

Fungus Gnats (Insecta, Diptera, Mycetophilidae) of the Imperial Palace, Tokyo

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Abstract Twenty-one species of the mycetophilid gnats are recorded from the Imperial Palace, Tokyo, of which 11 species: *Epicypta flavoterminalis* n. sp., *Mycetophila fruticosa* n. sp., *M. imperialis* n. sp. and *M. trifurcata* n. sp., *Anatella intricata* n. sp., *Brevicornu (B.) digitata* n. sp., *Cordyla triloba* n. sp., *Exechia latiseta* n. sp., *E. quadriloba* n. sp. and *E. ypsilon* n. sp., and *Pseudobrachypeza spinimentula* n. sp. are described, and five species are recorded as new to Japan.

Key words: Diptera, Mycetophilidae, Imperial Palace Tokyo, new species, new record.

Introduction

The taxonomical information on the mycetophilid gnats in the Imperial Palace, Tokyo, has not hitherto been available. Over 300 specimens of fungus gnats there were collected by Dr. Satoshi Shinonaga in 2001–04, and among these 22 species were recorded now. Eleven species of seven genera are described below as new to science and 5 of three genera recorded newly from Japan. With only 248 species known in Japan at present out of a total of about 1,200 confirmed species in the Palaearctic Region, it is clear that many further species in Japan and some more in the Palace Garden await discovery.

Materials and Methods

The dried specimens of the fungus gnats were collected by S. Shinonaga, a member of the faunistic surveys on Diptera in the Imperial Palace, Tokyo, in 2001–04. The male genitalia were macerated with 30% KOH and transferred to distilled water for dissection. After the examination and drawing of the abdomen with genitalia of each specimen, the dissected abdomens were stored in a short polyethylene tubule with glycerol and pinned with the specimen. The terms and abbreviations follow the previous paper (Sasakawa,

2005), except for setae or bristles on head and thorax: af, anterior frontals; ia, intra-alars; mspl, mesopleurals (anepisternal); oc, ocellars; or, orbitals; vt, verticals.

The holotypes of the new species are deposited in the collection of the Department of Zoology, National Museum of Nature and Science, Tokyo (NSMT).

Taxonomy

Mycetophilidae

Subfamily Sciophilinae

1. *Neoempheria cotyla* Sasakawa
Neoempheria cotyla Sasakawa, 2005: 276.
Imperial Palace: 1♂, 18 Oct. 2004 (Shinonaga).

This species is known to occur in Akasaka Imperial Gardens and Tokiwamatsu Imperial Villa, Tokyo. A male specimen examined has the longer wings (3 mm), and sparser rows of spines along the dorsal margin of cup-shaped cavity of the gonostylus (15 or 16 spines only). Although the distal cup-like shape of gonostylus in *N. cotyla* is similar to that of *N. aperta* Zeitzov and Menzel, 1996, known from Russia (Far East), *N. aperta* has only the setae apically, and also has the different wing pattern.

Distribution. Japan.

Subfamily Mycetophilinae

2. *Epicypta flavoterminalis* Sasakawa, n. sp.

(Figs. 1–2)

Holotype: Male (NSMT-I-DIP-5965), Imperial Palace, Tokyo, 24 Oct. 2001, coll. S. Shinonaga. *Paratypes*: 1 ♂, same data as holotype; 1 ♂, same locality, 18 Oct. 2004, coll. S. Shinonaga.

