tibia with a very closely set row of comb-like ad setae, without strong submedian seta. Claws and pulvilli short, fore claw and pulvillus at most subequal in length to 5th tarsomere.

Abdomen broadly reddish yellow to reddish brown; dorsal excavation of syntergum 1+2 and mid dorsal narrow long triangular portion of 3rd tergum and 1st to 4th sterna black; mid dorsal narrow longitudinal portion of 4th and 5th terga sometimes darkened; dorsum thinly whitish pollinose on lateral 1/3 of 3rd tergum and anterior and mid dorsal longitudinal portion of 4th; venter evenly and very thinly whitish pollinose. Hairs very dense fine and black, short and recumbent on 3rd and 4th terga, rather long and suberect on 5th; marginal setae absent on 2nd and 3rd terga; 4th tergum with a row of fine and short marginal setae which are at most 1/3 as long as 4th tergum; 5th tergum with a row of rather short marginal setae, discal setae indistinct; hair fascicle absent on venter.

Male genitalia: Sixth tergum entire, rather long, with many hairs; cerci in dorsal view broad, narrowed to apex, apical portion narrowly separated from each other; surstylus in lateral view rather broad, with many long hairs; gonopod broad, rounded apically, with few short hairs; epiphallus absent; distiphallus with minute spinules on ventrodistal portion.

Female: Vertex about 0.23 of head width; frontal vitta about 2/3 as wide as fronto-orbital plate at middle; lower portion of face not elongate below vibrissal level, vibrissa inserted above level of lower margin of face by about 2/5 length of pedicel. Inner vertical seta about 2/7 of eye height; outer vertical seta strong; 1-2 short reclinate and 2-3 proclinate orbital setae present; ocellar seta fine, slightly longer than postocellar seta; parafacial and gena with dense pale yellowish white hairs; occiput sometimes without black hairs. Antenna with 1st flagellomere about 2.8 times as long as pedicel. Thorax with pleural hairs mostly pale yellowish; dorsal hairs fine short dense and mainly black. Legs yellowish, tibiae broadly darkened basally and distally; tarsi and claw brown-black; claws and pulvilli short. Abdomen broadly reddish brown, rather darkened on 4th and 5th terga, dorsum rather thinly whitish pollinose with tessellate appearance; 4th tergum with a row of marginal setae; 5th tergum with short and fine marginal setae; hairs dense fine short and recumbent. Female genitalia very long, almost as long as length of thorax and abdomen together; 6th and 7th spiracles close to each other, situated in membrane of 6th segment; intersegmental membrane between 6th and 7th segments very long; 7th hemitergite narrow and long; 7th sternum reduced to a very narrow strip, without hair; 8th hemitergite very small; epiproct elongate.

Body length, 7.0-11.4 mm; wing length, 6.5-7.7 mm.

DOI: 10.21248/contrib.entomol.46.1.169-235

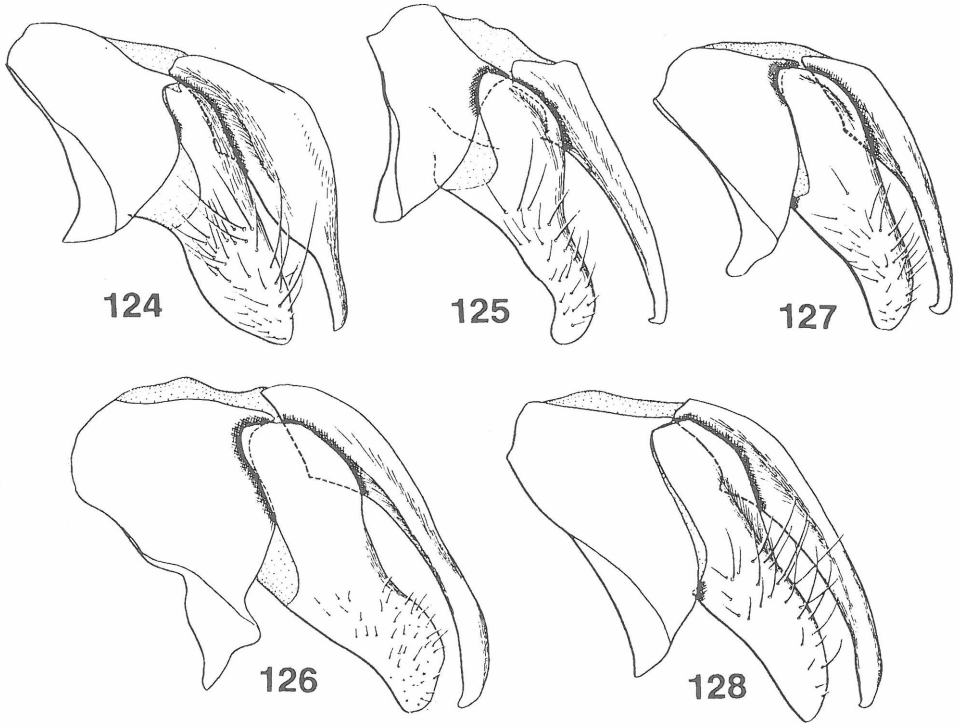


Fig. 124 *Crypsina prima*. - **Figs 125-128** *Nemorilla* spp. Epandrium, surstylus and cerci in lateral view (hairs on epandrium and cerci omitted): **125** *floralis*; **126** *insulata* **sp. n.**; **127** *maculosa*; **128** *aquila* **sp.n.**

Distribution: Japan (Kyushu); China (Yunnan); Australia (Queensland).

Type material examined: Holotype female of *Crypsina prima* BRAUER et BERGENSTAMM, Thorey, 1868, Both Hampton (NHW); holotype male of *Amplipila versicolor* CURRAN, Herberton, 3700 Ft., II 1911, Dodd; paratype male of *A. versicolor*, same data as holotype (both in DEI). Other specimens examined: KYUSHU: 33 males, Fukuoka City, Mt. Aburayama, 20.vii.1989, 5,11,15.viii.1989, 6.viii.1987, 3,5,27.ix.1987; 14.ix.1988, H. Shima; 4 males, Fukuoka Pref., Mt. Kusenbu, 14.vii.1989, H. Shima (all in BLKU).

Remarks: In Japan this species is found only in mid summer. Males fly very fast and sound peculiar buzzing. Although the known localities of this species are widely separated, it is probable that it will be found throughout the area from Southeast Asia to New Guinea when surveyed in more detail.

Genus *Nemorilla* RONDANI

Nemorilla RONDANI, 1856: 66. Type species: *Tachina maculosa* MEIGEN, 1824, by original designation.

Thyella ROBINEAU-DESVOIDY, 1863: 183. Preoccupied by *Thyella* WALLENGREN, 1858. Type species: *Tachina pabulina* MEIGEN, 1824 (= *Tachina floralis* FALLÉN, 1810), by original designation.

Aubaea ROBINEAU-DESVOIDY, 1863: 185. Type species: *Aubaea aurulenta* ROBINEAU-DESVOIDY, 1863 (= *Tachina floralis* FALLÉN, 1810), by original designation.

Pitthaea ROBINEAU-DESVOIDY, 1863: 188. Type species: *Pitthaea nebulosa* ROBINEAU-DESVOIDY, 1863 (= *Tachina floralis* FALLÉN, 1810), by original designation.

DOI: 10.21248/contrib.entomol.46.1.169-235

Essenia ROBINEAU-DESVOIDY, 1863: 193. Type species: *Essenia appendiculata* ROBINEAU-DESVOIDY, 1863 (= *Nemorilla* species), by original designation.

The genus *Nemorilla* is similar in general appearance to *Winthemia,* but is different in lacking hairs on the parafacial. The male genitalia of *Nemorilla* species are rather similar to those of *Winthemia* species, but the cerci are usually more flattened, the epiphallus is rather broad, the distiphallus is rather large and cylindrical and the male 6th abdominal tergum only weakly constricted at middle. The female genitalia are rather similar in structure to those of *Smidtia* but usually more elongate and the 7th abdominal sternum more reduced.

Nemorilla is a small genus containing one of the most common species of tachinids in the Old World. This genus is worldwide in distribution: 2 species have been known from the Palearctic region, 2 from Afrotropical, 1 from the Oriental, 1 from the Oceanian, 3 from North America and 4 from South America. Two of them are known even from oceanic islands, 1 from Seychelles and 1 from New Caledonia.

