

# A Systematic Study of the Genus *Actia* Robineau-Desvoidy of Japan (Diptera: Tachinidae)\*

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**Abstract.** Japanese species of the genus *Actia* Robineau-Desvoidy are revised. Thirteen species are recognized, classified into four species groups: *crassicornis* group, *lamia* group, *tarsata* group and *nigroscutellata* group. The autapomorphies of each species group are redefined, and characters illustrated. The following four new species are described from Japan: *A. solida* sp. nov., *A. ampla* sp. nov., *A. destituta* sp. nov. and *A. clavula* sp. nov. A key is provided for species groups and Japanese species of *Actia*, and local host records are listed.

**Key words:** Tachinidae, Siphonini, *Actia*, species groups, host records, systematics, Japan.

## Introduction

The genus *Actia* Robineau-Desvoidy, 1830, belongs to the tribe Siphonini, members of the subfamily Tachininae (Diptera: Tachinidae) with characteristically small sized body. The genus is known from sixty-four species widely distributed in the world, and with numerous undescribed species from the Oriental, Afrotropical and Neotropical Regions (Andersen, 1996; O'Hara, 1991). The genus is well characterized in the tribe Siphonini by the presence of a row of hairs on the katapisternum anterior to the mid coxa, V-shaped male sternum 5, male terminalia with short spinose J-shaped gonopods and absence of the dorsal cornu in the cephalopharyngeal skeleton of first instar larvae (O'Hara, 1988, 1989; Andersen, 1996).

Malloch (1930, 1935) described twenty-eight species as belonging to *Actia* from Malaysia, but only nine remain assigned to the genus (Mesnil, 1963; Crosskey, 1976, 1977). Mesnil (1952, 1957) described three species of *Actia* from Burma and Japan, and later Mesnil (1963) revised the tribe Siphonini of the Palearctic Region and reported nine species of *Actia* from this region. Shima (1970a) added two species from Nepal and Hong Kong, and Richter (1974, 1976, 1980) described three new species from middle Asia and Siberia. O'Hara (1991) revised the Nearctic species of this genus and reported eight species including four

new species. In this paper, O'Hara recognized three species groups for the Nearctic species and also assigned most Palearctic species to these groups. Andersen (1996) revised the European species of Siphonini and recorded seven species of *Actia* from Europe, recognizing two of O'Hara's species groups.

Currently, six Japanese species of *Actia* are known, including *Actia crassicornis* (Meigen), *A. jocularis* Mesnil, *A. maksymovi* Mesnil, *A. nigra* Shima, *A. nudibasis* Stein, and *A. pilipennis* (Fallén) (Takano, 1950; Mesnil, 1957; Mesnil & Pschorn-Walcher, 1968; Shima, 1970b; Herting, 1984). However, these Japanese species have not been studied in detail, and hosts are little known in comparison with European and North American species. In the present work we recognize thirteen species including four new and three newly recorded species from Japan. Descriptions and redescriptions of these species are given and the male and female genitalia are illustrated. A key to Japanese species is provided. We attempt to define the species groups of Japanese species following O'Hara (1991) and Andersen (1996).

## Materials and Methods

### Materials

Most materials used in this study are dried specimens. For detailed examination, genitalia were treated with a 10% hot solution of KOH for about ten minutes, transferred into 3% CH<sub>3</sub>COOH, and washed with distilled water. Dissected male and female genitalia were observed in pure glycerol under a stere-

\* Contribution from the Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University (No. 27).

oscopic microscope.

Materials are mainly from our personal collections and from the collection of the Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University, Fukuoka (BLKU). Additional specimens were borrowed from Systematic Entomology, Faculty of Agriculture, Hokkaido University, Sapporo (SEHU), Staatliches Museum für Naturkunde, Stuttgart (SMNS) and Zoological Museum of the University, Copenhagen (ZMUC). Depository of types and other specimens examined are indicated by the above acronyms.

#### Measurements

Measurements mostly follow Shima (1996). Vertex was measured between inner margins of compound eyes in comparison with width of the head in dorsal view. Eye-height, frons- and face-lengths were measured in lateral view. The width of the parafacial at middle height and that of the gena were measured at the horizontal position, respectively. Pedicel and 1st flagellomere were measured in lateral view, and the width of 1st flagellomere was measured at the widest position.

#### Terminology

Terminology mostly follows McAlpine (1981) and Shima (1996).

The following abbreviations for thoracic setae were used:

ac: acrostichal setae dc: dorsocentral setae

ia: intra-alar setae sa: supra-alar setae

For the positions of leg setae the following abbreviations were used:

ad: anterodorsal d: dorsal p: posterior

pd: posterodorsal pv: posteroventral v: ventral

## Systematics

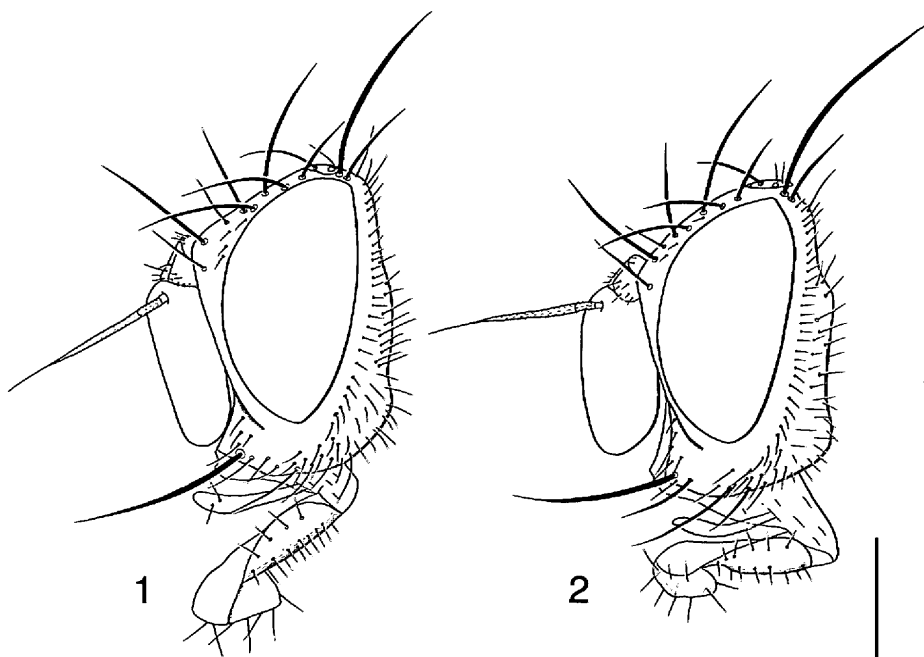
### Genus *Actia* Robineau-Desvoidy

*Actia* Robineau-Desvoidy, 1830: 85. Type species: *Roeselia lamia* Meigen, 1838, by designation of I.C.Z.N., 1987: 71.

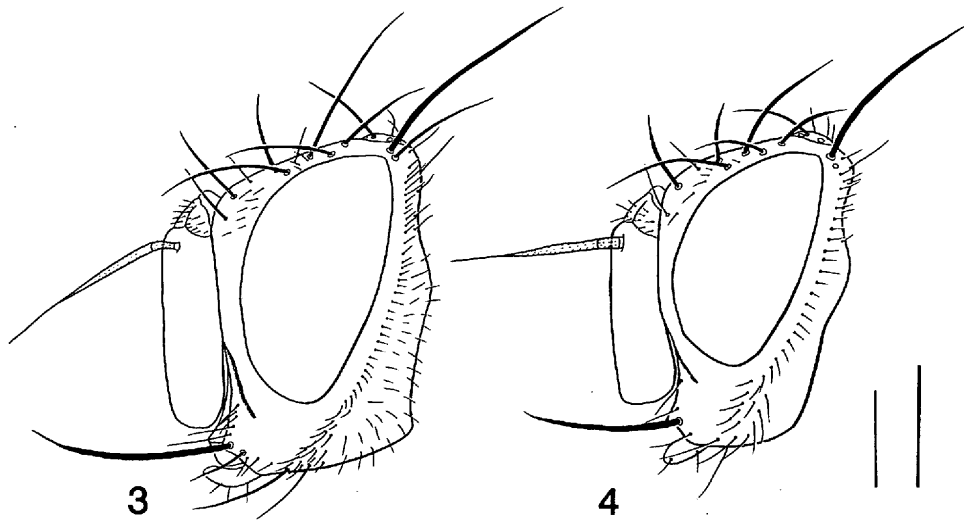
See O'Hara (1991) for complete list of synonymies.

#### Diagnostic characters of Japanese species.

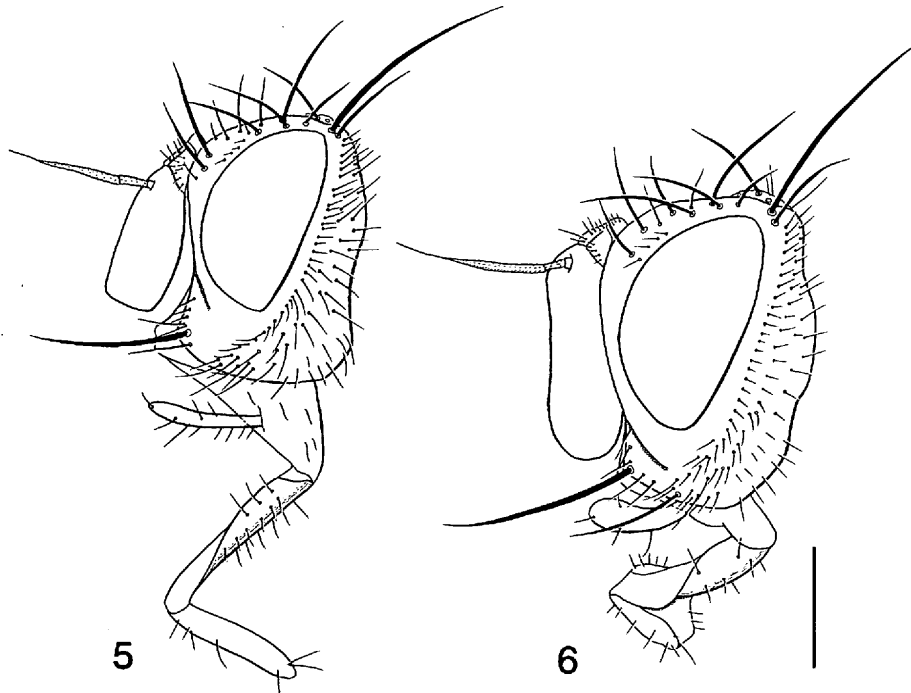
Head. Eye small to large in male, in female subequal to or slightly smaller than in male; antennal axis above upper 1/4 of eye-height; ocellar seta strong; parafacial with sparse fine hairs; 2 proclinate orbital setae in both sexes, anterior proclinate orbital seta longer than posterior one in almost all species; anterior or reclinate orbital seta nearly at middle of parafacial in profile; 4-5 frontal setae; upper occiput with some fine black setae behind row of occipital setae; postgena with some fine white hairs; antenna with 1st flagellomere markedly varied, linear to broad, male 1st flagellomere subequal to or slightly wider than in female; arista with 1st aristomere very short, 2nd aristomere varied, short to somewhat elongate, 3rd aristomere relatively long, thickened to near tip or evenly tapered, with short pubescence; palpus normal and clavate;



Figs. 1-2. Male heads in profile. — 1. *A. crassicornis*; 2. *A. solida*. Scale bar = 0.5 mm.



Figs. 3-4. Male heads in profile. — 3. *A. ampla*; 4. *A. destituta*. Scale bars=0.5 mm (left=3, right=4).



Figs. 5-6. Male heads in profile. — 5. *A. jocularis*; 6. *A. resinellae*. Scale bar=0.5 mm.

labella usually short, elongate in *A. jocularis*.

**Thorax.** Three postpronotal setae in straight line; 3+4 ac, 3+3-4 dc, 1+3 ia; scutellum with short fine apical setae, subapical setae strong, lateral and basal setae present; lower proepimeral seta absent or hair-like and directed upward; upper part of anepisternum with 2 setae anterior to row of anepisternal setae; 2+1 katepisternal setae, lower seta weaker and shorter than upper anterior one; row of hairs present on katepisternum anterior to mid coxa; prosternum usually setulose, bare in *A. nigra*.

**Wing.** Hyaline; tegula black; basicosta black or yellow.  $R_1$  bare or setulose dorsally on distal 1/2 or on

entire length, ventrally bare or setulose on distal 1/3;  $R_{4+5}$  setulose dorsally from base to beyond crossvein r-m, with only one strong setula on base ventrally; M usually complete to wing margin, terminating beyond the bend in *A. destituta* and *A. lamia*;  $CuA_1$  bare or setulose dorsally;  $A_1+CuA_2$  not reaching wing margin.

**Legs.** Fore tibia with preapical ad seta shorter than d seta in most species, with 1 submedian p seta; mid tibia with 1 ad, 3-4 pd and 1 v setae; claws and pulvilli very short; 5th tarsomere of foreleg varied in female, elongate and broadened or short.

**Abdomen.** Syntergum 1+2 not excavated to poste-

rior margin, lacking median marginal setae, with or without 1 lateral marginal seta on each side; tergum 3 with 2 median marginal setae and 1 lateral marginal seta on each side; terga 4–5 each with strong erect marginal setae; male sternum 5 little varied, more or less V-shaped, with or without median lobes along inner edge, apical lobes moderately setulose, with or without pair of strong setae; female sternum 5 square or rectangular in form, with strong setae.

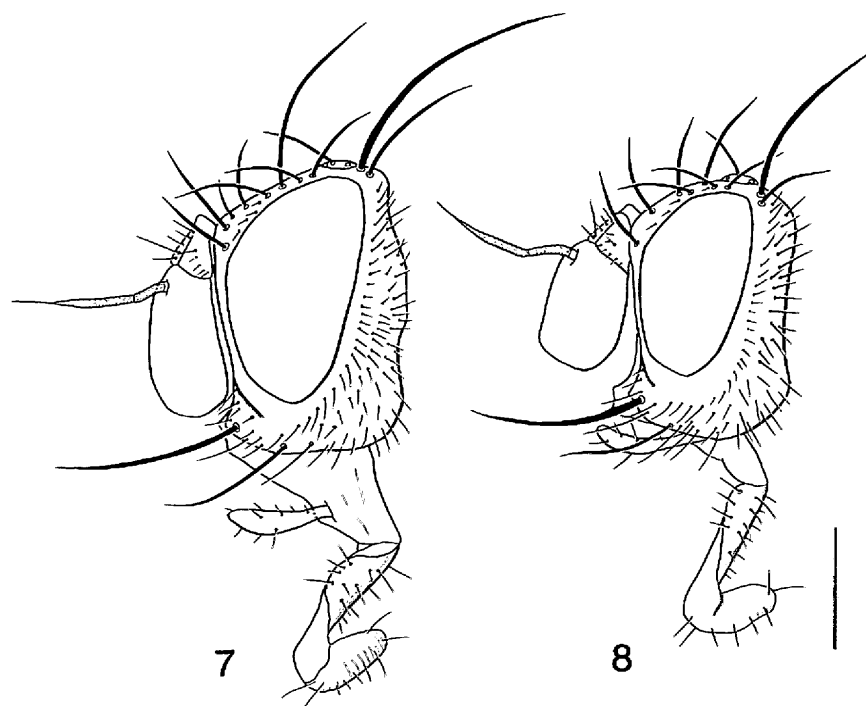
**Male genitalia.** Epandrium trapezoid in shape; surstylus not fused with epandrium, usually longer than cerci, in some species subequal in length to cerci, a little varied in shape, narrow or broad, straight or slightly curved dorsally, with tuft of long setae at middle outside or at base inside, or lacking; cerci in lateral view weakly curved dorsally, or in some species inflexed dorsally at middle, with setae on basal half; ejaculatory apodeme generally fan-shaped, very varied in size; aedeagal apodeme not extended ventrally beyond base of aedeagus; gonopod slightly varied, elongate or small, more or less J-shaped, with short spinules apically; paramere broad, rounded or truncate apically in most species; epiphallus absent; distiphallus very varied, broadly sclerotized or membranous apically, or mostly sclerotized, in ventral view centrally membranous, entirely sclerotized or partly sclerotized.