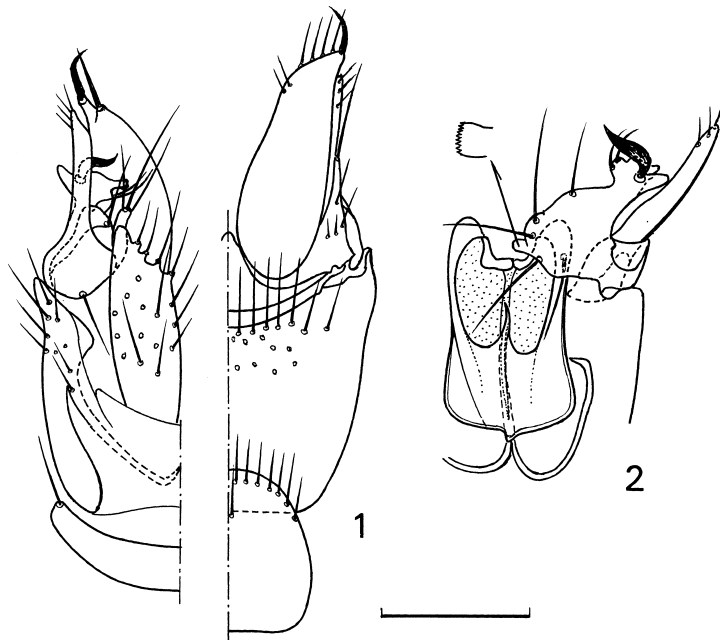
Male. Shiny black, but clypeus brown, T6 dark brown but yellow on distal half, gonocoxite and gonostylus yellow; mesoscutum less shining than scutellum and pleura. Antenna yellow but flagellomeres except for basal two or three ones tinged with brown; maxillary palp yellow. Wing very slightly yellow-tinged, veins brownish yellow, with central spot brown, extending anteriorly to costa (laterally beyond level of Rs) and posteriorly just beyond M; halter yellow. Legs yellow, hind femur brown on apical 1/4, all tarsi slightly brown-tinged.

Frons with long af and or; antenna 1–1.2 mm long, almost as long as head and thorax together, pedicel with long dorso-apical seta; flagellomeres each slightly longer than wide. Mesoscutum

with posteriormost dc and prsc distinctly long, pa much longer than dc; ppl three; scutellum with long basal and apical sc.

Wing: Costa ending at basal 2/5 distance between tips of R₅ and M₁, Sc short and ending free, R with 5–7 setulae below, M before r-m bare, r-m 1.5–1.8 times as long as M petiole, M₂ parallel with CuA₁, forking point of CuA before or beyond that of M. Legs: Fore basitarsus only a little shorter than tibia; fore tibia with 1–2 pd; mid tibia with 1d, 5 pd, 3a, 2v; hind tibia with 1 d, 5 pd, 6–7a; first tarsomere of mid leg with one row and that of hind leg with three rows of distinct setulae.

Gonocoxites shallowly emarginated on ventro-caudal margin; cercus distinctly truncated apically, with minute processes at setal bases; gonostylus almost as long as cercus; dorsal stylomere tabulate distally, bearing several setulae on tip, and lobate proximally, bearing long setae; ventral stylomere conical, with two spine-like setae on tip; mesal stylomere with a strong sinuous spine and five marginal setae on outer lobe and with



Figs. 1–2. Male genitalia of *Epicypta flavoterminalis* n. sp. (paratype). 1, 8th tergite and sternite, gonocoxite and gonostylus, dorsal (left half) and ventral (right half) views; 2, gonostylus, stylomeres and aedeagus, dorsal view. Scale=0.1 mm.

minutely serrated inner membranous lobe; aedeagal plate well-sclerotized at base, aedeagus slender, 110 μm long.

Body length 2.7–2.8 (holotype) mm, wing length 2.3–2.5 (holotype) mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species is easily distinguishable by the yellow posterior margin of the sixth abdominal tergite and the peculiar structure of gonostylus from *E. aterrima* (Zetterstedt, 1852) and *E. ornatipennis* (Okada, 1939), and also by the presence of central spot on the wing from the former species and by the entirely black mesoscutum from the latter.

Etymology. The specific name refers to the yellow end (Latin, *flavus*+*terminatus*) of black body.

3. *Mycetophila dentata* Lundström

Mycetophila dentata Lundström, 1913: 319.