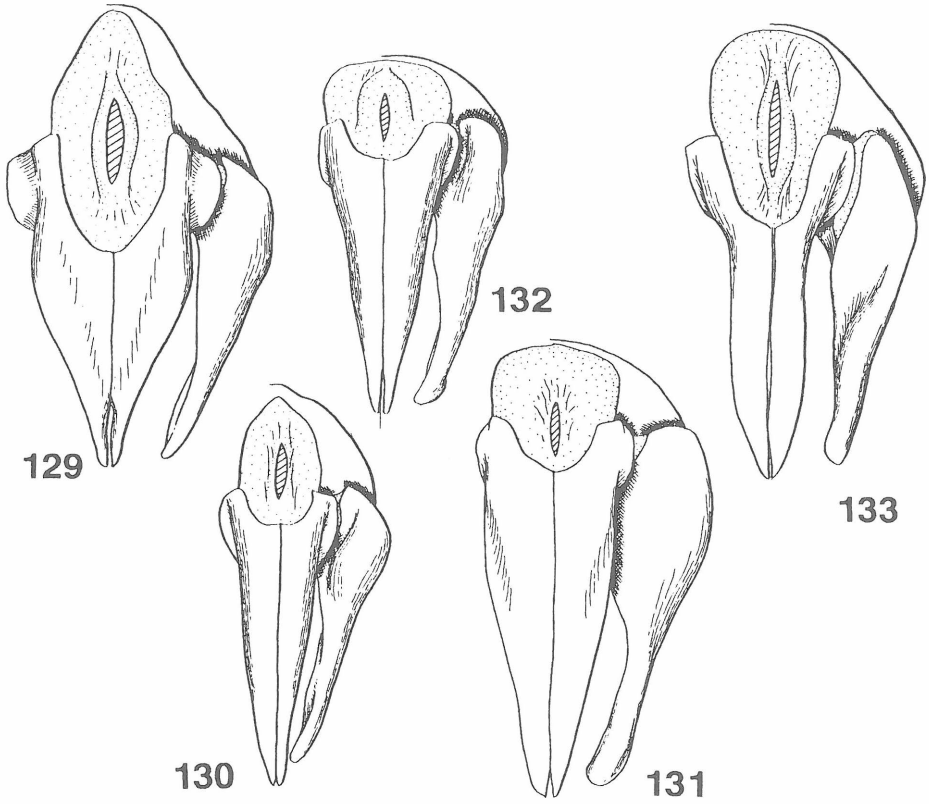


Fig. 129 *Crypsina prima*. - **Figs 130-133** *Nemorilla* spp. Epandrium, surstylus and cerci in dorsal view (hairs omitted): **130** *floralis*; **131** *insulata* **sp. n.**; **132** *maculosa*; **133** *aquila* **sp. n.**

Key to Japanese species of *Nemorilla*

1. Mid tibia without v seta; 3rd and 4th abdominal terga without discal setae; scutellum with 2 rather short lateral setae . . . . . *aquila* **sp. n.**

DOI: 10.21248/contrib.entomol.46.1.169-235

- Mid tibia with a v seta; abdomen with more or less distinct discal setae on 3rd and 4th terga; scutellum with only 1 lateral seta 2
2. Abdomen densely grayish white pollinose on entire dorsum of 3rd and 4th terga, 3 roundish black spots visible on 3rd tergum, posterior transverse black band only distinct on 5th tergum; vertex wide, 0.25 or more of head width in male, about 0.35 in female; postocellar seta straight, rather short and stout in male . . . . . *maculosa* (MEIGEN)
- Abdomen with rather broad posterior transverse black bands on each 3rd to 5th terga; vertex narrower, less than 0.22 of head width in male, about 0.3 in female; male postocellar seta fine and long, directed forward apically (female *insulata* unknown) 3
3. Vertex slightly less than 0.2 of head width in male; male abdominal dorsum broadly black, 3rd tergum whitish pollinose only on very narrow anterior portion, pollinose portion extending posteriorly on both sides; 4th abdominal tergum pollinose on anterior 2/5 and 5th on 1/3 . . . . . *insulata* **sp. n.**
- Vertex 0.22-0.25 of head width in male, 0.27-0.3 in female; abdominal dorsum usually more broadly pollinose, male 3rd tergum with broad posterior transverse black band which is extended triangularly on median and lateral portions; 4th tergum grayish yellow pollinose on anterior 2/3-2/4, 5th on anterior 1/2-2/3; in female abdominal dorsum grayish yellow-white pollinose on anterior 4/5 of each 3rd and 4th terga and anterior 2/3 of 5th . . . . . *floralis* (FALLÉN)

1. *Nemorilla floralis* (FALLÉN)
(Figs 76, 125, 130, 135)

Tachina floralis FALLÉN, 1810: 287.
Tachina notabilis MEIGEN, 1824: 333.
Tachina angustipennis MEIGEN, 1824: 333.
Tachina pabulina MEIGEN, 1824: 358.
Exorista laticella MACQUART, 1849: 373.
Exorista arrogans MACQUART, 1849: 374.
Tachina intersita WALKER, 1853: 72.
Nemorilla amica RONDANI, 1859: 100.
Aubaea campstris ROBINEAU-DESVOIDY, 1863: 186
Aubaea aurulenta ROBINEAU-DESVOIDY, 1863: 187.
Pitthaea nebulosa ROBINEAU-DESVOIDY, 1863: 189.
Nemorilla maculosa: Auct. (nec MEIGEN, 1824)

Nemorilla floralis is one of the most common tachinids occurring from Hokkaido to Kyushu in Japan, but unknown from the Ryukyus. Ten lepidopterous species have been recorded as hosts in Japan and here are added 16 species of Lepidoptera.

Male: Head whitish pollinose, fronto-orbital plate and upper parafacial grayish yellow; occiput dark grayish pollinose; antenna brown-black, basal and inner portion of 1st flagellomere narrowly reddish; palpus black. Vertex 0.22-0.25 of head width; frontal vitta widened anteriorly, about 1.5 times as wide as fronto-orbital plate at middle; parafacial narrowed below, slightly narrower than 1st flagellomere at middle height; gena 0.17-0.2 of eye height; face rather well concave, lower margin warped forward, not extending beyond vibrissal angle. Inner vertical seta fine and long, slightly more than 1/2 length of eye height; outer vertical seta absent; postocellar seta

DOI: 10.21248/contrib.entomol.46.1.169-235

rather fine and long, curved anteriorly at apex, about 3/4 as long as inner vertical seta; lowest frontal seta nearly level with apex of pedicel; vibrissa level with lower margin of face; occiput without black hairs, with pale yellowish white pile. Antenna falling short of lower margin of face by about 1/4 length of pedicel, 1st flagellomere 1.8-2 times as long as pedicel.

Thorax including scutellum black, dorsum rather densely grayish yellow-white pollinose, with a broad median and 2 rather broad lateral longitudinal black vittae; pleura rather thinly grayish white pollinose. Lateral scutellar seta single; apical scutellar seta fine, slightly shorter than scutellum.

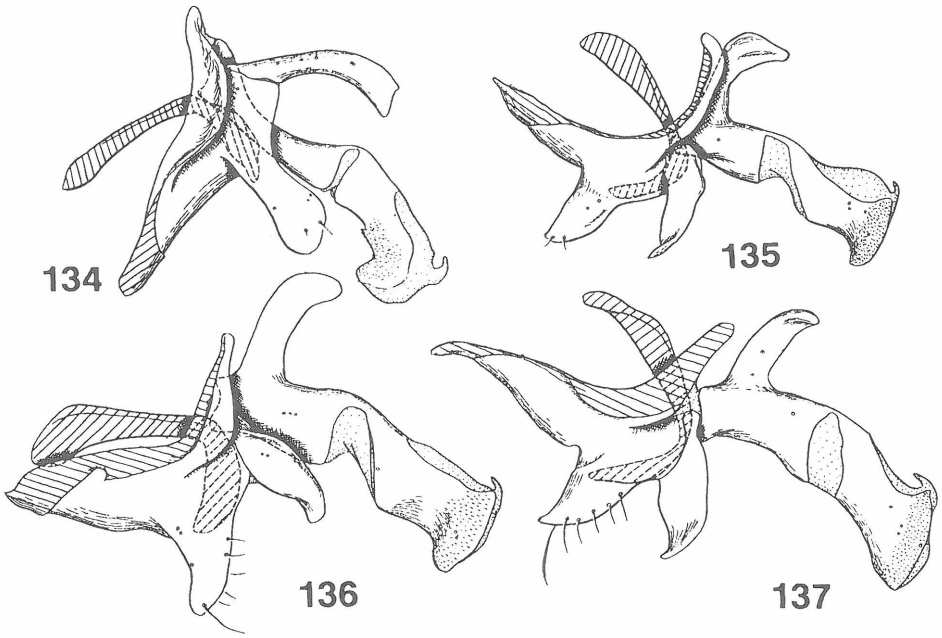


Fig. 134 *Crypsina prima*. - **Figs 135-137** *Nemorilla* spp. Hypandrium, gonopod, paramere and aedeagus in lateral view: **135** *floralis*; **136** *insulata* **sp. n.**; **137** *aquila* **sp. n.**

Wing hyaline, slightly and evenly tinged with pale brown; lower calypter pale brown. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1.5:2.5:1.5; vein R4+5 with only 1 fine setulae at base dorsally; vein M from dm-cu crossvein to its bend about 2 times distance between the bend and wing margin.