**Female genitalia.** Short; terga 6–7 present as narrow and small hemitergites, rarely absent; sterna 6–7 small,

rectangular or fan-shaped with strong setae, in some species anterior margin projected forward as invagination; sternum 8 semioval or isosceles triangular with strong setae; hypoproct present as median sclerite with strong setae, in most species subequal in size to tergum 8; spiracle 6 present on or close to tergum 6; spiracle 7 in membrane anterior to tergum 7, on tergum 6 or 7 in several species.

#### Species groups of Japanese species of the genus *Actia*

O'Hara (1991) erected the following three species groups for Nearctic species of the genus *Actia* on the basis of morphological structure of the male genitalia and the male sternum 5: the *autumnalis* group, the *crassicornis* group and the *lamia* group. He defined the autapomorphies of each group, and assigned Palearctic species as follows: *Actia crassicornis* (Meigen) and *A. dubitata* Herting to the *crassicornis* group and *A. jocularis* Mesnil, *A. lamia* (Meigen), *A. nigra* Shima, *A. nudibasis* Stein, *A. pilipennis* (Fallén) and tentatively *A. maksymovi* Mesnil to the *lamia* group. Andersen (1996) assigned European species as follows: *A. crassicornis* (= *dubitata*) to the *crassicornis* group, and *A. jocularis*, *A. lamia*, *A. nigra*, *A. resinellae* (= *nudibasis*), *A. pilipennis*, *A. maksymovi* and *A. nigroscutellata* to the *lamia* group. The species groups of Palearctic species are defined as follows. The *crassicornis* group: male genitalia with surstylus bearing tuft of long setae at middle; cerci sharply inflexed dorsally;



Figs. 7–8. Male heads in profile. — 7. *A. pilipennis*; 8. *A. maksymovi*. Scale bar = 0.5 mm.

distiphallus broadly sclerotized on lateral portion. The *lamia* group: male genitalia with apex of distiphallus membranous laterally, and narrowed apically; apex of distiphallus divided into two short processes, bearing some small spinules in ventral view. We follow the above authors' grouping method and define species groups for thirteen Japanese species. *Actia crassicornis*, *A. solida*, *A. ampla*, and *A. destituta* are assigned to the *crassicornis* group and *A. jocularis*, *A. resinellae*, *A. pilipennis*, *A. maksymovi*, *A. nigra*, *A. clavula* and *A. lamia* to the *lamia* group. *Actia tarsata* and *A. nigroscutellata* can not be assigned to either group or the Nearctic *autumnalis* group, and consequently are considered as representatives of distinct separate species groups, the *tarsata* and *nigroscutellata* groups.

**Key to the Palearctic species groups of *Actia***

1. Male genitalia with surstylus bearing tuft of long setae at middle (Fig. 25); cerci sharply inflexed dorsally (Fig. 13); distiphallus broadly sclerotized laterally (Fig. 37); female genitalia with hypoproct bent backward above tergum 8 (Fig. 75)..... ***crassicornis* group**
- Male genitalia without long setae on surstylus (Fig. 29); cerci weakly curved dorsally at middle (Fig. 17); distiphallus variable, not as described above; hypoproct lacking anterior inflexed portion (Fig. 77)..... 2
2. Male genitalia with apex of distiphallus mostly sclerotized laterally (Fig. 55), with 2 short ventral projections (Fig. 59); male sternum 5 with

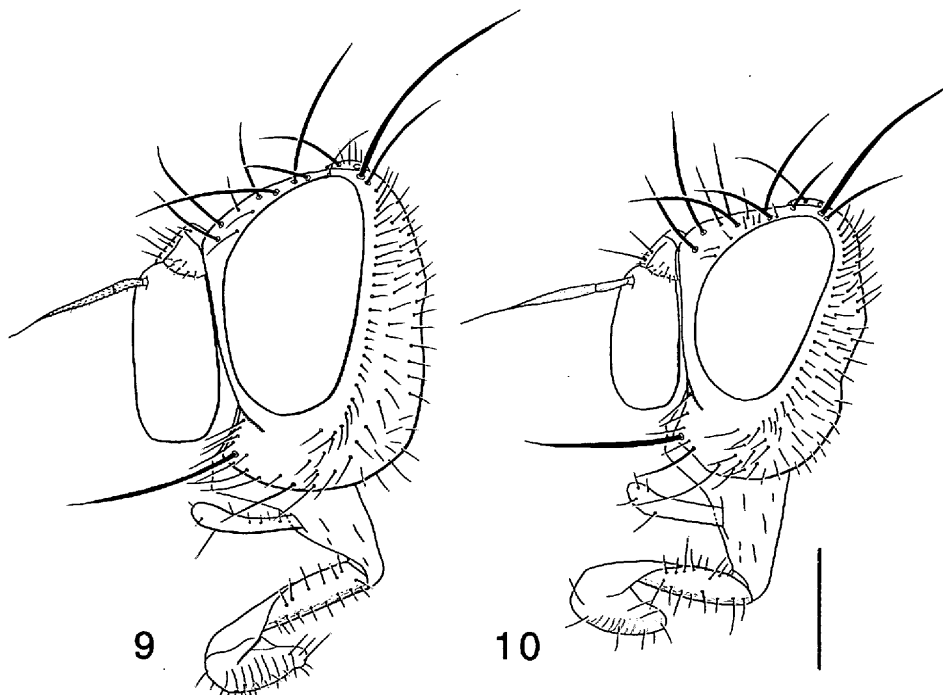
- pair of differentiated median lobes along inner edge (Fig. 71); female terga 6-7 absent (Fig. 86).  
 ..... ***tarsata* group**
- Apex of distiphallus membranous laterally (Fig. 53), lacking ventral projections (Fig. 57); male sternum 5 without median lobe (Fig. 65); female terga 6-7 present (Fig. 84)..... 3
3. Male genitalia with distiphallus narrowed apically and divided into two short apical processes, both processes bearing some small spinules in ventral view (Fig. 58); gonopod normal (Fig. 54)..... ***lamia* group**
  - Distiphallus entirely sclerotized and lacking apical spinules in ventral view (Fig. 60); gonopod elongate and strongly curved (Fig. 56)  
 ..... ***nigroscutellata* group**

**The *crassicornis* group**

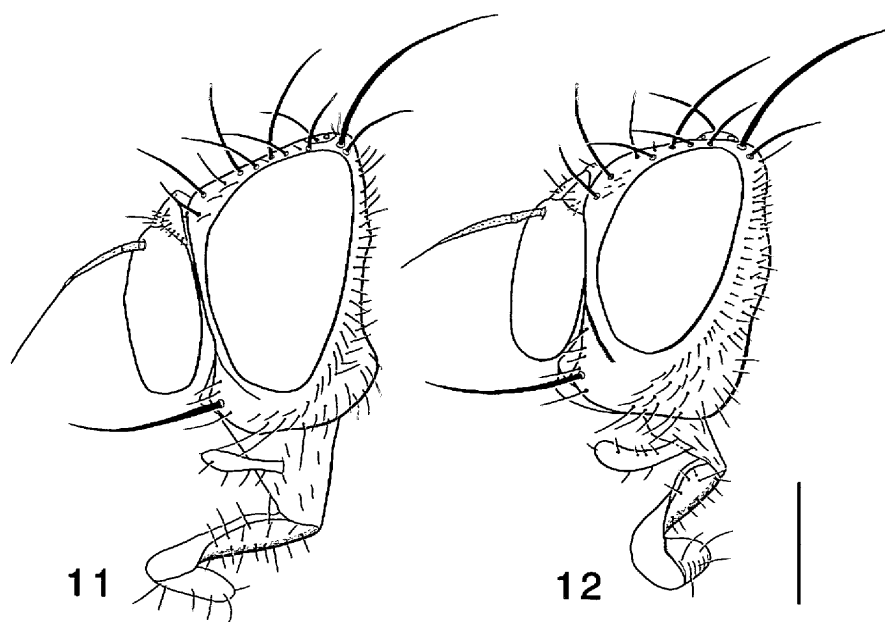
*Diagnosis.* Male. Sternum 5 with pair of differentiated median lobes on inner edge. Male genitalia. Surstylus with tuft of long, outer setae at middle; cerci sharply inflexed dorsally at middle; distiphallus broadly sclerotized laterally. Female genitalia. Hypoproct bent backward above tergum 8.

In the Palearctic Region only *Actia crassicornis* (Meigen) has been assigned to this group (Andersen, 1996). In the present study, we assign the following new Japanese species to this group; *Actia solida* sp. nov., *A. ampla* sp. nov., *A. destituta* sp. nov.

*Actia destituta* sp. nov. lacks an outer tuft of setae at middle on the surstylus but has long inner setae at the



Figs. 9-10. Male heads in profile. — 9. *A. nigra*; 10. *A. clavula*. Scale bar=0.5 mm.



Figs. 11–12. Male heads in profile. — 11. *A. tarsata*; 12. *A. nigroscutellata*. Scale bar = 0.5 mm.

base (Fig. 28). Despite this difference we have included this species because of the features of the male sternum 5 and distiphallus.

Female members of this group have the hypoproct uniquely bent backward above tergum 8 (Figs. 74, 75). This structure is not found in any other species groups and we consider this as an additional autapomorphy of the *crassicornis* group. The female of *A. destituta* is unknown.

#### *Actia crassicornis* (Meigen)

(Figs. 1, 13, 25, 37, 41, 61, 73, 74, 75, 88)

*Tachina crassicornis* Meigen, 1824: 351.

See Andersen (1996) for complete list of synonymies.

**Diagnosis.** Male. Gena 0.2–0.3 of eye-height; antenna with 1st flagellomere subrectangular, 2.5–3 times as long as wide and 5.5–6.6 times as long as pedicel; 2nd aristemere about 3 times as long as wide; ultimate section of  $CuA_1$  about 0.4 times as long as penultimate section, and about 1.6 times as long as crossvein dm-cu;  $R_1$  setulose dorsally along entire length, on apical 1/3 ventrally; M complete to wing margin;  $CuA_1$  setulose dorsally on proximal 2/3. Male genitalia. Surstylus with tuft of long outer setae at middle, in lateral view nearly straight and slender, subequal in width to apex of cerci; cerci in lateral view sharply inflexed dorsally at middle and apex curved ventrally, in dorsal view apex slender; gonopod J-shaped, with short spinules apically; paramere truncate apically; distiphallus broadly sclerotized, with ventrodiscal semicircular membranous area, in ventral

view rhombic in form, membranous centrally, with fine basal spinules. Female. Differing from male as follows: antenna with 1st flagellomere slender, 2.7–3 times as long as wide. Female genitalia. Sternum 5 nearly square in form, as long as wide; tergum 6 elongate, as long as sternum 5; sternum 6 nearly rectangular in form; tergum 7 short, subequal in length to sternum 8; sternum 7 with weakly sclerotized short anterior apodeme; sternum 8 isosceles triangular in form; hypoproct bent backward above tergum 8; spiracle 6 present on tergum 6; spiracle 7 in membrane anterior to tergum 7.

Body length. 4.5–5.0 mm.

Specimens examined. JAPAN [Hokkaido] 8 males, 2 females, Kamitoshibetsu, Ashoro-cho, 17. viii. 1996, T. Tachi; 2 males, same locality, 16. viii. 1996; 1 male, Okepepu-rindô, Shiretoko Pen., 12. viii. 1996 (Malaise trap), T. Tachi; 1 male, Shiretoko, Utoro, 30. viii. 1995, T. Saigusa; 1 female, Kushiro, Akan-machi, 31. vii. 1967, M. Honda; 1 female, Miyaginosawa, Sapporo, 27. vii. 1996, M. Sueyoshi. [Honshu] 1 female, Mt. Takakurayama, Akiu town, Miyagi, 13. viii. 1996, M. Sueyoshi; 1 male, Mt. Hachimori, Nagano, 1. vii. 1996 (Malaise trap), T. Tachi; 1 female, Inagawa, Ôkuwa vil., Nagano, 3. vii. 1996, T. Tachi; 1 female, Mt. Mizugaki, Sudama-cho, Yamanashi, 15. vii. 1996, T. Tachi; 1 male, same locality, 26. ix. 1975 (Malaise trap), J. Emoto; 1 female, Sawara-ike, Nirasaki city, Yamanashi, 11. vii. 1996, T. Tachi; 1 female, same locality, 12. vii. 1996, T. Tachi; 1 female, Sannose, Yamanashi, 28. vii. 1976, K. Hara; 1 male, Hainawarindô, Myôjin-kyô, Shizuoka, 4. vii. 1996, T. Tachi; 1

male, Jintū, Uchita-cho, Wakayama, 8. ix. 1996, M. Sueyoshi. DENMARK. 1 female, Store-Vildmose, 1. vi. 1978, S. Andersen & V. Michelsen; 1 male, Alslev, 18. vi. 1981, S. Andersen & V. Michelsen; 1 female, Saltvik; 1 male, Csákvár, 12. v. 1961, Mihályi (ZMUC). RUSSIA. [Ussuria: Primorsk Terr.] 3 males, Ussuriysk Reserve, 150 m, 22–26. vii. 1990 (Malaise trap), T. Saigusa; 1 male, 1 female, Andrevka, 50 km SW Slavyanka, 31. v. 1992, T. Saigusa; 1 female, Anisimovka, 300 m, 5. vi. 1992, T. Saigusa. SWITZERLAND. 1 male, Delémont, Domont, 6. viii. 1963; 1 female, same locality, 21. viii. 1967 (SMNS) (all in BLKU except as indicated).

Distribution. Japan (Hokkaido, Honshu); Europe northwards to Scotland and Lapland; Transcaucasia, Mongolia, Russia (SE Siberia, Ussuria).

Host. Unknown in Japan.