Imperial Palace: 1♂, 14 Feb. 2001 (Shinonaga); 1♂ 1♀, 15 Mar. 2001 (Shinonaga); 4♀, 8 Nov. 2004 (Shinonaga).

Mesoscutum shiny, dark brown in male and black in female, with yellow humeral area and three yellow spots before scutellum, but in females sometimes central one of prescutellar spots indistinct or quite absent. Wing 2.7–3.1 mm long, with brown central spot and pale brown preapical band, the latter starting at C beyond tip of R_1 and extending posteriorly to M_1 or beyond M_2 ; CuA_1 and CuA_2 slightly converging apically.

The gonostylus is distinctive as follows: ventral stylomere with stout spine near dorsal base distinctly stronger than others, four spines arranged in row along posterior ventral margin, and two or three long seta-like spines along ventral margin just above base of long ventro-basal seta. Female hind coxa narrowly brown-tinged at base.

Distribution. Japan (new record); Holarctic.

4. *Mycetophila edwardsi* Lundström

Mycetophila edwardsi Lundström, 1913: 316 (new name for *M. nebulosa* Edwards, 1913).

Imperial Palace: 2♂, 8 Nov. 2004 (Shinonaga).

This small, black species is characteristic in the following points: fourth antennal flagellomere about twice as long as wide; maxillary palp yellowish brown; mesoscutum dark brown in ground color, with three blackish median stripes which are narrowly separated by whitish pollinosity on posterior half, humeral area narrowly yellowish, pleura black; postpronotum with 3–5 setae; ppl 3; wing 3.2–3.4 mm long, with brown central spot, and pale brown preapical marking starting at C, filling about distal 3/5 of cell R_1 and cell R_5 , extending weakly to M_2 or CuA_1 , hyaline spot (about 1/3 width of marking) at middle of preapical marking just caudad of R_5 , apical and caudal margins of wing faintly fuscous; legs yellow but hind femur with blackish brown stripe on dorsal side, pale brown stripe on ventral base and blackish apex; cercus as long as gonocoxite; ventral stylomere of gonostylus with two dorsal lobes, of which proximal one with seven setae and distal one with eight short spine-like setae on tip, and ventral lobe with three long seta-like spines along inner margin and three short ones on tip.

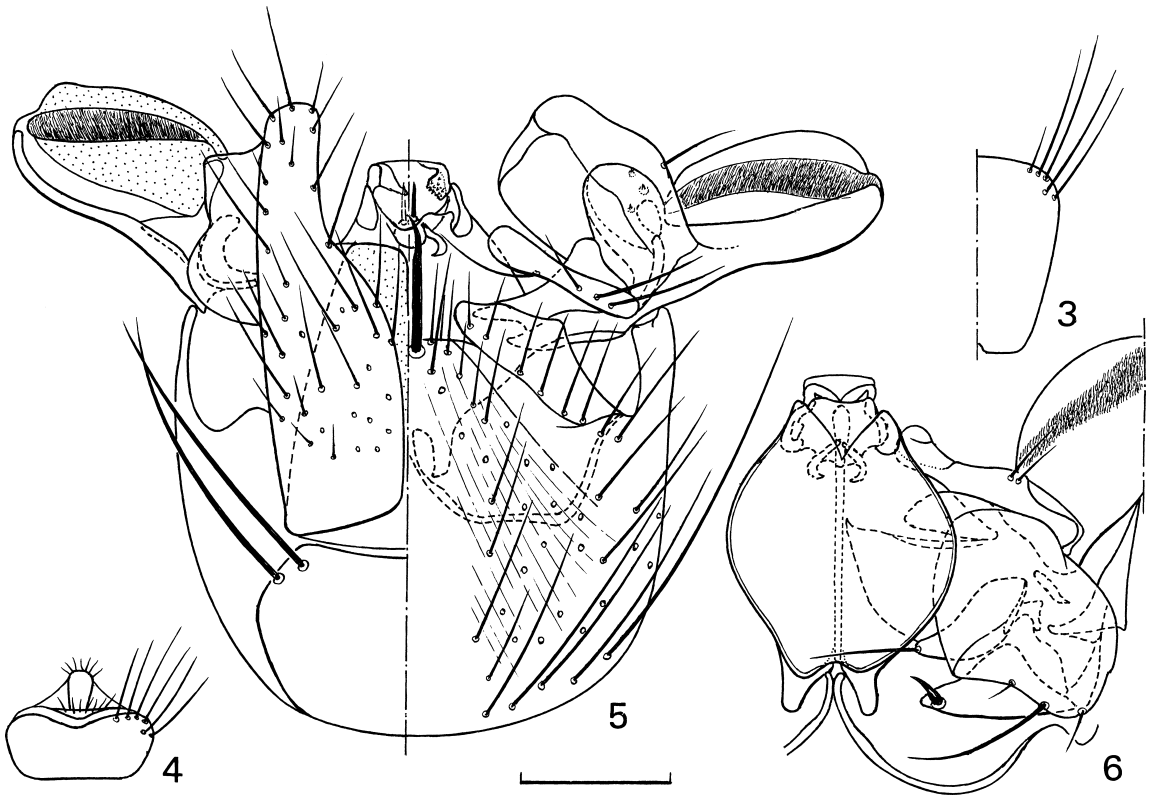
Distribution. Japan (new record); Europe, Russia.