Legs black, pulvilli pale brown. Mid tibia with 1 ad, 2 pd and 1 v setae; hind tibia with a sparsely set row of ad setae, a strong submedian seta present. Claws and pulvilli longer than 5th tarsomere.

Abdomen black in ground color, dorsum rather thinly dull yellowish white pollinose on anterior 3/5 of 3rd tergum, 2/3 of 4th and 1/2 of 5th, median longitudinal portion black; posterior black band of 3rd tergum extending triangularly to anterior portion on both sides; bases of hairs and setae roundly black. Hairs rather dense fine and erect; 2nd tergum with 2 rather weak median marginal setae; 3rd tergum with 2 strong median marginal and 2-4 irregular and rather fine median discal setae; 4th tergum with a row of strong marginal and 4 irregular median discal setae; 5th tergum with a row of rather strong discal and marginal setae.

Male genitalia. Cerci in dorsal view narrow, evenly narrowed to apex, in lateral view, weakly

DOI: 10.21248/contrib.entomol.46.1.169-235

curved ventrally; surstylus in lateral view weakly curved ventrally at apex, with rather dense short hairs; gonopod short, with a few hairs on posteroventral portion; epiphallus rather short, apical portion broadly curved posteriorly.

Female: Head more whitish pollinose; vertex about 0.27-0.3 of head width; all head setae stronger; postocellar seta rather strong, slightly curved anteriorly at apex; 1 reclinate orbital setae present; antenna falling only slightly short of lower margin of face, 1st flagellomere 2-2.3 times as long as pedicel; palpus reddish yellow, darkened basally; thoracic dorsum densely pale yellowish gray-white pollinose, with 3 broad longitudinal black vittae; claws and pulvilli shorter than 5th tarsomeres; abdominal dorsum more densely and broadly pale yellowish gray-white pollinose, with tessellate appearance, mid dorsal longitudinal vitta rather broad and diffusing marginally on 3rd tergum; 3rd tergum black on 2 lateral roundish spots and on posterior 1/3, 4th black on posterior 1/4 and 5th on 1/2; hairs on abdomen sparser and recumbent; 3rd and 4th terga each with 2 median discal setae. Female genitalia: Long and narrow; 6th and 7th spiracles close to each other, both present below 6th hemitergite; 7th hemitergite narrow and long, without hair; 7th sternum very narrow, without hair; 8th hemitergite small and elongate.

Distribution: Japan (Hokkaido, Honshu, Shikoku, Kyushu); Palearctic Region.

Hosts: LEPIDOPTERA: Hesperiidae: *Parnara guttata guttata* (BREMER & GREY) [Niigata, Honshu]; Lymantriidae: *Euproctis subflava* (BREMER) [Honshu] (as *E. flava*, ASHIBA, 1958; Takano, 1956); Noctuidae: *Autographa gamma* (LINNÉ) [Sapporo, Hokkaido], *A. nigrisigna* (WALKER) [Hirosaki, Honshu], *Macdunnoughia confusa* (STEPHENS) [Ibaraki, Honshu], *Nycteola asiatica* (KRULIKOWSKI) [Bibai, Hokkaido]; Pyralidae: *Cnaphalocrocis medinalis* (GUENEE) [Shikoku; Kyushu] (SAKAI et al., 1942; TAKANO, 1950), *Conogethes* sp. [Kanagawa, Honshu], *Goniorhynchus butyrosa* (BUTLER) [Tokyo, Honshu], *Ostrinia furnacalis* (GUENEE) [Kyushu] (as *O. nubilalis*, CLARK, 1934; TAKANO, 1950), *Pagyda quinquelineata* HERING [Tokyo & Ishikawa, Honshu] (TOGASHI, 1985), *Palpita nigropunctalis* (BREMER) [Hokkaido] (TAKANO, 1950, 1956); Tortricidae: *Archips fumosus* KODAMA [Bibai, Hokkaido], *A. fuscocupreanus* WALSINGHAM [Morioka, Honshu], *A. issikii* KODAMA [Bibai, Hokkaido], *A. pulchra* (BUTLER) [Bibai, Hokkaido] (as *N. maculosa* and as *Ariola*, MOMOI & KAMIJO, 1963), *A. oporanus* (LINNÉ) [Bibai, Hokkaido; Iwate, Honshu] (as *Cacoecia*, CIBC, 1962; as *N. maculosa* and as *A. piceanus*, MOMOI & KAMIJO, 1963; as *A. similis*, SATO & KAMIJO, 1979), *Choristoneura diversana* (HÜBNER) [Asahikawa, Ashibetsu & Bibai, Hokkaido] (KAMIJO, 1973), *Cymolomia hartigiana* (SAXESEN) [Bibai, Hokkaido], *Eurydoxa advena* FILIPJEV [Asahikawa, Hokkaido], *Lozotaenia coniferana* (ISSIKI) [Asahikawa & Bibai, Hokkaido], *Ptycholomoides aeriferana* (HERRICH-SCHÄFFER) [Utashinai & Bibai, Hokkaido] (as *N. maculosa*, MOMOI & KAMIJO, 1963; KAMIJO & SUZUKI, 1967); *Sparganothis pilleriana* (DENIS & SCHIFFERM.) [Sasayama, Honshu] (SHIMA, 1973), *Spilonota eremitana* MORIUTI [Takikawa, Hokkaido], *Zeiraphera rufimitrana truncata* OKU [Asahikawa, Hokkaido]; Yponomeutidae: *Yponomeuta melianellus* ZELLER [Tomakomai, Hokkaido]. Specimens examined (262 males 221 females from the following localities): HOKKAIDO: Mt. Rausu; Shari-machi; Akan-machi; Shibecha; Nukabira; Ashoro; Mts. Daisetu, Aizankei, Ten'-ninkyo; Mt. Yubari; Bibai; Asahikawa; Sapporo City; Mt. Moiwa; Nopporo; Mt. Apoi; Tomakomai; HONSHU: Aomori Pref.: Mt. Bonju (all in BLKU); Hirosaki City (NIAS); Morioka City: Ibaraki Pref.: Saitama Pref.: Minano; Yorii; Ogano; Kodama; Kamikawa; Tokigawa; Hanno (all in BLKU): Tokyo: Mt. Takao; Atsugi: Kanagawa Pref.: Hiratsuka (all in NIAS): Nagano Pref.: Karuizawa; Togakushi; Izuna-kogen: Niigata Pref.: Mts. Washigasu, Sasaguchihama; Arakawa; Naeba; Myoko-kogen; Mt. Atema: Ishikawa Pref., Noto-machi: Hyogo Pref., Sasayama; SHIKOKU: Matsuyama City, Dogo; TSUSHIMA: Hitakatsu; Mt. Ariake; Sumo;

DOI: 10.21248/contrib.entomol.46.1.169-235

Nii; KYUSHU: Fukuoka Pref.: Fukuoka City; Mt. Tachibana; Mt. Aburayama; Mt. Inunaki; Mt. Kusenbu: Nagasaki Pref., Mie, Matsuura; GOTO IS: Meshima: Oita Pref.: Mts. Kuju, Mt. Kuroiwa: Kumamoto Pref.: Gokanosho; Mt. Ichifusa: Kagoshima Pref.: Mts. Kirishima; Mt. Shibi; Iriki Pass; YAKU IS: Kurio (all in BLKU).