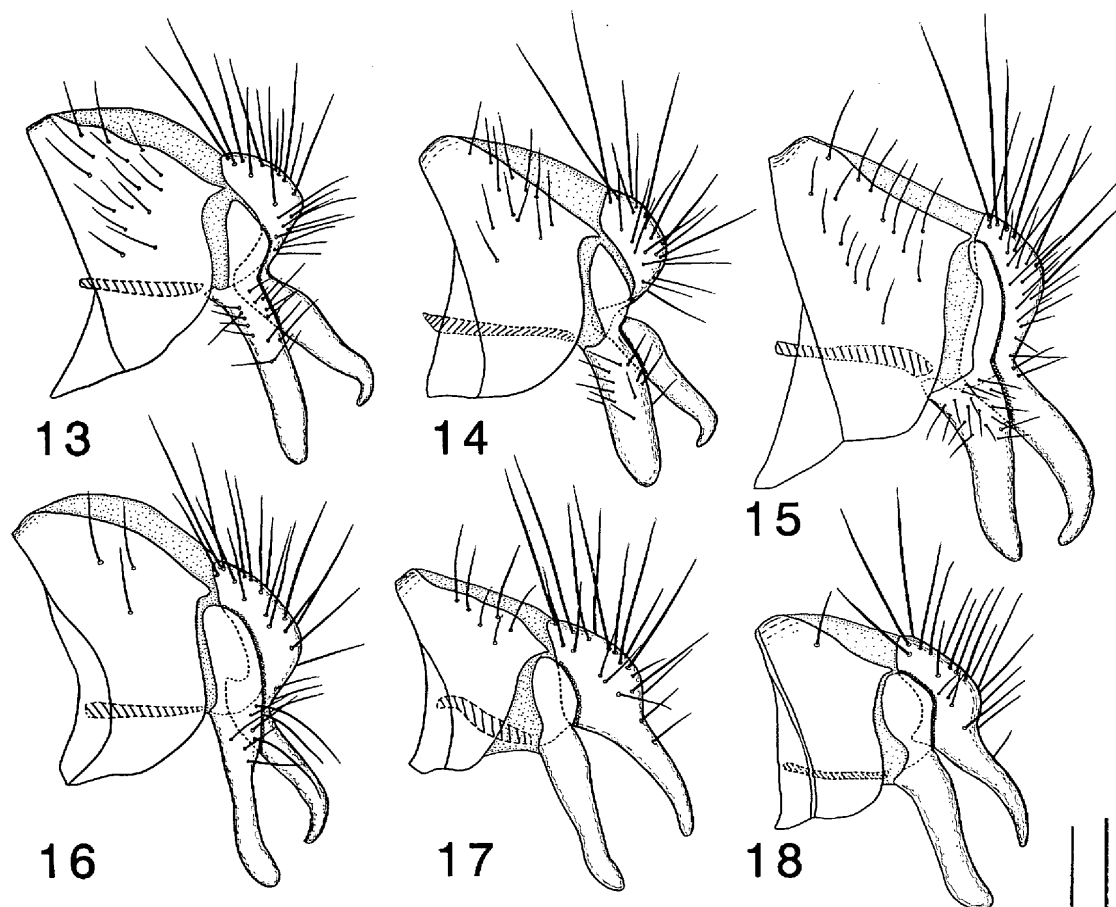
Remarks. So far as we have examined, European specimens are variable in form of the 1st flagellomere either subrectangular or suboval and in the length of the 2nd aristomere which is either long or short. Japanese specimens usually have a suboval 1st flagellomere and short 2nd aristomere. This species is similar

to *A. solida*, but distinguished from it by the long ultimate section of  $CuA_1$ .

*Actia solida* sp. nov.

(Figs. 2, 14, 26, 38, 42, 62, 89)

*Description.* Male. Head. Almost light gray in ground color, with whitish pollinosity; frontal vitta reddish yellow to orange; fronto-orbital plate gray, with yellowish pollinosity; antenna with scape and pedicel yellowish brown to orange, 1st flagellomere and arista dark brown to black on apical 1/2, yellow to brown on basal 1/2; palpus yellow. Vertex about 0.4 of head width; frons about 0.8 times as long as face; parafacial subequal to or slightly narrower than width of 2nd aristomere; gena 0.2–0.3 of eye-height; inner vertical setae very strong, about 0.6 of eye-height; anterior reclinate orbital seta subequal in length to anterior proclinate orbital seta; 4 frontal setae; antenna with 1st flagellomere subrectangular to oblong, 2.1–2.3 times as long as wide and 5.8–6.3 times as long as pedicel; 2nd aristomere about 3 times as long as wide; 3rd aristomere thickened on basal 1/2; labella



Figs. 13–18. Epandria, surstyli and cerci in lateral view. — 13. *A. crassicornis*; 14. *A. solida*; 15. *A. ampla*; 16. *A. destituta*; 17. *A. jocularis*; 18. *A. resinellae*. Scale bars=0.1 mm (left=15, right=all others).

normal.

**Thorax.** Gray in ground color, with yellowish pollinosity; scutellum pale gray in ground color, yellowish brown on apical 1/5. 3+4 dc; lower katepisternal seta about 0.8 times as long as upper anterior one; subapical scutellar seta about 1.8 times as long as scutellum; distance between bases of subapical scutellar setae 0.8–1.3 times as long as that between basal and subapical setae of same side.

**Wing.** Hyaline; basicosta black. Second costal sector about 0.3 times as long as 3rd; ultimate section of  $CuA_1$  about 0.4 times as long as penultimate section, and about 1.3 times as long as crossvein dm-cu;  $R_1$  setulose dorsally along entire length, on apical 1/3 ventrally; M complete to wing margin;  $CuA_1$  with 6–11 setulae dorsally on proximal 2/3.

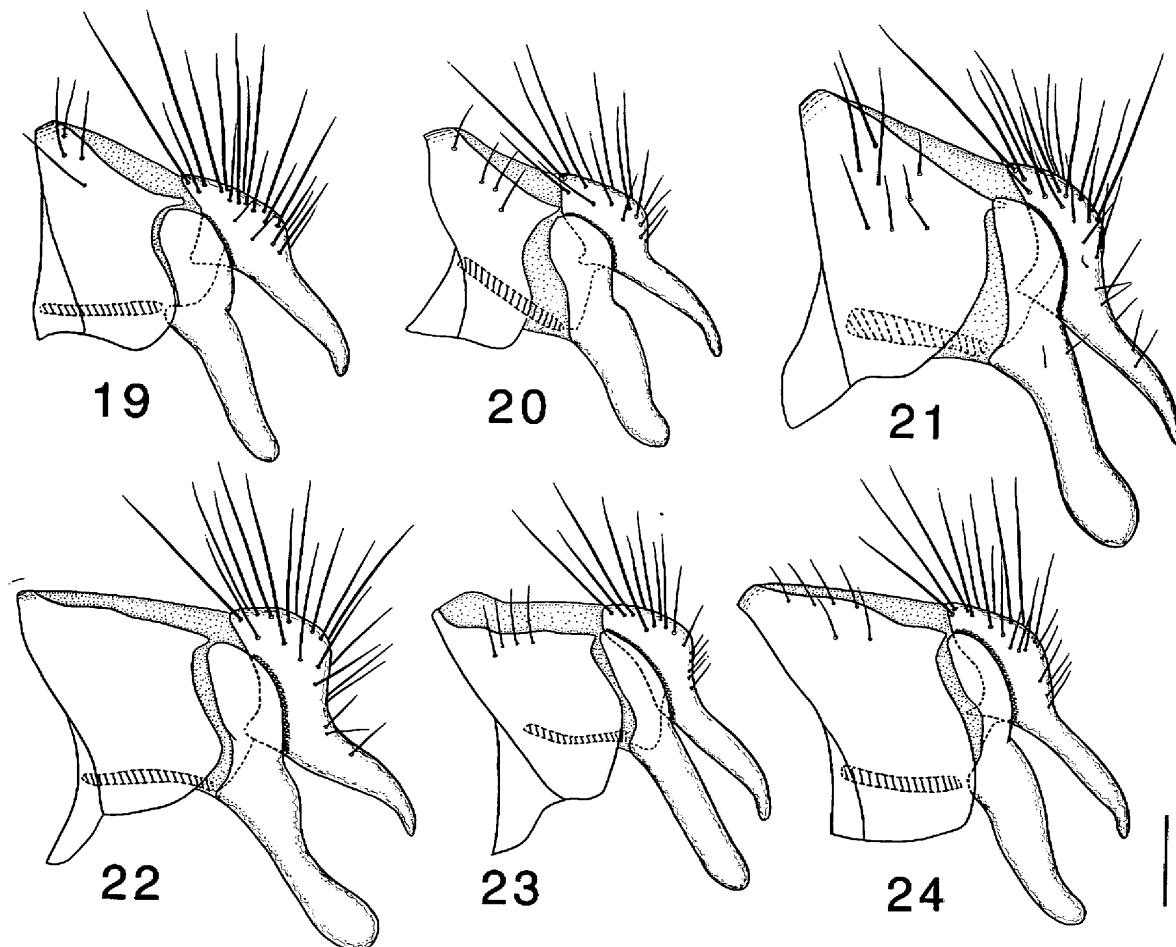
**Legs.** Coxae and trochanters brown; femora, mid and hind tibiae and tarsi black; fore tibia yellowish brown; pulvilli yellow. Fore tibia with 4 ad setae of unequal lengths and 3 pd setae; mid tibia with 3 pd setae; hind tibia with 6 ad setae of unequal lengths, 5 pd and 5 v setae.

**Abdomen.** Shining black in ground color; anterior

1/5 of terga 3–4 and 1/3 of tergum 5 with grayish pollinosity. Hairs recumbent; syntergum 1+2 without lateral marginal seta; tergum 5 about 0.6 times as long as 4th; sternum 5 with pair of median lobes along inner edge.

**Male genitalia.** Surstylus with tuft of long outer setae at middle, in lateral view broad, about twice as wide as cerci at apical 1/3, in dorsal view nearly straight; cerci in lateral view very sharply inflexed dorsally at middle and apex curved ventrally, in dorsal view widened at basal part; gonopod and paramere similar to *crassicornis*; distiphallus broadly sclerotized, with narrow dorsodistal membranous area, in ventral view centrally membranous, with some fine spinules at base.

**Female.** Differing from male as follows: gena somewhat narrow, 0.15–0.21 of eye-height; vertex 0.3–0.36 of head width; 1st flagellomere slender, 2.6–3 times as long as wide; 5th tarsomere of foreleg somewhat elongate, 1.5–2 times as long as 4th. Female genitalia. Sternum 5 nearly square in form, as long as wide; tergum 6 elongate, as long as sternum 5; sternum 6 nearly rectangular in form; tergum 7 short, subequal



Figs. 19–24. Epandria, surstyli and cerci in lateral view. — 19. *A. pilipennis*; 20. *A. maksymovi*; 21. *A. nigra*; 22. *A. clavula*; 23. *A. tarsata*; 24. *A. nigroscutellata*. Scale bar = 0.1 mm.



in length to sternum 8; sternum 7 with weakly sclerotized short anterior apodeme; sternum 8 isosceles triangular in form; hypoproct bent backward above tergum 8; spiracle 6 present on tergum 6; spiracle 7 in membrane anterior to tergum 7.

Body length. 4.5 mm.

Holotype male, Kamitoshibetsu, Ashoro-cho, Hokkaido, Japan, 17. viii. 1996, T. Tachi (BLKU).

Paratypes. JAPAN [Hokkaido] 1 male, Berabonai, Ashoro-cho, 24. vii. 1967, H. Shima; 1 male, 2 females, Kamitoshibetsu, Ashoro-cho, 17. viii. 1996, T. Tachi. [Honshu] 2 males, Kanayama, Sudama-cho, Yamanashi, 4. vi. 1975 (Malaise trap), J. Emoto; 1 female, same locality, 9. vii. 1975 (Malaise trap), J. Emoto; 1 female, same locality, 9. ix. 1975 (Malaise trap), T. Goto; 1 female, Hiraniwa, Yamagata vil., Iwate, 8. viii. 1996, M. Sueyoshi; 2 females, Mt. Mizugaki, Sudama-cho, Yamanashi, 15. vii. 1996, T. Tachi; 1 female, Hirogawara, Yamanashi, 12. vii. 1996, T. Tachi. RUSSIA. [Ussuria: Primorsk Terr.] 2 males, 1 female, Ussriysk Reserve, 150 m, 22–26. vii. 1990 (Malaise trap), T. Saigusa; 2 males, Medvezh'ya River 17 km SSW of Krounovka, 150 m, 24. v. 1992, T. Saigusa (all in BLKU).

Distribution. Japan (Hokkaido, Honshu); Russia (Ussuria).

Host. Unknown.

Remarks. This species very closely resembles *A. crassicornis* in general appearance, but differs in the male genitalia, where the surstylus in lateral view is broad, about twice as wide as the cerci at apical 1/3, the distiphallus is broadly sclerotized on the lateral portion. The external difference between these species is stated in the remarks under *A. crassicornis*.

#### *Actia ampla* sp. nov.

(Figs. 3, 15, 27, 39, 43, 63)

*Description.* Male. Head. Almost light gray in ground color, with whitish pollinosity; frontal vitta orange; antenna with scape and pedicel yellowish brown, 1st flagellomere and arista reddish brown; palpus yellow. Vertex about 0.4 of head width; frons about 0.9 times as long as face; parafacial much wider than width of 2nd aristomere; gena about 0.3 of eye-height; inner vertical setae very strong, about 0.7 of eye-height; anterior reclinate orbital seta about 1.3 times as long as anterior proclinate orbital seta; 5 frontal setae; antenna with 1st flagellomere about 3.5 times as long as wide and about 6.5 times as long as pedicel; 2nd aristomere about 3 times as long as wide; 3rd aristomere thickened on basal 2/5; labella normal.

Thorax. Gray in ground color; scutum with yellowish pollinosity; postpronotal lobe with whitish pollinosity. 3+4 dc; lower katapisternal seta about 0.8 times as long as upper anterior one; subapical scutellar seta about 1.8 times as long as scutellum; distance between bases of subapical scutellar setae subequal to that between basal and subapical setae of same side.

Wing. Hyaline; basicosta black. Second costal sector about 0.3 times as long as 3rd; ultimate section of CuA<sub>1</sub> about 0.4 times as long as penultimate section, and about 1.2 times as long as crossvein dm-cu; R<sub>1</sub> setulose dorsally along entire length, on apical 1/3 ventrally; M complete to wing margin; CuA<sub>1</sub> with 4–6 setulae dorsally on proximal 1/3.

Legs. Coxae and trochanters brown; femora, mid and hind tibiae and tarsi black; fore tibia yellowish brown; pulvilli yellow. Fore tibia with 5 ad setae of unequal lengths and 4 pd setae; mid tibia with 4 pd setae; hind tibia with 7–8 ad setae of unequal lengths, 4–5 pd and 3 v setae.

Abdomen. Shining black in ground color; anterior 1/4 of terga 3–4 with grayish pollinosity. Hairs recumbent; syntergum 1+2 without lateral marginal seta; tergum 5 about 0.36 times as long as 4th; sternum 5 with pair of median lobes along inner edge.