5. *Mycetophila fruticosa* Sasakawa, n. sp.

(Figs. 3–6)

Holotype: Male (NSMT-I-DIP-5966), Imperial Palace, Tokyo, 14 Feb. 2001, coll. S. Shinonaga.

Male. Head brownish black; face and clypeus yellowish brown, maxillary palp yellow; antenna dark brown but scape pale brown, pedicel and base of first flagellomere brownish yellow. Mesoscutum mat, brown, with three dark stripes almost connected with each another posteriorly, humeral area yellow, extending mesally in a form of triangle (about 1/3 as wide as width of anterior scutum in dorsal view); pleura entirely blackish brown; scutellum brownish yellow, with brown transverse band basally. Abdomen black, terminalia pale brown. Wing hyaline, with brown central spot and preapical band, the for-



Figs. 3–6. Male 8th tergite and sternite, genitalia of *Mycetophila fruticosa* n. sp. (holotype). 3, 8th tergite; 4, 8th sternite; 5, gonocoxite and gonostylus, dorsal and ventral views; 6, stylomeres and aedeagus, dorsal view. Scale=0.1 mm.

mer at bases of cells R_1 , R_5 and M_1 , extending over R_s and M petioles, the latter starting at C slightly before apex of R_1 , filling apex of cell R_1 , extending narrowly around apex of R_5 and reaching just beyond CuA_1 but distinctly narrowing at middle of cells M_1 and M_2 ; apical margin narrowly fuscous; halter yellow. Legs yellowish, hind coxa brown at base, all femora with brownish striations on dorsal and ventral sides, dorsal striations on mid and hind femora darker, hind femur dark brown on distal 2/5, distal two or three tarsomeres of all legs slightly brown-tinged.

Frons and vertex covered with whitish setulae; or and af black. Antenna 1.5 mm long, distinctly longer than head and thorax together; pedicel with strong dorso-apical seta; fourth flagellomere about 1.5 times as long as wide. Mesoscutum with pa and prsc longer than others; scutellum with

four sc; postpronotum and propleuron each with three setae; anepisternum with three strong setae; anepimeron with two or three setae.

Wing: Sc short, ending free; r-m slightly shorter than M petiole; R with 11 setulae below, M before r-m with 3–4 setulae below; R_5 parallel with M_1 apically; base of CuA -fork distinctly before that of M ; CuA_1 and M_1 parallel apically. Legs: Mid tibia with 5d (basal two short), 3a, 3–4v; hind tibia with 4d, 8–9a; basitarsus of fore leg slightly shorter than tibia; basitarsus of mid leg with a row of ventral setulae, and of hind leg with two rows of setulae.