2. *Nemorilla insulata* sp. n.
(Figs 126, 131, 136)

Closely resembling *N. floralis*, but differing as follows:
Male: Vertex narrow, about 0.2 of head width; frontal vitta about 2 times as wide as fronto-orbital plate at middle; parafacial narrow, about 3/5 as wide as 1st flagellomere at middle height; gena very narrow, about 0.1 of eye height; antenna long, falling short of lower margin of face by about 2/5 length of pedicel, 1st flagellomere about 2 times as long as pedicel; thoracic dorsum grayish white pollinose, presutural area of scutum with 5 longitudinal vittae, postsutural scutum with 4 vittae, pollinose portion between 2 inner vittae of presutural area and between 2 outer vittae of postsutural scutum brownish; thoracic pleura grayish white pollinose; abdominal dorsum whitish pollinose on narrow anterior portion of 3rd tergum, anterior 2/5 of 4th and 1/3 of 5th, narrow median longitudinal black vitta distinct on 4th and 5th terga, pollinosity on 3rd tergum expanded to anterior 1/2 on both sides, posterior black area reflecting dark brownish when seen from behind. Male genitalia: Cerci in lateral view flat, gently curved ventrally, in dorsal view rather broad at base and narrowed at middle; surstylus weakly narrowed near middle, with short and fine hairs; distiphallus rather short and broad, with minute spinules on distal portion.
Body length, 7.3-7.6 mm; wing length, 6.1-6.6 mm.
Female: Unknown.
Holotype male, Bonin Is., Chichijima Grp., Ani Jima, Sen-zan (NE Bay), 28.v.1958, F. M. Snyder (BPBM).
Paratype: OGASAWARA IS., 1 male, same data as holotype (BLKU).
Distribution: Japan (Ogasawara Is. = Bonin Is.).
Remarks: This species is apparently closely allied to the widely distributed species *N. floralis* and *N. maculosa*. It is probable that this species is derived from one of these species in the isolated north Pacific islands.

3. *Nemorilla maculosa* (MEIGEN)
(Figs 127, 132)

Tachina maculosa MEIGEN, 1824: 256.
Exorista notata MACQUART, 1849: 377.
Exorista pusilla MACQUART, 1849: 377.
Nemorilla aristalis RONDANI, 1859: 100.
Aubaea cita ROBINEAU-DESVOIDY, 1863: 186.
Aubaea minuta ROBINEAU-DESVOIDY, 1863: 188.
Nemorilla floralis: Auct. (nec FALLÉN, 1810)

Among many *Nemorilla* specimens examined in this study I have seen this species only from Hokkaido, Kyushu and the Ryukyus, but not from Honshu. It is not certain if this species is absent from Honshu. The host of this species is not known in Japan.
This species is very similar to *N. floralis* in general appearance, but may be rather easily

DOI: 10.21248/contrib.entomol.46.1.169-235

distinguished from it by the wider vertex and more densely pollinose body as far as the Japanese specimens are concerned.
Male genitalia: Closely resembling *floralis*; cerci in dorsal view slightly wider at base; surstylus in lateral view rather broad, weakly narrowed to blunt apex.
Distribution: Japan (Hokkaido, Kyushu, Ryukyus); Oriental and Palearctic Regions.
Specimens examined: HOKKAIDO: 5 males 2 females, Abashiri, Sharimachi, 2.viii.1967, H. Shima & A. Nakanishi (BLKU); KYUSHU: 2 males, Nagasaki Pref., Matsuura City, 3.xi.1965, Y. Ikezaki; 1 male, Nagasaki City, Mt. Hiko, 8.viii.1965, H. Shima; 2 males, Kagoshima City, Terayama Park, 10.v.1966, A. Tanaka; 2 females, Kagoshima City, Uearata, 28.v.1965, 20.ix.1966, A. Tanaka; 1 male, Ibusuki City, Mt. Uomi, 19.vi.1968, A. Mori (all in BLKU); RYUKYUS: 1 male, Tokara Is., Nakanoshima I., 12.vii.1964, H. Shima; 1 female, Tokara Is., Takara I., 16.vii.1964, A. Tanaka; 1 female, Amami I., Setouchi, Sude, 22.i.1972, H. Suzuki; 1 female, Ishigaki I., 25.vii.1978, K. Hara (all in BLKU); 1 male 1 female, Ryukyu I., 7.iii.1953, T. Shiraki (NIAS).

4. *Nemorilla aquila* sp. n.
(Figs 128, 133, 137)

Male: Head grayish white pollinose, fronto-orbital plate dark brownish and parafacial slightly yellowish; occiput entirely black; antenna brown-black, basal and inner portion of 1st flagellomere reddish; palpus reddish yellow, darkened at basal 1/2. Vertex about 0.22 of head width; frontal vitta widened anteriorly, only slightly wider than fronto-orbital plate at middle; parafacial slightly narrowed below, about 2/3 as wide as 1st flagellomere at middle height; gena narrow, about 0.13 of eye height; face rather weakly concave, lower margin warped forward, not extending beyond vibrissal angle. Inner vertical seta short, less than 1/4 of eye height; outer vertical seta absent; postocellar seta rather strong, nearly straight, about 4/5 as long as inner vertical seta; lowest frontal seta nearly level with base of arista; vibrissa level with lower margin of face; occiput without black hairs, with dull yellowish pile. Antenna with 1st flagellomere about 2.8 times as long as pedicel.
Thorax black, dorsum thinly dark brownish pollinose, 2 narrow longitudinal black vittae visible; pleura more densely grayish brown pollinose; scutellum black. All scutellar setae rather short; lateral setae double, anterior seta longer than posterior one and about as long as scutellum; apical scutellar setae fine, about 1/2 as long as scutellum.
Wing hyaline, slightly and evenly tinged with pale brown; lower calypter pale brown. Relative lengths of costal sectors 2nd, 3rd and 4th approximately as 1.5:2.5:1.5; vein R4+5 with only 1 fine setulae at base dorsally; vein M from dm-cu crossvein to its bend about 2 times distance between the bend and wing margin.
Legs black, pulvilli pale yellowish brown. Mid tibia with 1 ad and 3 short and fine pd setae, without v seta; hind tibia with a rather closely set ad setae, a strong submedian seta present. Claws and pulvilli longer than 5th tarsomere.
Abdomen black in ground color, broadly brownish pollinose; 3rd tergum with 4 narrow pollinose spots on anterior portion, black on broad inverse triangular area of median portion and both lateral longitudinal portions; 4th tergum rather thinly whitish pollinose on anterior 1/2, the pollinosity with tessellate appearance, median longitudinal portion and lateral portions black; 5th tergum thinly whitish pollinose on anterior 2/5, the pollinose area with tessellate appearance, median longitudinal portion black. Hairs dense fine and erect, becoming sparser posteriorly; 2nd tergum without distinct median marginal seta; 3rd tergum with 2 short and fine median marginal

DOI: 10.21248/contrib.entomol.46.1.169-235

setae; 4th tergum with a row of rather short marginal setae; 5th tergum with a row of short discal and marginal setae.

Male genitalia. Cerci in dorsal view nearly parallel-sided on basal 1/3 to apical 1/3, then narrowed apically, in lateral view flat, weakly curved ventrally; surstylus in lateral view weakly narrowed to apex, with rather dense long hairs on dorsal portion; epiphallus rather short; distiphallus with minute spinules on apical portion.

Female: Head more whitish pollinose, occiput grayish; vertex about 0.26 of head width; all head setae stronger, inner vertical seta about 2/5 of eye height; outer vertical seta about 1/2 as long as inner seta; postocellar seta fine, slightly shorter than outer vertical seta; 1 reclinate orbital seta subequal in length to outer vertical seta; lowest frontal seta nearly level with base of 1st flagellomere; palpus more broadly reddish yellow; thorax rather thinly grayish white pollinose, dorsum with 3 broad longitudinal black vittae; mid tibia with 2 pd setae; claws and pulvilli shorter than 5th tarsomere; abdomen rather thinly grayish white pollinose on anterior 2/3 of 3rd and 4th terga and 1/2 of 5th, the pollinose portion with tessellate appearance, mid dorsal longitudinal vittae distinct on 3rd to 5th terga, both sides of each 3rd and 4th terga obliquely and longitudinally black; 2nd tergum with 2 fine median marginal setae; 3rd tergum with 2 rather long median marginal setae; hairs on dorsum recumbent.

Body length: 5-6.5 mm; wing length; 4.3-5 mm.

Distribution: Japan (Honshu, Shikoku, Ryukyus).