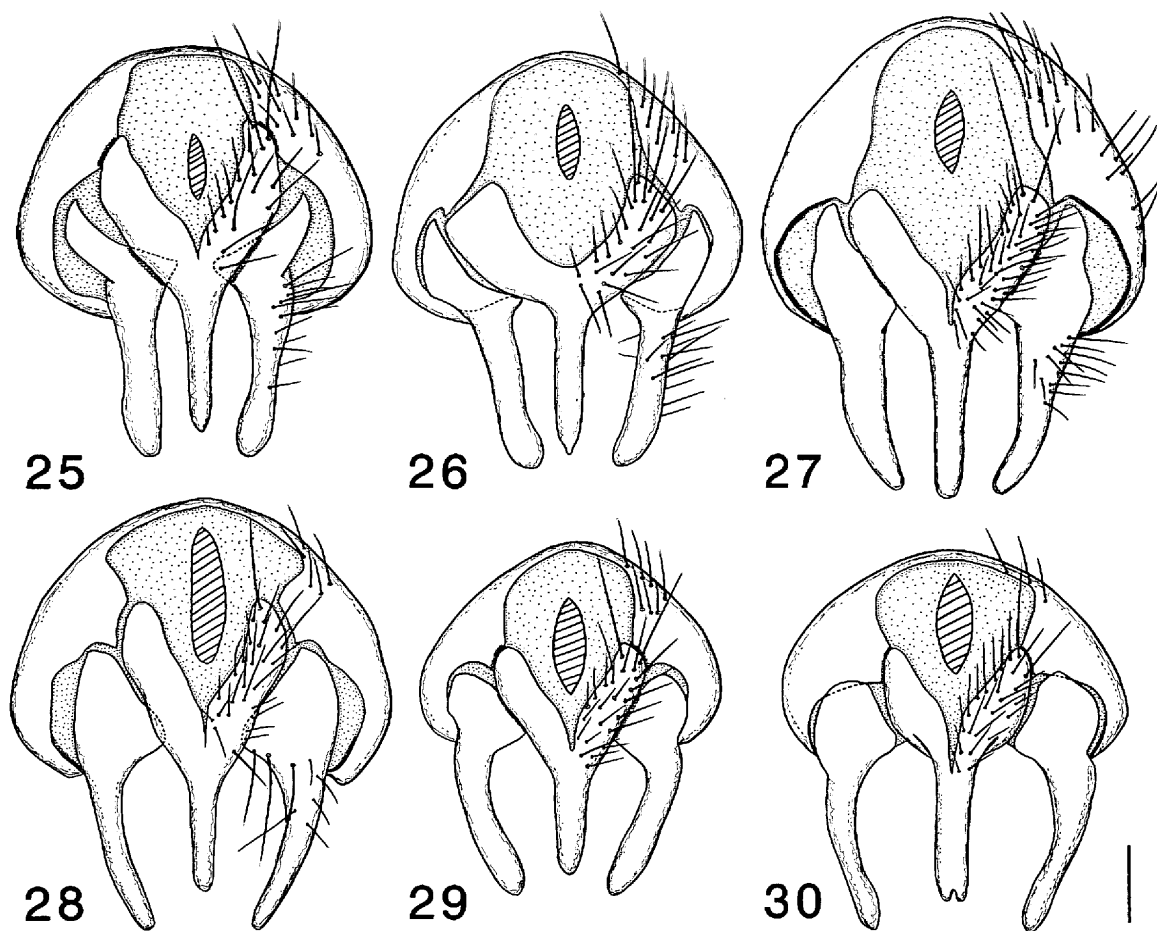
Male genitalia. Surstylus with tuft of long outer setae at middle, in lateral view slender apically; cerci subequal in length to surstylus, in lateral view slightly inflexed dorsally at middle and apex curved ventrally; gonopod in lateral view somewhat elongate; paramere rounded; distiphallus broadly sclerotized and narrowly membranous apically, in ventral view entirely sclerotized, with fine spinules at base.

Female. Differing from male as follows: antenna with 1st flagellomere slightly narrow, about 3 times as long as wide; foreleg with 5th tarsomere somewhat elongate, about 1.5 times as long as 4th. Female genitalia. Sternum 5 nearly square in form, as long as wide; tergum 6 shorter than sternum 5; sternum 6 nearly rectangular in form; tergum 7 shorter than sternum 8; sternum 7 without anterior apodeme; sternum 8 isosceles triangular in form; hypoproct bent backward above tergum 8; spiracle 6 present on tergum 6; spiracle 7 in membrane anterior to tergum 7.

Body length. 6.3–6.5 mm.

Holotype male, Kitamata-rindô, Nara, Japan, 26. vii. 1995, T. Tachi (BLKU).

Paratypes. JAPAN [Hokkaido] 1 female, Mt. Apoi, Samani-cho, 18. viii. 1996, T. Tachi (BLKU). [Honshu] 1 male, Shimokita, Aomori, Japan, 3. viii. 1953, N. Fukuhara (SEHU). KOREA. 1 female, Mt.



Figs. 25–30. Epandria, surstyli and cerci in dorsal view (setae omitted on left side).—25. *A. crassicornis*; 26. *A. solida*; 27. *A. ampla*; 28. *A. destituta*; 29. *A. jocularis*; 30. *A. resinellae*. Scale bars=0.1 mm (left=27, right=all others).

Sudo-san (700 m), Gyongsangbug-Do, 31. vii. 1977, K. Yamagishi (BLKU).

Distribution. Japan (Hokkaido, Honshu); Korea.

Host. Unknown.

Remarks. This species is very distinct from other species of the *crassicornis* group by the large body size and wide parafacial.

*Actia destituta* sp. nov.

(Figs. 4, 16, 28, 40, 44, 64, 90)

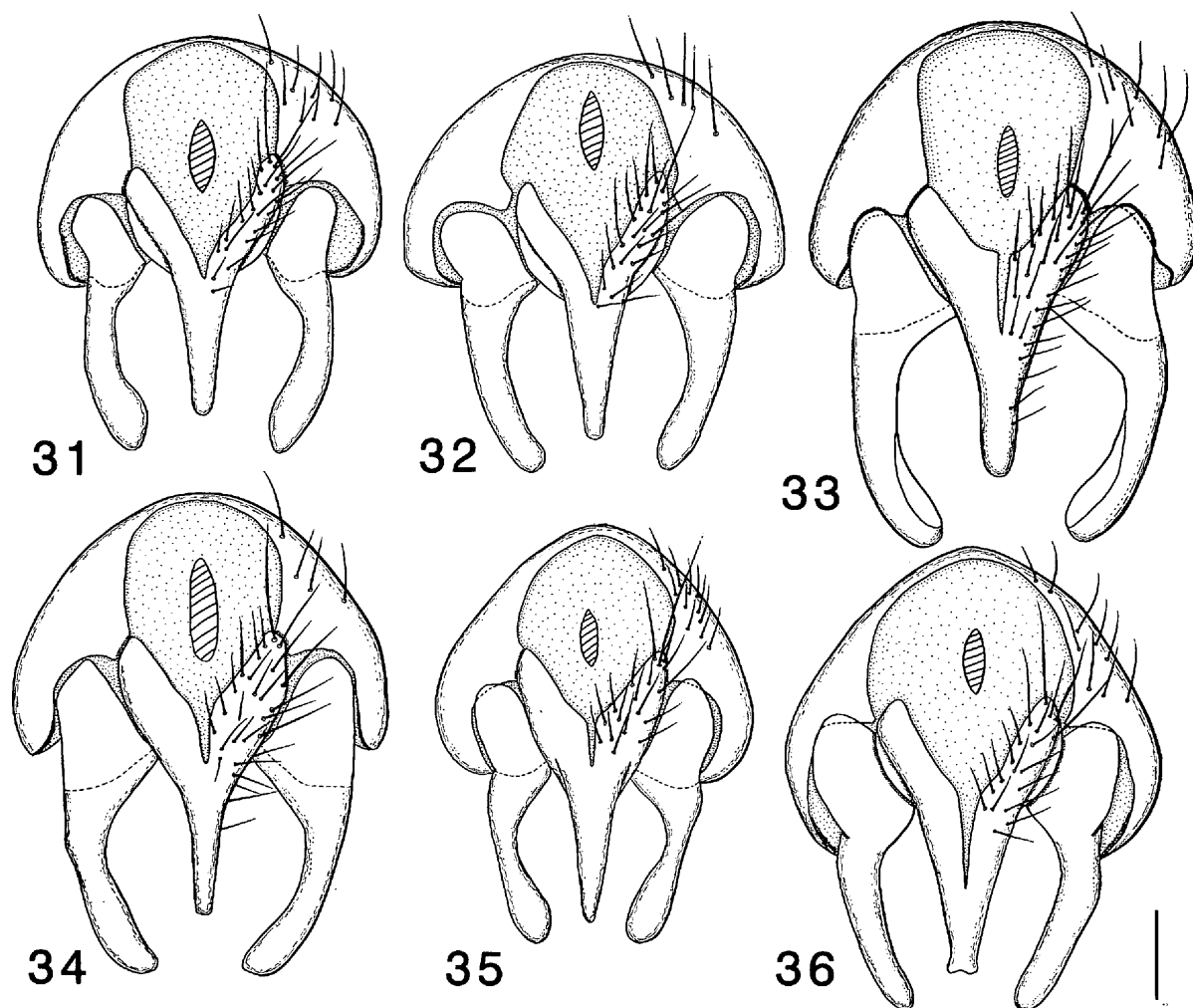
*Description.* Male. Head. Almost light gray in ground color, with whitish pollinosity; frontal vitta yellow; antenna with scape and pedicel orange, 1st flagellomere and arista yellowish brown on basal 1/2, black on apical 1/2; palpus yellow. Vertex about 0.4 of head width; frons about 0.8 times as long as face; parafacial wider than width of 2nd aristomere; gena about 0.32 of eye-height; inner vertical seta very strong, about 0.7 of eye-height; outer vertical seta missing; anterior reclinate orbital seta subequal in length to anterior proclinate orbital seta; 4 frontal

setae; antenna with 1st flagellomere about 3 times as long as wide and 6 times as long as pedicel; 2nd aristomere about 2.5 times as long as wide; 3rd aristomere thickened on basal 2/5; labella normal.

*Thorax.* Dark gray in ground color; scutum and scutellum with yellowish pollinosity; postpronotal lobe yellow, with whitish pollinosity; postalar callus and apical 1/5 of scutellum reddish yellow. 3+4 dc; lower katepisternal seta about 0.5 times as long as upper anterior one; subapical scutellar seta about 1.6 times as long as scutellum; distance between bases of subapical scutellar setae about 0.8 times as long as that between basal and subapical setae of same side.

*Wing.* Hyaline; basicosta yellow. Second costal sector about 0.2 times as long as 3rd; ultimate section of  $CuA_1$  only slightly longer than penultimate section, and about 3 times as long as crossvein dm-cu;  $R_1$  setulose dorsally along entire length, with 2–3 fine setulae on apical 1/3 ventrally; M terminating at bend;  $CuA_1$  with 3–4 setulae dorsally on proximal 2/9.

*Legs.* Coxae and trochanters reddish brown; femora brown, yellow on basal 2/3 of mid femur and



Figs. 31-36. Epandria, surstyli and cerci in dorsal view (setae omitted on left side). — 31. *A. pilipennis*; 32. *A. maksymovi*; 33. *A. nigra*; 34. *A. clavula*; 35. *A. tarsata*; 36. *A. nigroscutellata*. Scale bar=0.1 mm.

basal 1/2 of hind femur; tibiae brown; tarsi dark brown; pulvilli yellow. Fore tibia with 6 ad setae of unequal lengths and 4 pd setae; mid tibia with 4 pd setae; hind tibia with 7 ad setae of unequal lengths, 3 pd and 3 v setae.

Abdomen. Syntergum 1+2 and most of tergum 3 reddish yellow in ground color dorsally; mid-dorsal part of tergum 3 and entire terga 4-5 dark gray in ground color, evenly covered with grayish pollinosity; mid-dorsal longitudinal vitta distinct on terga 3-5; venter of syntergum 1+2, tergum 3 and median part of tergum 4 reddish yellow. Hairs recumbent; syntergum 1+2 without lateral marginal seta; tergum 5 about 0.6 times as long as 4th; sternum 5 with pair of median lobes along inner edge.

Male genitalia. Surstylus with tuft of long inner setae at base and long, fine outer sparse setae at middle, in lateral view apex slightly curved dorsally; cerci in lateral view slightly inflexed dorsally at

middle, apex curved ventrally; gonopod and paramere similar to *crassicornis*; distiphallus broadly sclerotized and slightly membranous dorsodistally, in ventral view slender apically, entirely sclerotized, with fine spinules at base.

Female. Unknown.

Body length. 4.4 mm.

Holotype male, Nagano, Japan, 24. vii. 1949, T. Yushima (SEHU).

Distribution. Japan (Honshu).

Host. Unknown.

Remarks. This species resembles *A. lamia* in having vein M terminated at the bend, but is distinguished from it by the following characters; long ultimate section of  $CuA_1$ , 3+4 dc and orange 1st flagellomere. The male genitalia of this species are distinctly of the *crassicornis* group type, and very similar to those of *A. pokaharana* Shima from Nepal and *A. darwini* Malloch from Australia.

**The lamia group**

**Diagnosis.** Male. Sternum 5 without median lobe. Male genitalia. Surstylus without tuft of distinct setae; cerci weakly curved dorsally at middle in lateral view; apex of distiphallus membranous laterally, and in ventral view narrowed apically and divided into two short apical processes, bearing some small spinules. Female genitalia. Hypoproct lacking anterior inflexed portion.

This group is characterized by the apical membranous lateral portion of the distiphallus which O'Hara (1991) considered as the only autapomorphy in this group. Andersen (1996) mentioned that the distiphallus in members of this group is apically narrowed and divided into two short processes, bearing some small spinules in ventral view, and assigned some European species to this group. We also consider these characters as autapomorphies of this group. However, contrary to Andersen (1996) we do not include *A. nigroscutellata* in this group, because the distiphallus of this species is not apically narrowed and entirely sclerotized in ventral view (Fig. 60).

The following Japanese species are included in this group: *A. jocularis*, *A. resinellae*, *A. nigra*, *A. clavula*, *A. pilipennis*, *A. maksymovi* and *A. lamia*.