Holotype male, Aichi Pref., Nishio City, Saimyojisan, 13.vii.1957, H. Kurahashi (EIHU).

Paratypes: SHIKOKU: 1 female, Tokushima Pref., Mugi-cho, Mugi Oshima, 1.xi.1991, K. Ohara; RYUKYUS: 1 female, Amami Oshima, Uken-mura, Edateku-Jima, 19.ix.1972, H. Suzuki (all in BLKU).

Remarks: This species very closely resembles *N. oceanica* described from New Caledonia by CURRAN (1929), but may be distinguished from it by its darker color, reddish yellow palpus, weak marginal scutellar setae and 2 short lateral scutellar setae. These 2 species, together with *N. nemorilloides* (BEZZI) from Seychelles and *N. afra* CURRAN from Africa, are characteristic in lacking ventral setae on the mid tibia.

III. Phylogenetic Considerations

As many of New World winthemiine genera and an African genus *Hemiwinthemia* were not available in this study and their identities are not certainly defined as yet, it is impossible to deduce the phylogenetic relationships among all the genera of the Winthemiini. Here I try to infer tentatively the phylogenetic relationships among Old World members of the tribe that I have examined. A cladogram of hypothesized relationships is shown in Fig. 138, and is based on the character states discussed below.

The basilliform sclerites are very broad and sometimes fused medially (Fig. 10) in all members of this tribe examined in this study. This character state is not found in most of other tribes of the Tachinidae and seem to be an autapomorphy of this tribe (character state 1 in Fig. 138).

Members of the Winthemiini have an elongate female genitalia. This character state is considered as an adaptation for parasitization and found in scattered genera of exoristine Tachinidae.

This is also considered as an autapomorphy of this tribe (2). The fully haired katepimeron is found in the members of Winthemiini and Ethiliini sensu HERTING (1984). At present I cannot determine if this character state is a synapomorphy shared by Winthemiini and Ethillini or occurred independently in stem species of these tribes, so it is not used to define the monophyly

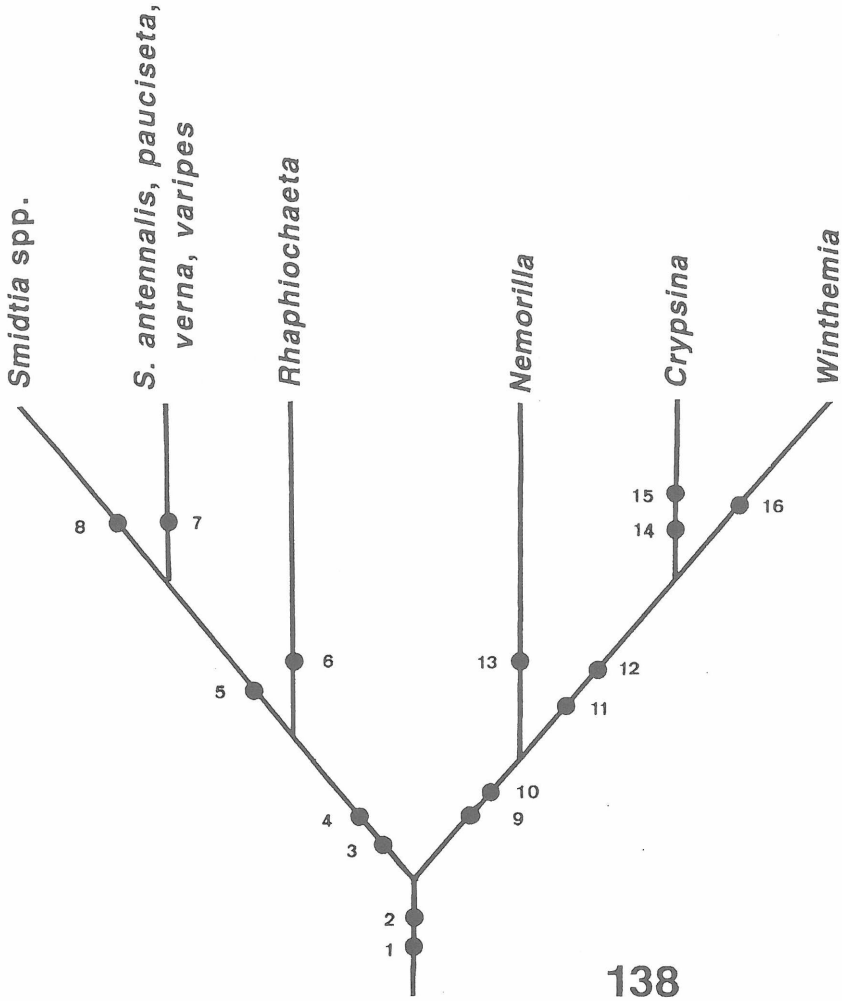
DOI: 10.21248/contrib.entomol.46.1.169-235

of the Winthemiini. Female members of the Winthemiini lay unincubated hard-shelled eggs directly on host exoskelton and this character state is found in Exoristini, Ethillini and some members of Eryciini in the subfamily Exoristinae. I think, however, this character state is plesiomorphic in the family Tachinidae, so it is not used to define the monophyly of this tribe.
In aedeagal structure members of *Smidtia* and *Rhaphiochaeta* seem to be more specialized than those of *Crypsina*, *Winthemia* and *Nemorilla* (including *Ossidingia* TOWNSEND [reference synonymy, e.g. CROSSKEY, 1980]) in having a weakly sclerotized dorsodistal expansion (Figs. 11-13). This area is almost always membranous in most genera of Exoristinae, although it varies in shape among groups. This character state is considered to be a synapomorphy shared by *Smidtia* and *Rhaphiochaeta* (4).
The male 6th abdominal tergum is more or less reduced in members of the subfamily Tachininae and Exoristinae sensu HERTING in comparison with that in the Phasiinae and Dexiinae. The entire and rather elongate condition of the male 6th abdominal tergum is considered to be primitive compared with strongly reduced condition, because strongly reduced 6th abdominal tergum is scattered in some genera among the vast complex of exoristine genera. The former condition is found in *Crypsina*, *Winthemia* and *Nemorilla*, and the latter in *Rhaphiochaeta* and *Smidtia* (3).
In species of *Smidtia* the 6th abdominal tergum is completely absent or rarely represented by a pair of setae (*japonica*) (5) and in *Rhaphiochaeta breviseta*, the only representative of the genus, it is reduced to a pair of very small hemitergites. In contrast, it is rather well represented and bears several setae in members of *Crypsina*, *Winthemia* and *Nemorilla*. In *Crypsina prima* it is entire and long, but in members of *Winthemia* and *Nemorilla* it is more or less constricted at the middle or narrowly separated medially into 2 rather broad and long hemitergites (11).
A thickened 3rd aristomere is sometimes found in scattered genera of Exoristinae, but only in *Rhaphiochaeta* in this tribe. This seems to be a derived condition of a slender 3rd aristomere (6)
In the male genitalia of *Smidtia antennalis*, *pauciseta*, *verna* and the Burmese species *S. varipes* (MESNIL) the anteroventral portion of the epandrium is strongly narrowed (Fig. 6, arrow) and the distal arms of the hypandrium are long and broad. These character states are absent from other species of this tribe (e.g. Fig. 7, arrow), and they seem to represent a secondary adaptation for copulation. These states may be considered synapomorphies of these species (7).
The parafacial is usually bare in most genera of exoristine Tachinidae, but it is fully haired in many species of *Smidtia* and in all members of *Winthemia* and *Crypsina*. The parafacial is haired at most on upper portion or sparsely so in *Smidtia antennalis*, *pauciseta*, *verna* and *varipes*. The haired parafacial is considered to be apomorphic and this state of the character seems to have occured at least two times in this tribe (8) (12).
The reclinate orbital setae are usually developed in the males of most genera of the Exoristinae, and the reduction of this character seems to be derived. This condition is found in members of *Crypsina*, *Winthemia* and *Nemorilla* (10).
In the female genitalia the 7th abdominal sternum is represented by a rather broad and long sclerite (*Smidtia*) or the sternum is greatly reduced or absent (9) (*Crypsina*, *Nemorilla*, *Winthemia*; *Rhaphiochaeta* female not examined). The 8th abdominal tergum is always reduced to a pair of small sclerites in members of this tribe, and the reduction is much more advanced in *Crypsina* and *Winthemia* than in *Nemorilla* and *Smidtia*. As the reduction of the abdominal terga and sterna is considered to be the derived condition, *Winthemia* is considered to be most advanced (16), and *Crypsina* follows it. *Nemorilla* and *Smidtia* are plesiomorphic in these structures.