***Actia jocularis* Mesnil**

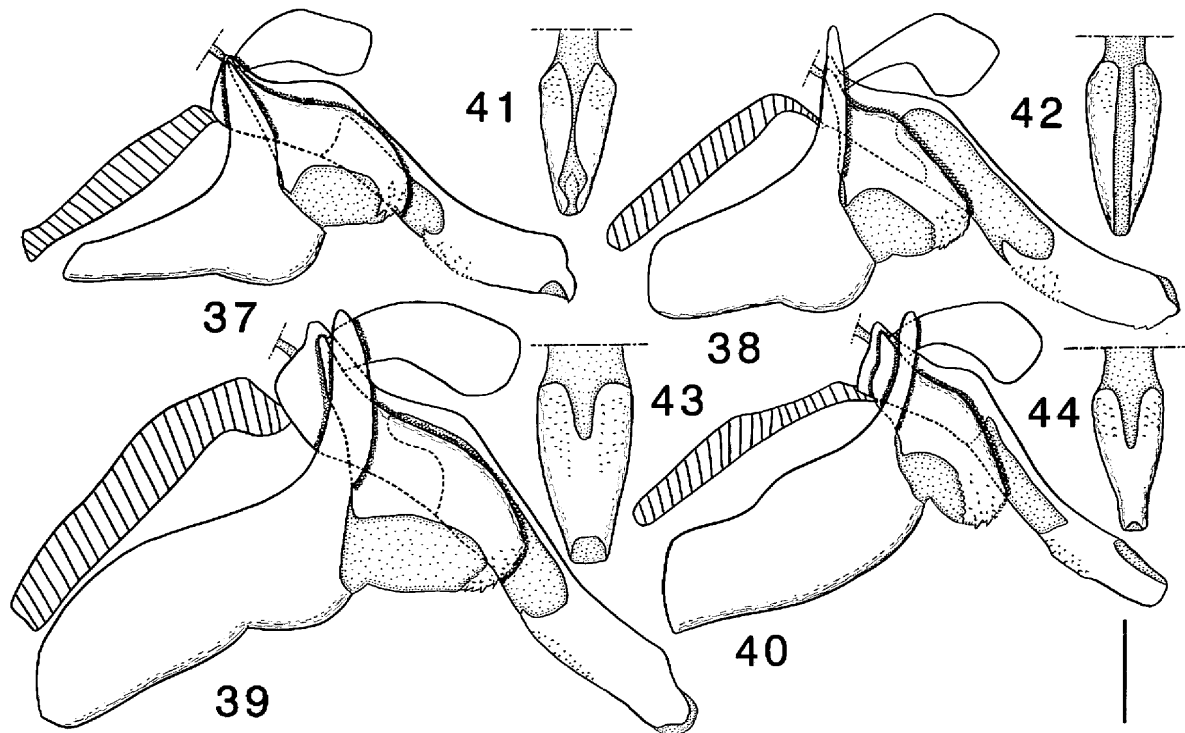
(Figs. 5, 17, 29, 45, 49, 65, 76, 77)

*Actia jocularis* Mesnil, 1957: 47.

**Diagnosis.** Male. Vertex about 0.4 of head width; parafacial wider than width of 2nd aristomere; gena about 0.4 of eye-height; antenna with 1st flagellomere about 2 times as long as wide and 4.6 times as long as pedicel; prementum long and slender; labella elongate, about 0.7 times as long as eye-height; 3+3 dc; R<sub>1</sub> setulose dorsally on apical 1/2, bare ventrally; M complete to wing margin; CuA<sub>1</sub> setulose dorsally nearly to crossvein dm-cu. Male genitalia. Surstylus in lateral view slightly curved dorsally at apex; cerci strongly curved ventrally at apex; gonopod apically narrowed and J-shaped, with short spinules apically; paramere nearly square; distiphallus as described under diagnosis of *lamia* group. Female. Differing from male as follows: antenna with 1st flagellomere slender, about 2.3 times as long as wide. Female genitalia. Sternum 5 nearly rectangular in form; tergum 6 shorter than sternum 5; tergum 7 subequal in length to tergum 6; spiracles 6-7 present on tergum 6.

Body length. 4.5-4.8 mm.

Specimens examined. JAPAN [Hokkaido] 1 male, Tôro-lake, Shibecha-cho, 14. viii. 1996, T. Tachi; 1 male, Shumarinai-lake, 7. vii. 1996, T. Tachi; 2 males, 1 female, Gojikkoku, Shibecha-cho, 15. viii. 1996, T.



Figs. 37-44. Hypandria, gonopods, parameres and distiphalli in lateral view. Figs. 41-44. Distiphalli in ventral view. — 37, 41. *A. crassicornis*; 38, 42. *A. solida*; 39, 43. *A. ampla*; 40, 44. *A. destituta*. Scale bar=0.1 mm.

Tachi; 2 females, Kamitoshibetsu, Ashoro-cho, 17. viii. 1996, T. Tachi. [Honshu] 1 female, Senninbashi, Towadako-machi, Aomori, 5. viii. 1996, M. Sueyoshi; 2 females, Komagatake, Tazawako-machi, Akita, 10. viii. 1996, M. Sueyoshi; 1 male, Hinoemata, Fukushima, 21. vii. 1996 (Malaise trap), T. Tachi; 3 males, same locality, 22. vii. 1996, T. Tachi; 2 males, same data (Malaise trap), T. Tachi; 1 male, Uranantai pass, Nikkô city, Tochigi, 17. viii. 1996, M. Sueyoshi; 1 male, Mt. Hakusan (alt. 1700–1900 m), Ishikawa, 4. ix. 1984, I. Togashi; 1 male, same locality, 3. ix. 1993, I. Togashi; 1 male, Ochiai, Sudama-cho, Yamanashi, 16. vii. 1996, T. Tachi; 1 male, 2 females, Inagawa, Ôkuwa vil., Nagano, 3. vii. 1996, T. Tachi; 1 male, Mt. Hachimori, Nagano, 1. vii. 1996 (Malaise trap), T. Tachi; 2 females, Togakushi, Nagano, 26. vi. 1996, T. Tachi; 2 females, Yunosawa-tôge, Yamato vil., Yamanashi, 17. vii. 1996, T. Tachi; 2 males, same locality, 18. vii. 1996 (Malaise trap), T. Tachi; 1 male, same data, T. Tachi; 10 males, Abôdaira, Kamitakara vil., Gifu, 1. ix. 1996, M. Sueyoshi; 1 male, Karasawa pass, Chino city, Nagano, 31. viii. 1996, M. Sueyoshi; 1 female, Mt. Kongôsan, Chihayaakasaka vil., Ôsaka, 7. ix. 1996, M. Sueyoshi (all in BLKU).

Distribution. Japan (Hokkaido, Honshu).

Host. See 'Hosts of Japanese species of *Actia*'.

Remarks. This species is very characteristic in having the elongate labella. In the structure of the male genitalia this species is well assigned to the *lamia*

group by having apical membranous part of the distiphallus.

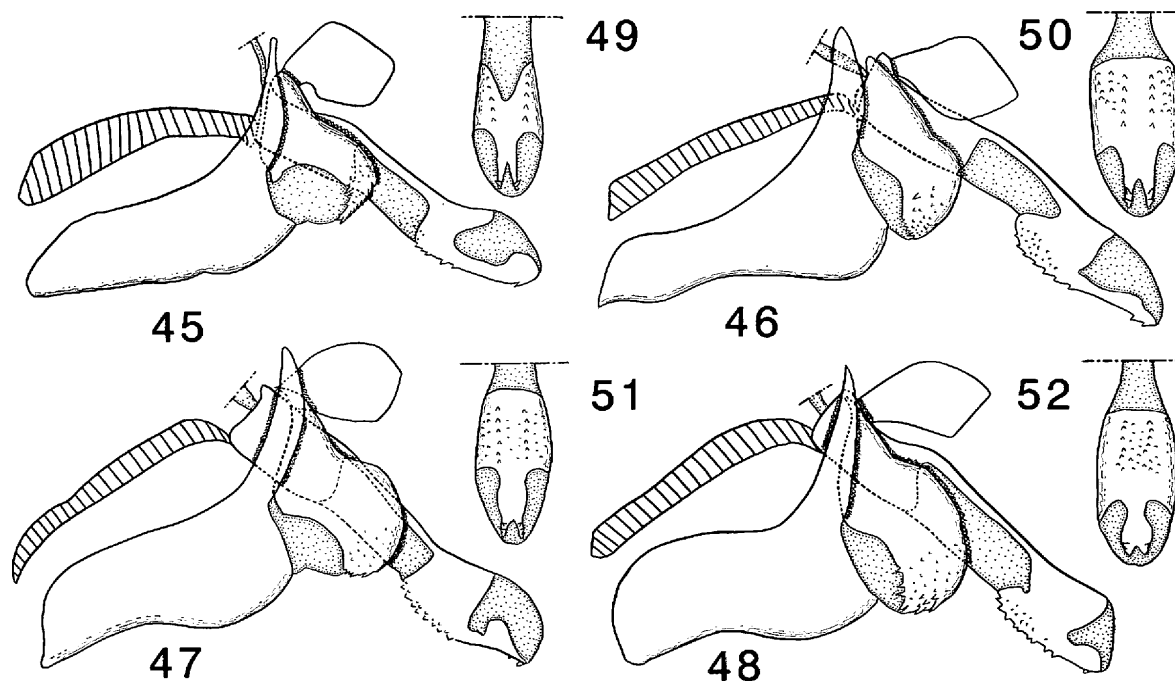
*Actia resinellae* (Schrank)

(Figs. 6, 18, 30, 46, 50, 66, 78, 79)

*Musca resinellae* Schrank, 1781: 478.

See Andersen (1996) for complete list of synonymies.

**Diagnosis.** Male. Antenna with 1st flagellomere yellowish brown; basicosta yellow. Vertex of 0.4–0.5 of head width; parafacial wider than width of 2nd aristomere; gena about 0.3 of eye-height; antenna with 1st flagellomere 2.8–3 times as long as wide and 6.4–7.5 times as long as pedicel; 3+4 dc; R<sub>1</sub> setulose dorsally on apical 1/2, bare ventrally; M complete to wing margin; CuA<sub>1</sub> setulose dorsally nearly to crossvein dm-cu. Male genitalia. Surstylus in lateral view slightly curved dorsally; cerci in dorsal view narrowly separated from each other at apex; gonopod apically broad and J-shaped, with short spinules apically; paramere nearly square; distiphallus somewhat elongate, similar to *jocularis*. Female. Differing from male as follows: antenna with scape and pedicel yellow, 1st flagellomere 2.8–3 times as long as wide. Female genitalia. Sternum 5 nearly rectangular in form; terga 6–7 narrower, tergum 6 about 2.5 times as long as tergum 7; sternum 6 nearly fan-shaped in form; anterior margin of sternum 7 weakly projected forward; spiracle 6 present on tergum 6; spiracle 7 in membrane



Figs. 45–52. Hypandria, gonopods, parameres and distiphalli in lateral view. Figs. 49–52. Distiphalli in ventral view. — 45, 49. *A. jocularis*; 46, 50. *A. resinellae*; 47, 51. *A. pilipennis*; 48, 52. *A. maksymovi*. Scale bar = 0.1 mm.

anterior to tergum 7.

Body length. 5.0–6.0 mm.

Specimens examined. JAPAN [Kyushu] 1 male, Mitoma, Fukuoka city, Fukuoka, 30. iii. 1964, K. Nozato; 1 male, 2 females, same locality, 7. vi. 1965, K. Nozato (all in BLKU); EUROPE. 1 male, 2 females, Kiefentrieben, 11. iv. 1974 (SMNS); 1 male, 28. vi. 31; 1 female, I.C. Nielsen leg. (ZMUC).

Distribution. Japan (Kyushu); Europe northwards to S. England, S. Sweden, St. Petersburg, Mongolia and Russia (S Siberia and Kuril Is.).

Host. See 'Host of Japanese species of *Actia*'.

Remarks. This species is distinct from other species by the yellowish brown 1st flagellomere. This species is parasitic on *Dioryctria sylvestrella* in Japan as well as in Europe.

#### *Actia pilipennis* (Fallén)

(Figs. 7, 19, 31, 47, 51, 67, 80, 81)

*Tachina pilipennis* Fallén, 1810: 273.

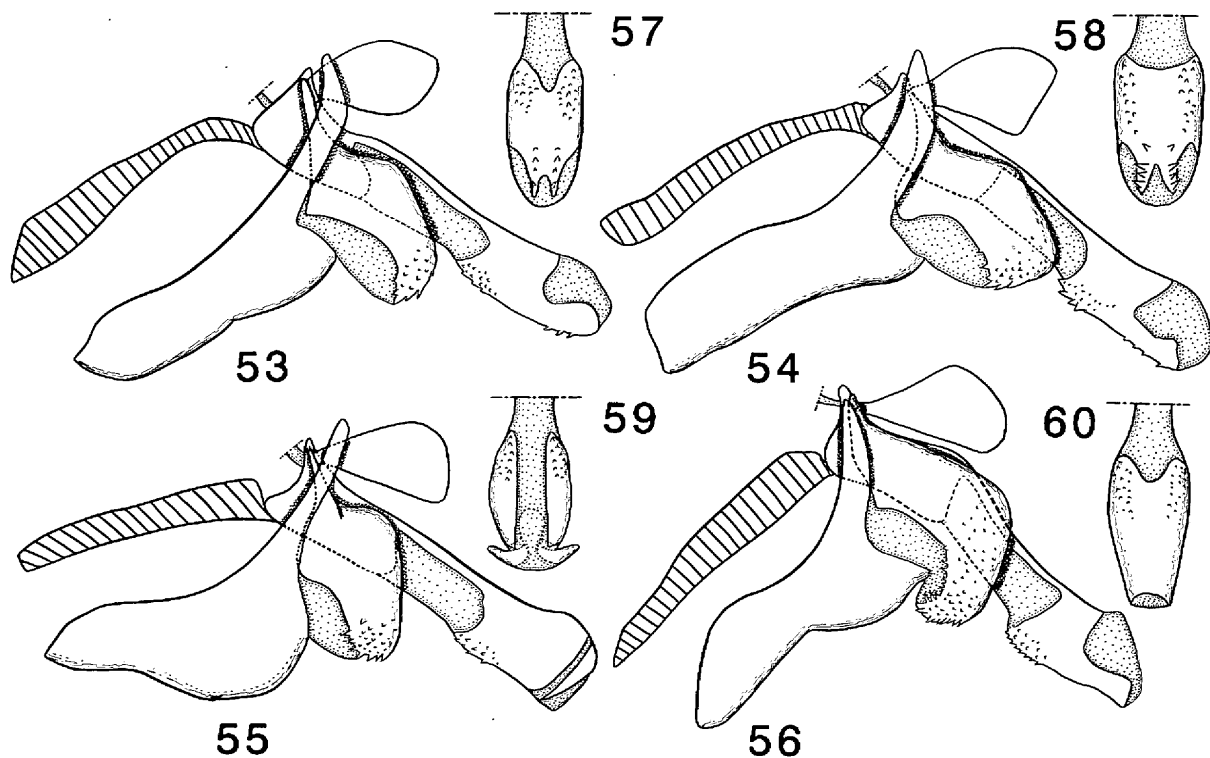
See Andersen (1996) for complete list of synonymies.

**Diagnosis.** Male. Vertex about 0.4 of head width; parafacial subequal to or slightly wider than width of 2nd aristemere; gena about 0.3 of eye-height; antenna with 1st flagellomere nearly rectangular, about 1.7 times as long as wide and 4–4.3 times as long as

pedicel; 2nd aristemere about 3 times as long as wide; 3+4 dc; basicosta reddish yellow to yellow; R<sub>1</sub> setulose dorsally along entire length, bare ventrally (sometimes with 1–4 setulae apically); M complete to wing margin; CuA<sub>1</sub> with setulae dorsally beyond crossvein dm-cu. Male genitalia. Surstylus in lateral view nearly straight, in dorsal view apex somewhat narrow; cerci in lateral view weakly curved dorsally at middle; gonopod similar to *resinellae*; paramere rounded apically; distiphallus similar to *jocularis*. Female. Differing from male as follows; antenna with 1st flagellomere slender, about 2 times as long as wide. Female genitalia. Similar to *resinellae*; tergum 6 large and elongate, subequal in length to sternum 5; tergum 7 much shorter than tergum 6; spiracle 6 present on tergum 6 or in membrane anterior to tergum 6; spiracle 7 in membrane anterior to tergum 7.