DOI: 10.21248/contrib.entomol.46.1.169-235

The epiphallus is usually developed in most genera of Exoristinae. It is absent in *Crypsina prima* (Fig. 129) (14), but well developed and long in species of *Winthemia*, *Nemorilla*, *Rhaphiochaeta* and *Smidtia*. It seems to be most developed in *Nemorilla* (13).

The lower portion of face is strongly narrowed and elongate in male of *Crypsina prima*, but it is not so in all other members of this tribe as well as in most other members of exoristine genera. These character states seem to represent autapomorphies of *Crypsina* (15).



138

Fig. 138 Tentatively inferred phylogenetic relationships among Old World genera of Winthemiini. Numbers indicating synapomorphies of clades: 1. Broad basilliform sclerite; 2. female genitalia elongate; 3. reduction of male 6th abdominal tergum; 4. weakly sclerotized dorsodistal portion of distiphallus; 5. absence of male 6th abdominal tergum; 6. thickened arista; 7. narrow and elongate anterodorsal portion of epandrium; 8. fully haired parafacial; 9. reduction of female 7th abdominal sternum; 10. absence of reclinate orbital seta in male; 11. medially divided orconstricted male 6th abdominal tergum; 12. fully haired parafacial; 13. enlarged epiphallus; 14. absence of epiphallus; 15. narrowed and elongate lower portion of face in male; 16. strong reduction of female 7th abdominal sternum and 8th hemitergites.

DOI: 10.21248/contrib.entomol.46.1.169-235

IV. Host/Parasite Lists of Winthemiini from Japan

1. Parasite-Host List

Parasitoid Names	**Host names** [Literature]
Nemorilla floralis (FALLÉN)	*Archips fumosus*; *A. fuscocupreanus*; *A. issikii*; *A. pulchra* [MOMOI & KAMIJO, 1963]; *A. oporanus* [CIBC, 1962; MOMOI & KAMIJO, 1963; SATO & KAMIJO, 1979]; *Choristoneura diversana* [KAMIJO, 1973]; *Cymolomia coniferana*; *Ptycholomoides aeriferana* [KAMIJO & SUZKI, 1967; MOMOI & KAMIJO, 1963]; *Sparganothis pilleriana* [SHIMA, 1973]; *Spilonota eremitana*; *Zeiraphera rufimitrana truncata* (Lep., Tortricidae)
	Autographa gamma; *A. nigrisigna*; *Macdunnoughia confusa*; *Nycteola asiatica* (Lep., Noctuidae)
	Cnaphalocrocis medinalis [SAKAI et al., 1942; TAKANO, 1950]; *Conogethes* sp.; *Ostrinia furnacalis* [TAKANO, 1950]; *Pagyda quinquelineata* [TOGASHI, 1985]; *Palpita nigropunctalis* [TAKANO, 1950, 1956] (Lep., Pyralidae)
	Euproctis subflava [ASHIBA, 1958; TAKANO, 1956] (Lep., Lymantriidae)
	Parnara guttata guttata (Lep., Hesperiidae)
	Yponomeuta melianellus (Lep., Yponomeutidae)
Smidtia amoena (MEIGEN)	*Arctia caja phaeosoma* [TAKANO, 1950, 1956] (Lep., Arctiidae)
	Tristrophis veneris (Lep., Geometridae)
	Celaena leucostigma (Lep., Noctuidae)
	Drymonia dodonides [SHIMA, 1973] (Lep., Notodontidae)
Smidtia japonica (MESNIL)	*Palaeocimbex carinulata* (Hym., Cimbycidae)
Winthemia angusta SHIMA, CHAO et ZHANG	*Dolbina tancrei*; *Smerinthus planus* [SHIMA et al., 1992] (Lep., Sphingidae)
Winthemia cruentata (RONDANI)	*Autographa gamma* (Lep., Noctuidae) [KANEKO & KONISHI, 1995]
	Sphinx constricta (Lep., Sphingidae)
Winthemia mallochi BARANOV	*Phalera assimilis* (Lep., Notodontidae)
Winthemia sumatrana (TOWNSEND)	*Anosia chrysippus chrysippus* (Lep., Danaidae)
	Erionota torus (Lep., Hesperiidae)
	Histia flabellicornis ultima (Lep., Zygaenidae)
	Lymantria mathura aurora [SCHAEFER & SHIMA, 1981] (Lep., Lymantriidae)
Winthemia venusta (MEIGEN)	*Ascotis selenaria cretacea* [TOGASHI, 1985] (Lep., Geometridae)
	Stauropus fagi persimilis; *Torigea straminea* (Lep., Notodontidae)

DOI: 10.21248/contrib.entomol.46.1.169-235

2. Host-Parasite List

Host names [Japanese Common names]	**Parasitoid names** [Localities]
Order **Hymenoptera**	
Cimbycidae	
Palaeocimbex carinulata (KONOW) [Nasiashibuto-habachi]	*Smidtia japonica* [Honshu]
Order **Lepidoptera**	
Arctiidae	
Arctia caja phaeosoma (BUTLER) [Hitoriga]	*Smidtia amoena* [Honshu]
Danaidae	
Anosia chrysippus chrysippus (LINNÉ [Kaba-madara]	*Winthemia sumatrana* [Ryukyus]
Geometridae	
Ascotis selenaria cretacea (BUTLER) [Yomogi-eashaku]	*Winthemia venusta* [Honshu]
Tristrophis veneris (BUTLER) [Torafu-tsubame-edashaku]	*Smidtia amoena* [Hokkaido]
Hesperiidae	
Erionota torus Evans [Banana-seseri]	*Winthemia sumatrana* [Ryukyus]
Parnara guttata guttata (BREMER et GREY) [Ichimonji-seseri]	*Nemorilla floralis* [Honshu]
Lymantriidae	
Euproctis subflava (BREMER) [Dokuga]	*Nemorilla floralis* [Honshu]
Lymantria mathura aurora BUTLER [Kashiwa-maimai]	*Winthemia sumatrana* [Ryukyus]
Noctuidae	
Autographa gamma (LINNÉ) [Gamma-kin-uwaba]	*Nemorilla floralis* [Hokkaido]; *Winthemia cruentata* [Hokkaido]
A. nigrisigna (WALKER) [Tamana-kin-uwaba]	*Nemorilla floralis* [Honshu]
Celaena leucostigma (HÜBNER) [Sho-buyoto]	*Smidtia amoena* [Hokkaido]
Macdunnoughia confusa (STEPHENS) [Kiku-gin-uwaba]	*Nemorilla floralis* [Honshu]
Nycteola asiatica (KRULIKOWSKI) [Kobusuji-kinokawaga]	*Nemorilla floralis* [Hokkaido]
Notodontidae	
Drymonia dodonides (STAUDINGER) [Tobimon-shachihoko]	*Smidtia amoena* [Honshu]
Phalera assimilis (BREMER et GREY) [Tsumaki-shachihoko]	*Winthemia mallochi* [Kyushu]
Stauropus fagi persimilis BUTLE [Shachihoko-ga]	*Winthemia venusta* [Honshu]
Torigea straminea (MOORE) [Ki-shachihoko]	*Winthemia venusta* [Honshu]