Body length. 5.0 mm.

Specimens examined. JAPAN [Hokkaido] 6 males, 2 females, Kamitoshibetu, Ashoro-cho, 17. viii. 1996, T. Tachi; 1 male, 1 female, same data (Malaise trap), T. Tachi; 1 male, same locality, 11. viii. 1996, T. Tachi; 1 male, Gojikkoku, Shibecha-cho, 15. viii. 1996 (Malaise trap), T. Tachi; 1 male, Tôro-lake, Shibecha-cho, 14. viii. 1996, T. Tachi; 2 males, Bibai, 29. vi. 1976, K. Kamijo; 1 male, Bibai, 9. vii. 1973, K. Kamijo; 1 male, Ebetsu, 29. v. 1959, T. Kumata



Figs. 53–60. Hypandria, gonopods, parameres and distiphalli in lateral view. Figs. 57–60. Distiphalli in ventral view. — 53, 57. *A. nigra*; 54, 58. *A. clavula*; 55, 59. *A. tarsata*; 56, 60. *A. nigroscutellata*. Scale bar=0.1 mm.

(SEHU); 1 female, Jozankei, Sapporo city, 21. viii. 1996, T. Tachi. [Honshu] 1 female, Hinoemata, Fukushima, 21. vii. 1996 (Malaise trap), T. Tachi; 1 male, Sawara-ike, Nirasaki city, Yamanashi, 11. vii. 1996, T. Tachi; 3 males, same locality, 12. vii. 1996, T. Tachi; 1 male, Kanayama, Sudama-cho, Yamanashi, 9. vi. 1975 (Malaise trap), J. Emoto; 1 male, same locality, 19. vii. 1975 (Malaise trap), J. Emoto; 1 male, same locality, 8. ix. 1975 (Malaise trap), J. Emoto; 4 males, Mt. Hachimori, Nagano, 1. vii. 1996, T. Tachi; 1 male, Togakushi, Nagano, 24. vi. 1996, T. Tachi; 2 males, 2 females, Shinmyôhara, Ômachi city, Nagano, 29. vi. 1996, T. Tachi; 1 female, Shimashima-dani, Azumi vil., Nagano, 30. vi. 1996, T. Nakamura; 1 female, Ochiai, Sudama-cho, Yamanashi, 16. vii. 1996, T. Tachi; 1 female, Gobagoe, Asahi vil., Nagano, 30. vi. 1996 (Light trap), T. Tachi (all in BLKU except as indicated).

**Distribution.** Japan (Hokkaido, Honshu); Europe northwards to Ireland, Scotland, N. Sweden and St. Petersburg, Mongolia and Russia (S Siberia, Kuril Is., Ussuria).

**Host.** See 'Hosts of Japanese species of *Actia*'.

**Remarks.** This species sometimes has 1–4 setulae on ventral surface of  $R_1$  and resembles members of the *crassicornis* group in this feature. This species is,

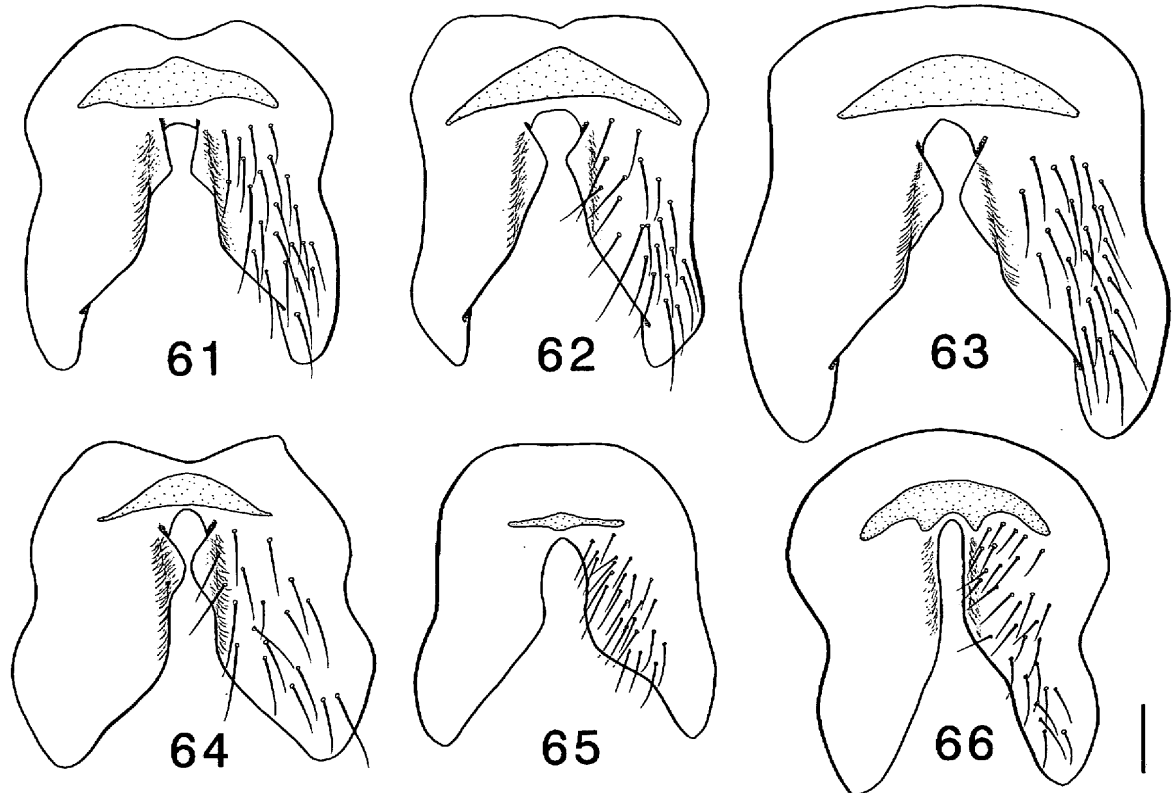
however, easily distinguished from them by the structure of the male and female genitalia; male sternum 5 without distinct median lobe, surstylus without outer long setae at middle, cerci weakly curved dorsally at middle and female genitalia with hypoproct lacking anterior inflexed portion.

*Actia maksymovi* Mesnil

(Figs. 8, 20, 32, 48, 52, 68, 82, 83)

*Actia maksymovi* Mesnil, 1952: 153.

**Diagnosis.** Male. Vertex about 0.4 of head width; parafacial subequal to or slightly wider than width of 2nd aristomere; gena about 0.3 of eye-height; antenna with 1st flagellomere 1.7–2.8 times as long as wide and 4.3–5.4 times as long as pedicel; 2nd aristomere about 4 times as long as wide; 3rd aristomere thickened on basal 2/3; 3+4 dc; basicosta black;  $R_1$  setulose dorsally on apical 1/2, bare ventrally; M complete to wing margin;  $CuA_1$  with 8–14 setulae dorsally nearly to crossvein dm-cu; 2nd costal sector about 0.3 times as long as 3rd. Male genitalia. Surstylus in lateral view thickened, slightly curved dorsally; cerci in lateral view weakly curved dorsally at middle, in dorsal view slender; gonopod similar to *resinellae*; paramere truncate apically; distiphallus similar to *jocularis*. Female.



Figs. 61–66. Male sternum 5 in ventral view (setae omitted on left side). — 61. *A. crassicornis*; 62. *A. solida*; 63. *A. ampla*; 64. *A. destituta*; 65. *A. jocularis*; 66. *A. resinellae*. Scale bar = 0.1 mm.

Differing from male as follows: antenna with 1st flagellomere slender, about 1.8 times as long as wide. Female genitalia. Similar to *pilipennis*; tergum 6 shorter than sternum 5; sternum 7 somewhat wide; spiracles 6–7 present on or in membrane anterior to each tergum, respectively.

Body length. 4.5–5.0 mm.

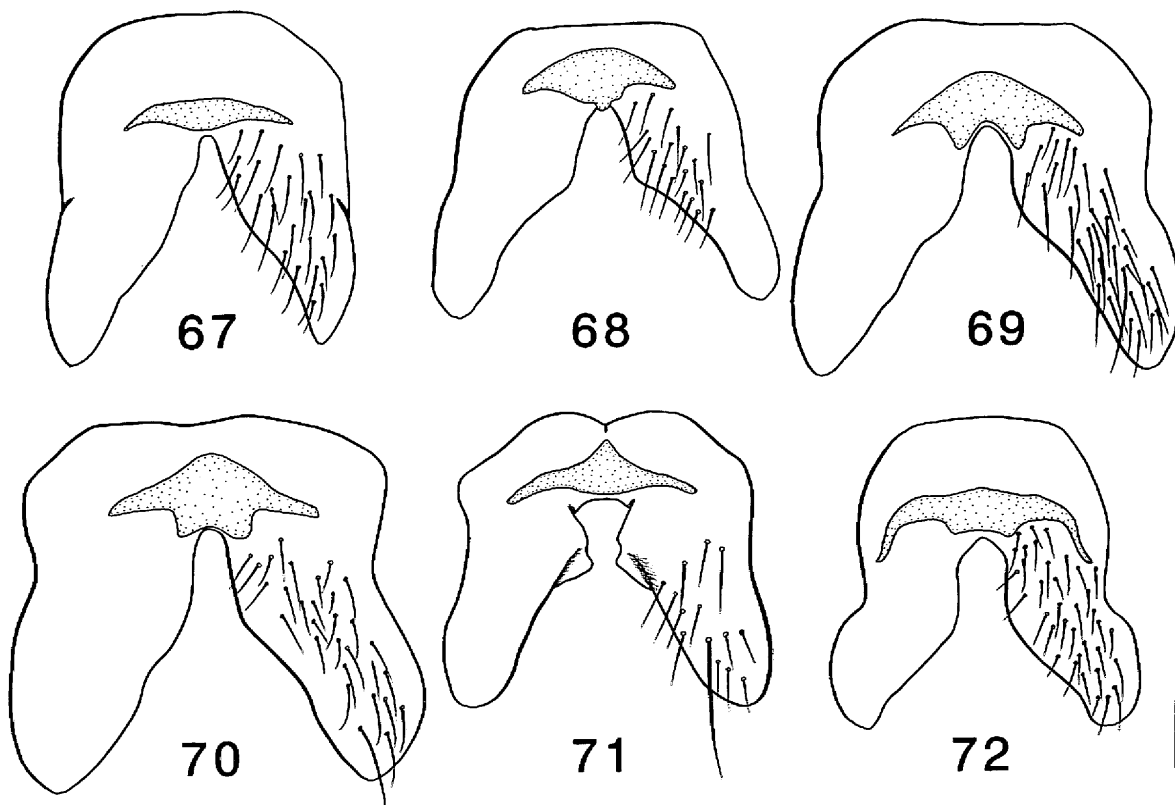
Specimens examined. JAPAN [Hokkaido] 1 female, Nopporo, 16. vii. 1968, K. Kamijo; 1 male, Nopporo, 27. vii. 1969, K. Kamijo; 1 female, Nopporo, 2. vii. 1971, K. Kamijo; 1 male, Naka-Furano, 30. v. 1975, K. Kamijo; 1 male, 2 females, same locality, 31. v. 1975, K. Kamijo; 1 female, Soranuma, Sapporo city, 22. vii. 1996, M. Sueyoshi; 2 males, Bibai, ii. 1975, K. Kamijo; 1 female, Sapporo, no data, H. Kono (SEHU); 1 male, Gojikkoku, Shibeche-cho, 14. viii. 1996, T. Tachi; 3 males, Tôro-lake, Shibeche-cho, 14. viii. 1996 (Malaise trap), T. Tachi, 1 male, Tomakomai, Tomakomai city, 31. vii. 1996, M. Sueyoshi; 1 female, Kamitoshibetsu, Ashoro-cho, 17. viii. 1996, T. Tachi. [Honshu] 1 male, Hinoemata, Fukushima, 22. vii. 1996 (Malaise trap), T. Tachi; 6 females, Biwasawa, Inawashiro-machi, Fukushima, 14. viii. 1996, M. Sueyoshi; 1 female, Shin-Kazawa, Gunma, 11. vii. 1972, S. Sugi; 8 males, 5 females, Yunosawa-tôge, Yamato vil., Yamanashi, 17. vii. 1996, T. Tachi;

3 males, 1 female, same locality, 18. vii. 1996, T. Tachi; 3 males, same data (Malaise trap); 3 males, Ochiai, Sudama-cho, 16. vii. 1996, T. Tachi; 1 female, Mt. Mizugaki, Sudama-cho, 15. vii. 1996, T. Tachi; 1 male, 1 female, same locality, 16. vii. 1996 (Malaise trap); 1 male, Mt. Hachimori, Nagano, 1. vii. 1996 (Malaise trap), T. Tachi; 1 male, Karasawa pass, Chino city, Nagano, 31. viii. 1996, M. Sueyoshi; 3 females, Togakushi, Nagano, 27. vi. 1996, T. Tachi; 1 female, Kanayama, Sudama-cho, Yamanashi, 24. viii. 1975; 1 female, same locality, 10. ix. 1975; 1 male, same locality, 26. ix. 1975 (Malaise trap), J. Emoto; 1 male, same locality, 27. vi. 1975, J. Emoto (all in BLKU except as indicated).

Distribution. Japan (Hokkaido, Honshu); French Alps, Swiss Jura, Wallis, Slovakia, St. Petersburg, Mongolia and Russia (S Siberia).

Host. See 'Hosts of Japanese species of *Actia*'.

Remarks. This species is similar to *A. clavula* in general appearance, but is distinguished from it by the following characters; male genitalia with surstylus in lateral view thickened, slightly curved dorsally and cerci in lateral view weakly curved dorsally at middle.



Figs. 67–72. Male sternite 5 in ventral view (setae omitted on left side). — 67. *A. pilipennis*; 68. *A. maksymovi*; 69. *A. nigra*; 70. *A. clavula*; 71. *A. tarsata*; 72. *A. nigroscutellata*. Scale bar = 0.1 mm.



*Actia nigra* Shima

(Figs. 9, 21, 33, 53, 57, 69, 84, 85)

*Actia nigra* Shima, 1970b: 184.

**Diagnosis.** Male. Vertex about 0.4 of head width; parafacial subequal to or slightly wider than 2nd aristomere; gena about 0.3 of eye-height; antenna with 1st flagellomere 1.9–2.3 as long as wide and 3.8–4.4 as long as pedicel; palpus yellow; 3+3 dc; prosternum bare; basicosta black;  $R_1$  setulose dorsally on apical 1/2, bare ventrally; M complete to wing margin;  $CuA_1$  with 8–14 setulae dorsally nearly to crossvein dm-cu. Male genitalia. Surstylus in lateral view somewhat widened apically; cerci in lateral view curved dorsally at middle; gonopod and paramere similar to *resinellae*; distiphallus similar to *jocularis*. Female. Differing from male as follows: antenna with 1st flagellomere more slender, about 2 times as long as wide. Female genitalia. Similar to *pilipennis*; sternum 6 wider; sternum 7 somewhat narrower; a narrow sclerite present anterior to hypoproct; spiracle 6 present on tergum 6, spiracle 7 present in membrane anterior to tergum 7.

Type material examined. Holotype male, Pirikapetanu, Mt. Satsunai, Mts. Hidaka, Hokkaido, 27. vii. 1967, T. Saigusa; paratypes, 2 males, 1 female, same data as holotype, 27. vii. 1967, H. Shima, T. Saigusa & A. Nakanishi. Additional material examined. JAPAN [Hokkaido] 2 males, Kamitoshibetsu, Ashoro-cho, 16. viii. 1996, T. Tachi; 1 male, Okepepu-rindô, Shiretoko Pen., 13. viii. 1996, T. Tachi; 1 male, 1 female, same locality, 29. viii. 1995, T. Tachi; 1 male, Ponrubeshibe-rindô, Ashibetsu city, 9. viii. 1996, T. Tachi; 1 male, Jozankei, Sapporo city, 20. viii. 1996, T. Tachi; 1 female, Shiretoko-tôge (alt. 600 m), 30. viii. 1995, T. Saigusa; 3 females, Nukabira, 4. vi. 1986, H. Shima (all in BLKU).

Distribution. Japan (Hokkaido); Russia (Kuril Is.).

Host. Unknown.

Remarks. *Actia nigra* is the only species having a bare prosternum in this genus. This species is similar to *A. clavula* in features of the male genitalia, but is distinguished from it by the yellow palpus and weakly, dorsally curved cerci at middle.

*Actia clavula* sp. nov.

(Figs. 10, 22, 34, 54, 58, 70)

**Description.** Male. Head. Almost gray in ground color; frontal vitta reddish brown; antenna with scape, pedicel and arista reddish brown to dark brown, 1st flagellomere black; palpus dark yellow to brown. Vertex about 0.4 of head width; frons about 0.9 times as long as face; parafacial distinctly wider than width

of 2nd aristomere; gena about 0.4 of eye-height; inner vertical setae very strong, about 0.9 of eye-height; anterior reclinate orbital seta about 1.2 times as long as anterior proclinate orbital seta; 5 frontal setae; antenna with 1st flagellomere oval, 2.3–2.5 times as long as wide and 5.8–6.3 times as long as pedicel; arista with 2nd aristomere about 2.5–3 times as long as wide; 3rd aristomere thickened on basal 3/5; palpus normal.

Thorax. Gray in ground color, with yellowish pollinosity; scutellum pale gray. 3+3 (rarely 3+4) dc; lower katepisternal seta about 0.6 times as long as upper anterior one; prosternum usually pair of setae (rarely bare); subapical scutellar seta about 1.8 times as long as scutellum; distance between bases of subapical scutellar setae about 0.8 times as long as that between basal and subapical setae of same side.

Wing. Hyaline; basicosta black. Second costal sector about 0.3 times as long as 3rd; ultimate section of  $CuA_1$  about 0.3 times as long as penultimate section, and about 1.3 times as long as crossvein dm-cu;  $R_1$  setulose dorsally on apical 1/2, bare ventrally; M complete to wing margin;  $CuA_1$  with 3–7 setulae dorsally on basal 1/3.

Legs. Coxae and trochanters brown; femora and tarsi black; tibiae yellowish brown; pulvilli yellow. Fore tibia with 6 ad setae of unequal lengths and 4 pd setae; mid tibia with 3 pd setae; hind tibia with 6–8 ad setae of unequal lengths, 5–7 pd and 3–4 v setae.

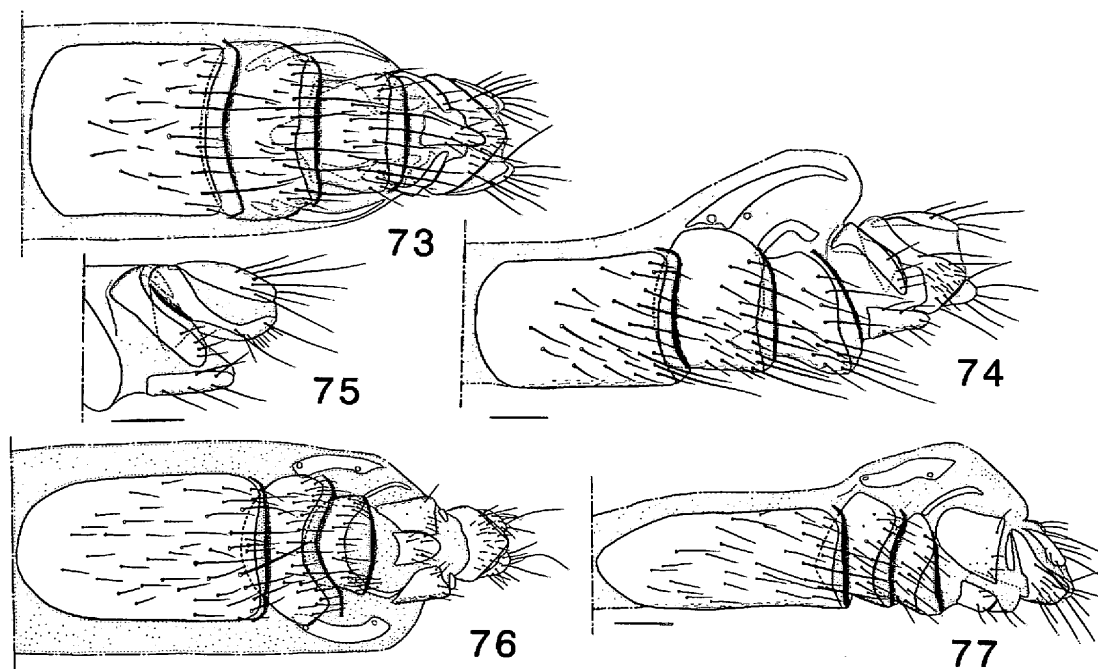
Abdomen. Shining black in ground color; anterior 1/5 of terga 3–4 and 1/3 of tergum 5 with grayish pollinosity; venter of median portion of syntergum 1+2 and terga 3–4 sometimes with grayish pollinosity. Hairs recumbent; syntergum 1+2 with 0–1 lateral marginal seta on each side; tergum 5 about 0.7 times as long as 4th; sternum 5 without median lobe.

Male genitalia. Surstylus in lateral view very expanded apically; cerci in lateral view strongly curved dorsally at middle; gonopod in lateral view somewhat elongate, J-shaped with short spinules apically; paramere broad and truncated apically; apex of distiphallus membranous laterally, and in ventral view apically narrowed and apex divided into two short processes, bearing some small spinules.

Female. Very similar to male, but differing as follows: antenna with 1st flagellomere 1.2–2.6 times as long as wide and 5–5.7 times as long as pedicel. Female genitalia. Similar to *nigra*; sternum 5 elongate; tergum 6 much shorter; sternum 7 with short anterior apodeme.

Body length. 4.3–6.0 mm.

Holotype male, Shinhodaka, Kamitakara vil., Gifu,



Figs. 73-77. Female terminalia in ventral view, in lateral view and in ventrolateral view. — 73-75. *A. crassicornis*; 76, 77. *A. jocularis*. Scale bars=0.1 mm.

18. viii. 1997 (Malaise trap), T. Tachi (BLKU).

Paratypes. JAPAN [Honshu] 2 males, 1 female, Yunosawa tōge, Yamato vil., Yamanashi, 21. viii. 1997 (Malaise trap), T. Tachi; 1 male, Kanayama, Sudama-cho, Yamanashi, Japan, 1. ix. 1975 (Malaise trap), J. Emoto; 1 male, same locality, 11. vi. 1975, J. Emoto; 3 males, 2 females, same locality as holotype, 12, 24-26. vi. 1975 (Malaise trap), J. Emoto; 1 female, same locality as holotype, 5. viii. 1995, T. Tachi (all in BLKU); 1 male, Shirane-oike, Akaishi Mts., 13. viii. 1973, T. Hattori (EIHU).

Distribution. Japan (Honshu).

Host. Unknown.

Remarks. This species is similar to *A. maksymovi* in general appearance, but is easily distinguished from it by 3+3 dc, the wide parafacial and  $CuA_1$  setulose dorsally only on basal 1/3.

### *Actia lamia* (Meigen)

(Fig. 91)

*Roeselia lamia* Meigen, 1838: 254.

See Andersen (1996) for complete list of synonymies.

**Diagnosis.** Female. Vertex about 0.4 of head width; parafacial much wider than width of 2nd aristemere; gena about 0.3 of eye-height; antenna with 1st flagellomere about 2.3 times as long as wide and about 5 times as long as pedicel; 2nd aristemere about 2.5 times as long as wide; basicosta brown to reddish brown;  $R_1$  setulose dorsally along entire length, bare ventrally

(rarely with 1-3 setulae); M terminating at bend; vein  $CuA_1$  setulose dorsally nearly to crossvein dm-cu; ultimate section of  $CuA_1$  about 0.7 times as long as penultimate section, and about 2.5 times as long as crossvein dm-cu.

Body length. 5.0-7.0 mm.

Specimens examined: JAPAN [Hokkaido] 2 females, Utonai-ko, Titose, 4. vii. 1961, T. Kumata. AUSTRIA. 1 male, Fladnitz a. d., Raab, Styria, 11. v. 1975, Elsasser; 1 female, Kaiserwald, Zwaring südlich v., Styria, 25. v. 1975, Elsasser (all in BLKU).

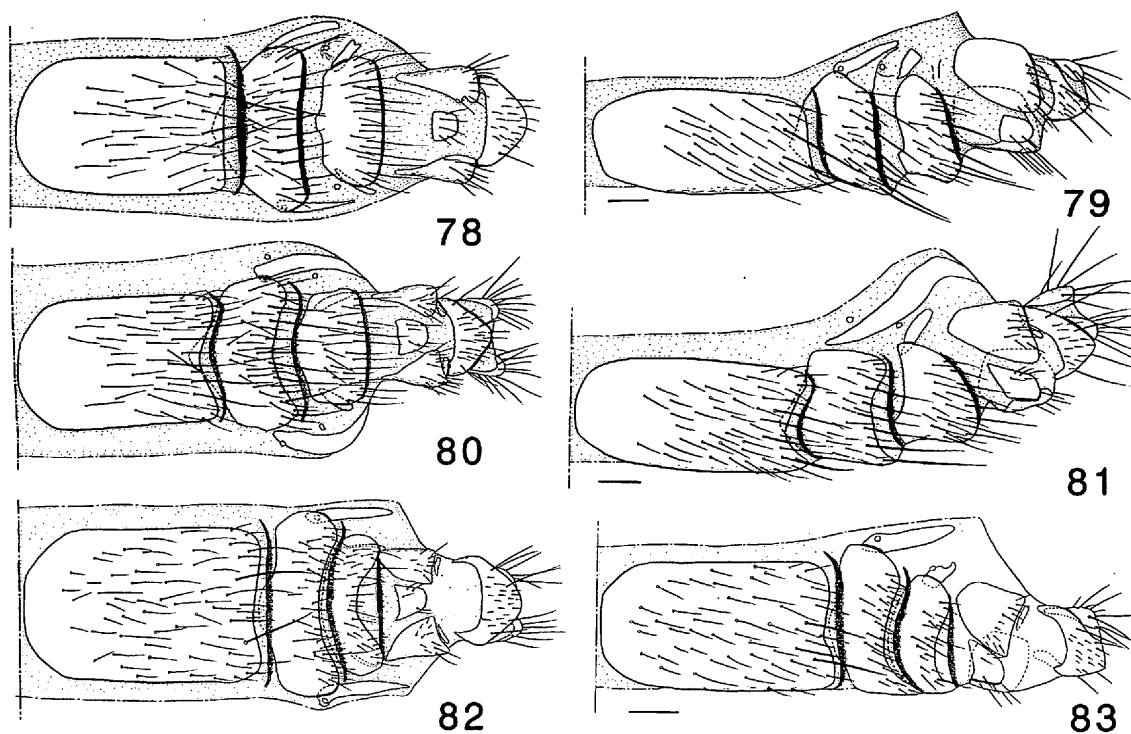
Distribution. Japan (Hokkaido); Europe northwards to S. England, middle Sweden, St. Petersburg, Transcaucasia, Mongolia and Russia (S. Siberia, Ussuria, Kuril Is.).

Host. Unknown in Japan.

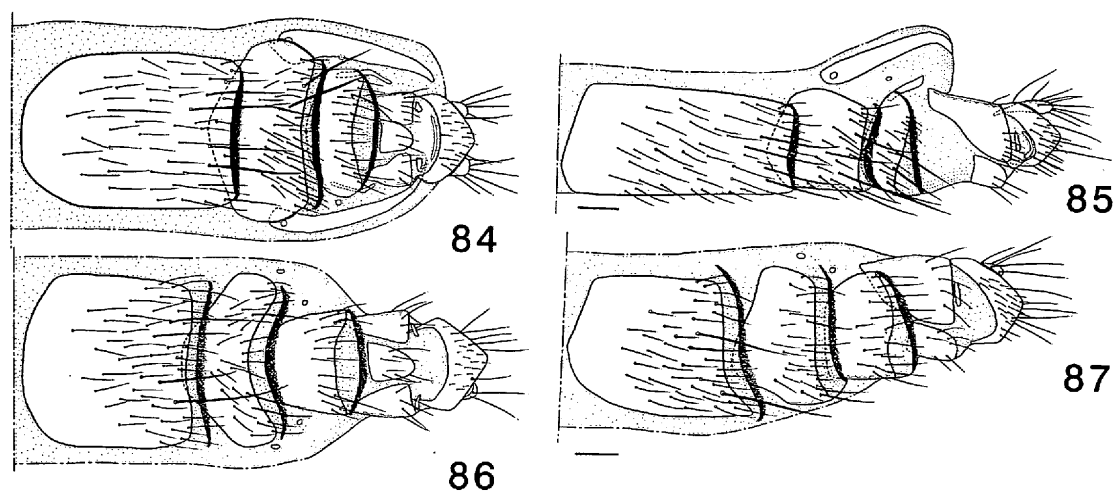
Remarks. This species is similar to *A. destituta* in having M terminating at the bend. These species are, however, assigned to different species groups by features of the male genitalia as mentioned in the remarks of *A. destituta*. This species may be distinguished from *A. destituta* by the length of the ultimate section of  $CuA_1$ . This is the first Japanese record of this species.

### The *tarsata* group

**Diagnosis.** Male. Sternum 5 with pair of differentiated median lobes. Male genitalia. Surstylus without tuft of outer setae; cerci weakly curved dorsally at middle; distiphallus partly membranous laterally at about apical 1/4, in dorsal view apical rounded area



Figs. 78-83. Female terminalia in ventral view and in ventrolateral view. — 78, 79. *A. resinellae*; 80, 81. *A. pilipennis*; 82, 83. *A. maksymovi*. Scale bars=0.1 mm.



Figs. 84-87. Female terminalia in ventral view and in ventrolateral view. — 84, 85. *A. nigra*; 86, 87. *A. tarsata*. Scale bars =0.1 mm.

membranous, apex of distiphallus widened in ventral view. Female. 5th tarsomere of foreleg elongate and broadened; terga 6-7 absent.