DOI: 10.21248/contrib.entomol.46.1.169-235

Pyralidae	
Cnaphalocrocis medinalis (GUENEE) [Kobu-nomeiga]	*Nemorilla floralis* [Shikoku, Kyushu]
Conogethes sp. [Matsuno-gomadara\nomeiga]	*Nemorilla floralis* [Honshu]
Goniorhynchus butyrosa (BUTLER) [Kuroheri-ki-nomeiga]	*Nemorilla floralis* [Honshu]
Ostrinia furnacalis (GUENEE) [Awanomeiga]	*Nemorilla floralis* [Honsu, Kyushu]
Pagyda quinquelineata HERING [Yoshinomeiga]	*Nemorilla floralis* [Honshu]
Palpita nigropunctalis (BREMER) [Maeaka-sukashi-nomeiga]	*Nemorilla floralis* [Hokkaido]
Sphingidae	
Dolbina tancrei STAUDINGER [Sazamami-suzume]	*Winthemia angusta* [Honshu]
Smerinthus planus WALKER [Uchi-suzume]	*Winthemia angusta* [Honshu]
Sphinx constricta BUTLER [Ko-ebigara-suzume]	*Winthemia cruentata* [Kyushu]
Tortricidae	
Archips fumosus KODAMA [Ichii-oo-hamaki]	*Nemorilla floralis* [Hokkaido]
A. fuscocupreanus WALSINGHAM [Midare-kakumon-hamaki]	*Nemorilla floralis* [Honshu]
A. issikii KODAMA [Momi-atoki-hamaki]	*Nemorilla floralis* [Hokkaido]
A. pulcher (BUTLER) [Tatesuji-hamaki]	*Nemorilla floralis* [Hokkaido]
A. oporanus (LINNÉ) [Matsu-atoki-hamaki]	*Nemorilla floralis* [Hokkaido, Honshu]
Choristoneura diversana (HÜBNER) [Kosuji-obi-hamaki]	*Nemorilla floralis* [Hokkaido]
Cymolomia hartigiana (SAXESEN) [Tohi-hime-hamaki]	*Nemorilla floralis* [Hokkaido]
Eurydoxa advena FILIPJEV [Hiroba-birodo-hamaki]	*Nemorilla floralis* [Hokkaido]
Lozotaenia coniferana (ISSIKI) [Tohi-oo-hamaki]	*Nemorilla floralis* [Hokkaido]
Ptycholomoides aeriferana (HERRICH-SCHAEFER) [Karamatsu-itohiki-hamaki]	*Nemorilla floralis* [Hokkaido]
Sparganothis pilleriana (DENIS & SCHIFFERMÜLLER) [Tengu-hamaki]	*Nemorilla floralis* [Honshu]
Spilonota eremitana MORIUTI [Karamatsu-] [Todomatsu-hime-hamaki]	*Nemorilla floralis* [Hokkaido]
Zeiraphera rufimitrana truncata OKU [matsu-amime-hime-hamaki]	*Nemorilla floralis* [Hokkaido]

DOI: 10.21248/contrib.entomol.46.1.169-235

Yponomeutidae

Yponomeuta melianellus ZELLER [Ringo-suga]

Zygaenidae

Histia flabellicornis ultima HERING [Kuro-tsubame]

Nemorilla floralis [Hokkaido]

Winthemia sumatrana [Ryukyus]

V. Acknowledgments

I am grateful to Dr. JAMES E. O'HARA, Biological Resources Division, Agriculture and Agri-Food Canada, Ottawa, for his critical review of an early draft of this paper. I am also much indebted to the following entomologists for their kind help in lending or offering specimens: the late Dr. K. BABA, Niigata; Mr. BEN BRAGGE, Zoologisch Museum, Amsterdam; Dr. R. CONTRERAS-LICHTENBERG, Naturhistorisches Museum, Wien; Assoc. Prof. JUN EMOTO, Nanzan University, Nagoya; Dr. NEAL L. EVENHUIS, Bishop Museum, Honolulu; the late Prof. SHO FUKUSHI, Hirosaki University, Hirosaki; Mr. NAOMI GYOTOKU, Fukuoka; Mr. KATSUJI HARA and Mr. CHOJU TAMAKI, Saitama; Dr. JAMES E. O'HARA, Ottawa; Dr. BENNO HERTING and Dr. HANS-PETER TSCHORSNIG, Staatliches Museum für Naturkunde, Stuttgart; Mr. YOSHIHIRO IKEZAKI, Nagasaki; Prof. R. KANO, Saitama Medical University, Saitama; Dr. HIROMU KURAHASHI, National Institute of Health, Tokyo; Dr. TAKESHI MATSUMURA and Dr. KAZUHIKO KONISHI, National Institute of Agro-Environmental Sciences, Tsukuba; Prof. AKIRA MIYATA, Oita Medical University, Oita; Mr. Y. MIYATAKE, Osaka Museum of Natural History, Osaka; Dr. A. NAGATOMI and Dr. K. KUSIGEMATI, Kagoshima University, Kagoshima; Prof. AKINORI NAKANISHI, Hyogo Prefectural Museum of Human & Nature, Sanda; Mr. KENJI OHARA, Tokushima Prefectural Museum, Tokushima; Mr. ISAO OTSUKA, Kumamoto; Prof. TOYOHEI SAIGUSA, Kyushu University, Fukuoka; Dr. SATOSHI SHINONAGA, Tokyo Medical & Dental University, Tokyo; Dr. MASAAKI SUWA, Hokkaido University, Sapporo; Mr. AKIRA TANAKA, Kagoshima Agricultural Experiment Station, Kagoshima; Dr. ICHIJI TOGASHI, Ishikawa Agricultural College, Ishikawa; Dr. NORMAN E. WOODLEY, U.S. Department of Agriculture, Washington D.C.; Mr. NIGEL WYATT, Natural History Museum, London; Dr. MASAKO YAFUSO, University of the Ryukyus, Naha; Mr. KENZO YAMAGISHI, Meijo University, Nagoya; Mr. JOACHIM ZIEGLER, Deutsches Entomologisches Institut, Eberswalde.

VI. Literature

ARNAUD, P. H. Jr. 1982: Host-parasite catalog of North American Tachinidae. - U.S. Dept. Agric. Misc. Publ. (**1319**): 1-860.

ASHIBA, M. 1958: Parasitic Hymenoptera and Diptera of *Euproctis*. - Shin-konchu **11**: 32-34 (in Japanese).

BARANOV, N. 1932: Zur Kenntnis der orientalischen *Winthemia*-Arten (Dipt. Larvaev.). - Ent. Nachr Bl. **6**: 45-47.

BARANOV, N. 1939: Sechs neue Raupenfliegen aus der Sammlung Takanos. - Ent. Nachr Bl. **12**: 110-112.

BEZZI, M. 1907: Tachinidae. - In: BECKER et al. (eds.) "Katalog der paläarktischen Diptera." **3**, 828 pp. Budapest.

BORISOVA, K. B. 1962: On two new species of the genus *Nemosturmia* T. T. (Diptera, Larvaevoridae) from the Far-East. - Trud. Zool. Inst. Akad. Nauk SSSR. **30**: 326-329 (in Russian).

BRAUER, F. & J. v. BERGENSTAMM 1889: Zweiflügler des Kaiserlichen Museums zu Wien. 4. Muscaria Schizometopa (Exclusive Anthomyidae). - 1. Denkschr. Akad. Wissensch. Wien. **56**: 69-180.

CANTRELL, B. K. 1989: The Australasian species of *Winthemia* ROBINEAU-DESVOIDY (Diptera: Tachinidae) with notes on Oceanian and Oriental species. - J. Aust. ent. Soc. **28**: 93-104.

CLARK, C. A. 1934: The European corn borer and its controlling factors in the Orient. - U.S. Dept. Agr., Tech. Bull. **455**: 1-37.

DOI: 10.21248/contrib.entomol.46.1.169-235

Commonwealth Institute of Biological Control 1962: Report of work carried out during 1961: 49-55.

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**: 1-221.

CROSSKEY, R. W. 1976: A taxonomic conspectus of the Tachinidae (Diptera) of the Oriental Region. - Bull. Br. Mus. nat. Hist. (Suppl.) **26**: 1-357.

CROSSKEY, R. W. 1984: Annotated keys to the genera of Tachinidae (Diptera) found in tropical and southern Africa. - Ann. Natal Mus. **26**: 189-337.

CURRAN, C. H. 1927: Some new Australasian and African Diptera of the families Muscidae and Tachinidae (Diptera). - Ent. Mitt. **16**: 438-448.

CURRAN, C. H. 1929: Diptera collected by Prof. and Mrs. COCKERELL in New Caledonia and Fiji Islands. - Amer. Mus. Novit. (**375**): 1-15.

EGGER, 1861: Dipterologische Beiträge. Fortsetzung der Beschreibung neuer Dipteren. - Verh. zool.-bot. Ges. Wien **11**: 209-216.

Entomological laboratory, Kyushu University & Japan Wildlife Research Center 1989: A check list of Japanese insects. II. 541-1088. Fukuoka.

EVENHUIS, N. L. & THOMPSON, F. C. 1990: The designations of genus group names of Diptera in d'Orbigny's Dictionnaire Universel d'Histoire Naturelle. - Bishop Mus. Occ. Pap. **30**: 226-258.

FABRICIUS, I. C. 1794: Entomologia systematica emendata et aucta. Secundum classes, ordines, genera, species adjectis synonimis, locis, observationibus, descriptionibus. **4**, 472+5 pp. Copenhagen.

FALLÉN, C.F. 1810: Forsok att bestamma de i Sveige funne Flugarter, som kunna foras til Slagtet Tachina. K. Svenska Vetensk Akad. Handl. [2] **31**: 253-287.

GUIMARAES, J. H. 1972: A revision of the genus *Winthemia* ROBINEAU-DESVOIDY in America north of Mexico (Diptera, Tachinidae). - Arq. Zool. **22**: 27-112.

HERTING, B. 1960: Biologie der westpaläarktischen Raupenfliegen. Dipt., Tachinidae. Monog. angew. Ent. (**16**): 1-188.

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

HERTING, B. & DELY-DRASKOVITS, A. 1993: Family Tachinidae. - In: A. SOOS (ed.) Catalogue of Palaearctic Diptera **13**: 118-458. Hangarian Nat. Hist. Mus., Budapest.

KAMIJO, K. 1973: The parasite complex of *Choristoneura diversana* HÜBNER injurious to Todo-fir, *Abies sachalinensis* MASTERS. - Jpn. J. appl. Ent. Zool. **17**: 77-83 (in Japanese with English summary).

KAMIJO, K. & SUZUKI, S. 1967: Notes on parasites of *Ptycholomoides aeriferana* H.-S. - Bull. Hokkaido For. Exp. St. (**5**): 25-32 (in Japanese with English summary).

KANEKO, J. & KONISHI, K. 1995: Rate of parasitism of cocoons of silver Y moth, *Autographa gamma* (L.), in grass fields at Sapporo, Japan and species composition of parasitoids. - Jpn. J. appl. Ent. Zool. **39**: 162-164 (in Japanese with English summary).

KOCHA, T. 1971: A new species of the genus *Smidtiola* MESNIL from Japan (Diptera: Tachinidae). - Kontyu **39**: 292-293.

*LIOY, P. 1864: I Ditteri distribuiti secondo un nuovo metodo di classificazione naturale. - Atti Ist. veneto Sci. (3)**9**: 1311-1352.

MACQUART, M. J. 1849: Nouvelles observations sur les Dipteres d'Europe de la tribu des Tachinaires (suite). - Ann. Soc. Ent. Fr. (2) **7**: 353-418.

MALLOCH, J. R. 1930: Notes on Australian Diptera. XXIV. Proc. Linn. Soc. N.S.W. **55**: 303-353.

MCALPINE, J. F. 1981: Morphology and Terminology - Adults. - In: MCALPINE et al. (eds.) "Manual of Nearctic Diptera" **1**: 9-63. Agriculture Canada, Ottawa.

MEIGEN, J. W. 1824: Systematische Beschreibung der bekannten europäischen zweiflügligen Insekten. - IV. xii+428 pp. Hamm.

MESNIL, L. P. 1949: Larvaevorinae (Tachininae). - In: LINDNER (ed.) "Die Fliegen der palaearktischen Region" 64g: 49-104. Schweizerbart'sche Verlag., Stuttgart.

DOI: 10.21248/contrib.entomol.46.1.169-235

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

MESNIL, L. P. 1963: Nouveaux tachinaires de la region palearctique principalment de l'URSS et du Japon. - Bull. Inst. roy Sci. nat. Belg. **39**: 1-56.

MESNIL, L. P. 1967: Tachinaires palearctiques inedits (Diptera). - Mushi **41**: 37-57.

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

MOMOI, S. & KAMIJO, K. 1963: Natural enemies of microlepidopterous pests infesting coniferous trees. - Rep. Koshunai Nurs. Hokkaido For. (2): 54-67 (in Japanese).

ROBINEAU-DESVOIDY, J. 1830: Essai sur les myodaires. - Mem. Acad. roy. Sci. Inst. Fr., Paris: 1-813.

ROBINEAU-DESVOIDY, J. 1847: Myodaires des environs de Paris (Suite). - Ann. Soc. Ent. Fr. (2) **5**: 255-287, 571-617.

ROBINEAU-DESVOIDY, J. 1863: Histoire naturelle des Dipteres des environ de Paris. 1, xii+1143 pp. Victor Masson et Fils, Paris.

RONDANI, C. 1856: Genera italica ordinis Dipterorum ordinatim disposita et distinct et in familias et stirpes aggrergata. - Dipterologiae italicae prodromus **1**, 226 pp. Parma.

RONDANI, C. 1859: Species italicae ordinis Dipterorum in genera characteribus definita, ordinatim collectae, methodo analitica distinctae, et novis vel minus cognitis descriptis. - Dipterologiae italicae prodromus **3**, 243 pp. Parmae.

SABROSKY, W. C. 1973: Identification of *Winthemia* of America north of Mexico, with a revised key to the females (Diptera, Tachinidae). - Ann. Ent. Soc. Amer. **66**: 1035-1041.

SAKAI, K.; IKEDA, Y. & SAMESHIMA, T. 1942: Studies on bionomics and control measures of *Cnaphalocrocis medinalis* GUENEE (Preliminary Report). - Oyo-Kontyu **4**: 1-24 (in Japanese).

SATO, H. & K. KAMIJO 1979: Notes on parasites of *Archippus similis* (BUTLER). - Bull. Iwate Pref. For. Expt. Sta. (3): 1-19 (in Japanese with English summary).

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

SHIMA, H. 1973: New host records of Japanese Tachinidae (Diptera: Calyptrata). - Sieboldia **4**: 153-160.

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

SHIMA, H.; CHAO, C.-M. & ZHANG, W.-X. 1992: The genus *Winthemia* (Diptera: Tachinidae) from Yunnan Province, China. - Jpn. J. Ent. **60**: 207-228.

STEIN, P. 1924: Die verbreitesten Tachiniden Mitteleuropas nach ihren Gattungen und Arten. - Arch. Naturgesch. A **6**: 1-271.

TAKANO, S. 1950: Tachinidae. - In: ISHII et al. (eds.) "Iconographia Insectorum Japonicorum," Editio Secunda Reformata: 1699-1716. Hokuryukan, Tokyo.

TAKANO, S. 1956: Systematic and ecological studies of Tachinoidea. - Ann. Rep. Co-oper. Minist. Educ., 1955, Agr.: 59-63 (in Japanese).

TOGASHI, I. 1985: Tachinid fauna in Ishikawa Prefecture, with host records of some species (1). - Bull. Ishikawa Agric. Coll. (**15**): 35-37.

TOWNSEND, C. H. T. 1913: Inquiry into the relationships and taxonomy of the muscoid flies. - Can. Ent. **45**: 37-57.

TOWNSEND, C. H. T. 1926: New Holarctic Muscoidea. - Insecutor Inscit. menstr. **14**: 24-41.

TOWNSEND, C. H. T. 1927: Fauna sumatrensis. Diptera Muscoidea III. Supplta Ent. **16**: 56-76.

TOWNSEND, C. H. T. 1928: New Muscoidea from the Philippines region. - Philipp. J. Sci. **34** (1927): 365-397.

TOWNSEND, C. H. T. 1941: Manual of Myiology. XI, 342 pp. Itaquaquecetuba, Sao Paulo.

TSCHORSNIG, H.-P. & HERTING, B. 1994: Die Raupenfliegen (Diptera: Tachinidae) Mitteleuropas: Bestimmungstabellen und Angaben zur Verbreitung und Ökologie der einzelnen Arten. - Stutt. Beitr. Naturk. A (**506**): 1-170.

DOI: 10.21248/contrib.entomol.46.1.169-235

WALKER, F. 1853: Insecta britannica, Diptera 2, London: vi+297 pp.
WALKER, F. 1859: Catalogue of the dipterous insects collected at Makassar in Celebes, by Mr. A.R. WALLACE, with descriptions of new species. - J. Proc. Linn. Soc. Lond. 4 (1860): 90-144.
WOOD, D. M. 1987: Tachinidae. - In: MCALPINE et al. (eds.) "Manual of Nearctic Diptera" 2: 1193-1269. Agriculture Canada, Ottawa.

* Not directly seen.

Author's address:
HIROSHI SHIMA
Biosystematics Laboratory
Graduate School of Social and Cultural Studies
Kyushu University, Ropponmatsu
Fukuoka 810, Japan

(Formerly Biological Laboratory
College of General Education, Kyushu University)

DOI: 10.21248/contrib.entomol.46.1.169-235