In the male genitalia of *Actia tarsata*, the surstylus sometimes bears short, fine, sparse setae, the cerci are weakly curved, and the median lobes of the sternum 5 are developed. These characters are also shared by some members of the *lamia* and *crassicornis* groups; the characteristics of the surstylus and cerci are found in the *lamia* group, and those of the median lobes are present in the *crassicornis* group. In *A. tarsata*, howev-

er, the lateral portion of the distiphallus is partly membranous, the apex of the distiphallus is widened in ventral view, the 5th tarsomere of the female foreleg is elongate and broadened, and female terga 6-7 are absent. These character states are found only in this species and considered apomorphic in the genus *Actia*. We consider that *A. tarsata* represents a distinct species group differing from any other known groups.

*Actia tarsata* Richter

(Figs. 11, 23, 35, 55, 59, 71, 86, 87)

*Actia tarsata* Richter, 1980: 541.

**Redescription.** Male. Head. Almost gray in ground color; frontal vitta reddish yellow to orange; antenna with scape and pedicel dark brown, 1st flagellomere blackish brown to black, orange at base; arista brown, black on basal 1/2; palpus yellow. Vertex about 0.4 of head width; frons about 0.9 times as long as face; parafacial narrower than width of 2nd aristemere; gena about 0.2 of eye-height; inner vertical setae very strong, about 0.8 of eye-height; anterior reclinate orbital seta about 1.5 times as long as anterior proclinate orbital seta; 5 frontal setae; parafrenal with 3–4 fine hairs; antenna with 1st flagellomere 2.3–2.5 times as long as wide and 6–6.6 times as long as pedicel; 2nd aristemere about 2.8 times as long as wide; 3rd aristemere thickened on basal 1/3; labella normal.

Thorax. Dark gray in ground color, with yellowish pollinosity; postpronotal lobe yellow, with whitish pollinosity; scutellum blackish brown, yellow on apical 2/5. 3+4 dc; lower katepisternal seta about 0.7 times as long as upper anterior one; subapical scutellar seta about 2 times as long as scutellum; distance between bases of subapical scutellar setae about 1.3 times as long as that between basal and subapical setae of same side.

Wing. Hyaline; basicosta yellow. Second costal sector about 0.2 times as long as 3rd; ultimate section of  $CuA_1$  about 0.6 times as long as penultimate section, and about 2 times as long as crossvein dm-cu;  $R_1$  bare; M complete to wing margin;  $CuA_1$  bare dorsally;

Legs. Coxae and trochanters reddish brown; femora black; fore tibia yellowish brown, mid and hind tibiae brown; tarsi black; pulvilli yellow. Fore tibia with 5 ad setae of unequal lengths and 3 pd setae; mid tibia with 4 pd setae; hind tibia with 6 ad and 6–8 pd setae of unequal lengths and 3 v setae.

Abdomen. Broadly shining black in ground color dorsally; most of syntergum 1+2 and anterior half of tergum 3 yellow, sometimes blackish brown; venter of syntergum 1+2 and most of tergum 3 reddish yellow in ground color; anterior 1/8 of terga 3–4 with grayish pollinosity. Hairs recumbent; syntergum 1+2 with 1 lateral marginal seta on each side; tergum 5 0.3–0.5 times as long as 4th; sternum 5 with pair of median lobes and pair of distinct strong setae.

Male genitalia. Surstylus in lateral view straight, in dorsal view thickened apically and curved inward; cerci in lateral view weakly curved dorsally at middle, apex slightly curved ventrally, in dorsal view slender;

gonopod and paramere similar to *resinellae*; distiphallus partly membranous laterally at about apical 1/4, in dorsal view apical rounded area membranous, in ventral view centrally membranous and apical sclerotized part somewhat widened.

Female. Differing from male as follows: antenna with 1st flagellomere slender, 2.7–3.3 times as long as wide; 5th tarsomere of foreleg elongate and broadened, about 2 times as long as wide, 3.5–4 times as long as 4th tarsomere. Female genitalia. Sternum 5 nearly square in form; terga 6–7 absent; sternum 6 nearly fan-shaped; spiracles 6–7 present in membrane.

Body length. 4.3 mm.

Specimens examined. JAPAN [Hokkaido] 3 females, Kamitosibetsu, Ashoro-cho, 17. viii. 1996, T. Tachi; 6 males, Gojikkoku, Shibecha-cho, 14. viii. 1996, T. Tachi; 5 males, same locality, 15. viii. 1996 (Malaise trap), T. Tachi; 1 male, Tôro lake, Shibecha-cho, 14. viii. 1996, T. Tachi; 1 male, Rarumanai, Eniwa city, 31. vii. 1996, M. Sueyoshi; 1 male, Odaitô, 1. vii. 1968, T. Saigusa; 2 females, Iburi, Tomakomai city, 17, 19. viii. 1977, K. Ôhara. [Honshu] 1 male, Mt. Nyûto, Akita, 3. viii. 1968, S. Fukushi; 3 females, Tsurunoyu, Tazawako-machi, Akita, 10. viii. 1996, M. Sueyoshi; 1 male, Eboshidake, Tazawako-machi, Akita, 10. viii. 1996, M. Sueyoshi; 3 males, 2 females, Mt. Waga, Sawauchi vil., Iwate, 20. viii. 1988, T. Chiba; 2 males, Mt. Ide, Fukushima, 27. vii. 1970, K. Kanmiya; 1 male, Hirogawara, Yamanashi, 14. vii. 1996, T. Tachi; 2 females, Hirogawara, Yamanashi, 29. viii. 1996, M. Sueyoshi; 1 male, Sannose, Yamanashi, 28. vii. 1976, K. Hara; 5 males, 4 females, Mt. Hodaka (alt. 1100 m), Gifu, 12. viii. 1995, T. Tachi (all in BLKU).

Distribution. Japan (Hokkaido, Honshu); Russia (SE Siberia, Ussuria).

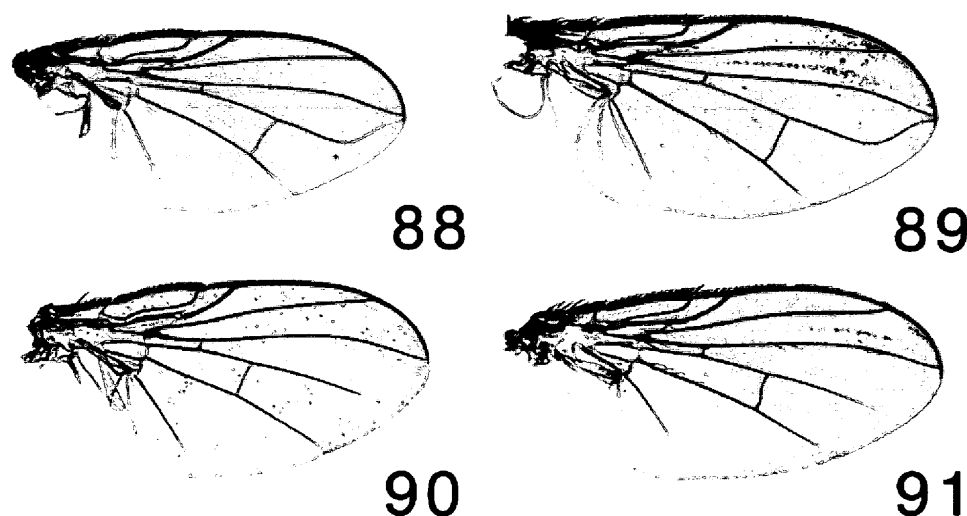
Host. Unknown.

Remarks. This species is characterized by bare  $R_1$  and  $CuA_1$  and an elongate and broadened female 5th tarsomere of the foreleg. This species was described from Russia, and is here recorded for the first time from Japan.

**The nigroscutellata group**

**Diagnosis.** Very similar to the *lamia* group, but differing from it in the following characters: Male genitalia. Distiphallus entirely sclerotized, lacking apical spinules in ventral view; gonopod elongate and strongly curved ventrally.

Andersen (1996) included *A. nigroscutellata* in the *lamia* group on the basis of an apically membranous distiphallus. The ventral structure of the distiphallus



Figs. 88-91. Wings. — 88. *A. crassicornis*; 89. *A. solida*; 90. *A. destituta*; 91. *A. lamia*.

in this species, however, is not common to members of the *lamia* group. The ventral portion of this species is entirely sclerotized and lacks apical spinules (Fig. 60). This species group is defined here based on this peculiar feature of the male distiphallus for a single Palearctic species, *A. nigroscutellata*. The gonopod of this species is elongate and strongly curved (Fig. 56). We consider that this is also an autapomorphy of this group.

***Actia nigroscutellata* Lundbeck**

(Figs. 12, 24, 36, 56, 60, 72)

*Actia nigroscutellata* Lundbeck, 1927: 462.

**Diagnosis.** Male. Vertex about 0.4 of head width; parafacial wider than width of 2nd aristomere; gena 0.3-0.4 of eye-height; antenna with 1st flagellomere about 2.5 times as long as wide and 5.5 times as long as pedicel; 2nd aristomere about 3.3 times as long as wide; 3rd aristomere thickened on basal 3/4; basicosta black;  $R_1$  setulose dorsally on apical 1/2, bare ventrally; M complete to wing margin;  $CuA_1$  bare dorsally; anterior 1/8 of terga 3-4 and 1/4 of tergum 5 with grayish pollinosity; sternum 5 without median lobe. Male genitalia. Surstylus in lateral view apically narrow and slightly curved dorsally; cerci in lateral view weakly curved dorsally at middle, apex slightly curved ventrally, in dorsal view somewhat widened apically; gonopod in lateral view elongate and strongly curved, with short spinules apically; paramere rounded apically; apex of distiphallus membranous laterally, in ventral view entirely sclerotized, without apical spinule and with some basal spinules.

Body length. 4.3-4.7 mm.

Specimens examined. JAPAN [Hokkaido] 1 male,

Kamitoshibetsu, Ashoro-cho, 17. viii. 1996, T. Tachi; 1 male, Berabonai, Ashoro-cho, 16. vi. 1968, T. Saigusa (BLKU). GERMANY. 1 female, Württemberg, 20. viii. 1963; 1 male, Dorpat, 3. vii. 1996 (SMNS); 1 male, Sortavala, Tiensuu, 4. viii. 1934; 1 female, U: Westend, Fennia, 11. viii. 1938 (ZMUC).

**Distribution.** Japan (Hokkaido); Europe northwards to middle Sweden and St. Petersburg.

**Host.** Unknown in Japan.

**Remarks.** This species is widely distributed in the Palearctic Region, but appears to be very rare. This species is easily distinguished from other Japanese species of *Actia* by the bare  $CuA_1$ . This is the first Japanese record of this species.

**Key to the Japanese species of *Actia***

1. Vein  $R_1$  bare dorsally ..... *A. tarsata* Richter
- Vein  $R_1$  setulose dorsally on apical 1/2 or on entire length.....2
2. Vein  $CuA_1$  bare dorsally  
.....*A. nigroscutellata* Lundbeck
- Vein  $CuA_1$  setulose dorsally.....3
3. Vein M terminating at bend.....4
- Vein M complete to wing margin.....5
4. Ultimate section of vein  $CuA_1$  about 2.5 times as long as crossvein dm-cu; 3+3 dc; antenna with 1st flagellomere blackish brown; palpus brown; basicosta brown.....*A. lamia* Meigen
- Ultimate section of vein  $CuA_1$  about 3 times as long as crossvein dm-cu; 3+4 dc; 1st flagellomere orange; palpus yellow; basicosta yellow  
.....*A. destituta* sp. nov.
5. Vein  $R_1$  setulose dorsally along entire length... 6
- Vein  $R_1$  setulose dorsally on apical 1/2..... 9
6. Vein  $R_1$  bare ventrally.....*A. pilipennis* Fallén

- Vein R<sub>1</sub> setulose ventrally on apical 1/3 .....7
- 7. Body length more than 6 mm; 5 frontal setae; antenna with 1st flagellomere about 3 times as long as wide ..... *A. ampla* sp. nov.
- Body length less than 6 mm; 4 frontal setae; 1st flagellomere about 2.5 times as long as wide....8
- 8. Ultimate section of vein CuA<sub>1</sub> long, about 1.6 times as long as crossvein dm-cu; male genitalia with surstylus in lateral view slender, subequal in width to apex of cerci... *A. crassicornis* (Meigen)
- Ultimate section of vein CuA<sub>1</sub> short, about 1.3 times as long as crossvein dm-cu; surstylus in lateral view broad, about twice as wide as apex of cerci ..... *A. solida* sp. nov.
- 9. Antenna with 1st flagellomere yellowish brown; basicosta yellow to reddish brown  
..... *A. resinellae* (Schrank)
- First flagellomere black; basicosta black.....10
- 10. Labella elongate, about 0.7 times as long as eye-height..... *A. jocularis* Mesnil
- Labella normal.....11
- 11. Prosternum bare; palpus yellow... *A. nigra* Shima
- Prosternum setulose; palpus dark yellow to brown.....12
- 12. 3+4 dc; vein CuA<sub>1</sub> setulose dorsally almost to crossvein dm-cu; parafacial subequal to or slightly wider than width of 2nd aristonere; gena 0.25-0.32 of eye-height.... *A. maksymovi* Mesnil
- 3+3 dc; vein CuA<sub>1</sub> setulose dorsally on basal 1/3; parafacial distinctly wider than width of 2nd aristonere; gena 0.36 of eye-height  
..... *A. clavula* sp. nov.

### Hosts of Japanese species of *Actia*

Previously only two species of Lepidoptera, *Lymantria dispar* and *Dioryctria sylvestrella*, were recorded as hosts of Japanese species of *Actia* (Shima, 1970b, 1981; Schaefer & Shima). In this study eleven host species are newly reported. The following list is arranged alphabetically by species of *Actia*, host families, and host species. Each host record is accompanied by locality, references and collection acronym.

#### *Actia jocularis* Mesnil

##### Lymantriidae

*Lymantria dispar* (Linné)-[Chitose, Hokkaido] (Schaefer & Shima, 1981).

##### Tortricidae

*Acleris issikii* Oku-[Ishikawa, Honshu] (BLKU).  
*Clepsis monticolana* Kawabe-[Ishikawa, Honshu] (BLKU).

#### *Actia maksymovi* Mesnil

##### Tortricidae

*Acleris alnivora* Oku-[Sapporo, Hokkaido] (SEHU).  
*Archips issikii* Kodama-[Nopporo, Hokkaido] (BLKU).  
*Archips pulchra* (Butler)-[Nopporo, Hokkaido] (BLKU).  
*Cymolomia hartigiana* (Saxesen)-[Sapporo, Hokkaido] (BLKU).  
*Ptycholomoides aeriferana* (Herrich-Shäffer)-[Gunma, Honshu] (BLKU).  
*Spilota eremitana* Moriuti-[Naka-furano, Hokkaido] (BLKU).  
*Spilota laricana* (Heineman)-[Bibai, Hokkaido] (BLKU).

#### *Actia pilipennis* Falln

##### Tortricidae

*Choristoneura diversana* (Hübner)-[Bibai, Hokkaido] (BLKU).  
*Sparganothis pilleriana* (Denis & Schiffermübler)-[Hokkaido] (SEHU).

#### *Actia resinellae* (Schrank)

##### Pyralidae

*Dioryctria sylvestrella* (Ratzeburg)-[Fukuoka, Kyushu] (Shima, 1970b) (BLKU).

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(\* not directly examined)

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