T8 broad; S8 with short median process on posterior margin; cercus narrowed apically. Gonocoxites excavated on postero-lateral parts before end, with two long spine-like setae at middle of ventral margin; gonostylus broadly lobate

on both dorsal and ventral sides, of which dorsal lobe with densely setulose band on inner side but without apical spines, and ventral lobe with several setae; mesal stylomere with one or two spines on tip of proximal process; aedeagal plate ovoid, with a pair of median spines and spinulose areas laterally before ventral apex; aedeagus 152 μm long.

Body length 3 mm, wing length 3.3 mm.

Female. Unknown.

Remarks. This species is somewhat similar to *M. edwardsi* Lundström in the body coloration and wing pattern, but is easily recognizable by its bicolored scutellum and absence of the hyaline spot in the preapical marking on cell R_5 . Also, this species resembles European *M. gibbula* (Edwards, 1925) in having the large, yellow humeral area. However, the gonostylus of this species are distinctive, differing from the known species of the *vittipes*-group with a row of apical spines on the gonostylus.

Etymology. The specific name refers to the bushy (Latin, *fruticosus*) gonostylus.

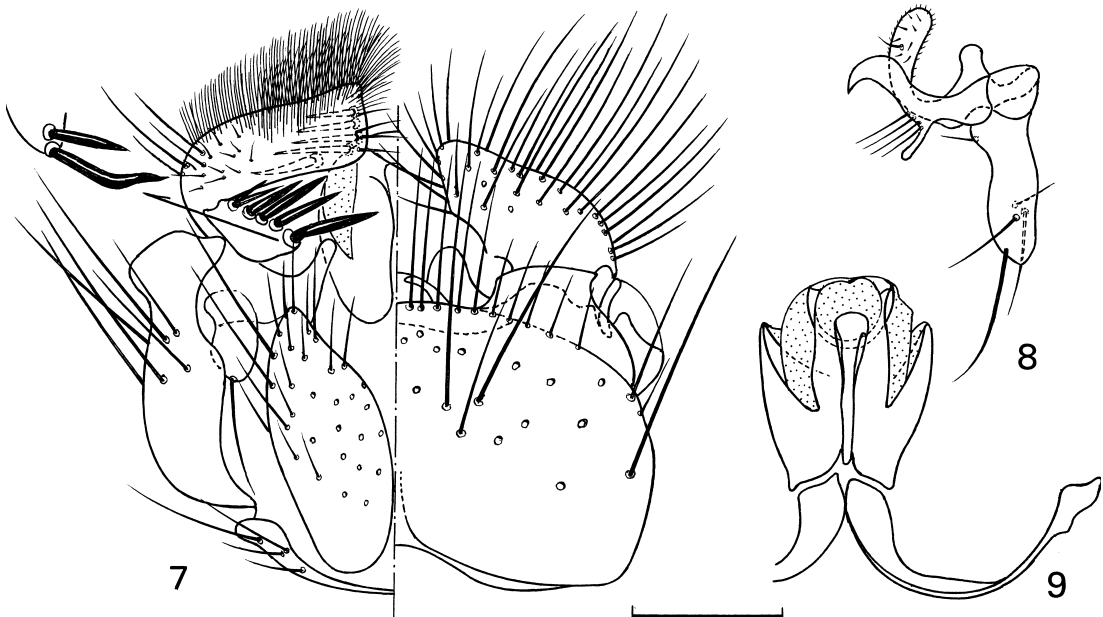
6. *Mycetophila imperialis* Sasakawa, n. sp.

(Figs. 7–9)

Holotype: Male (NSMT-I-DIP-5967), Imperial Palace, Tokyo, 18 Oct. 2004, coll. S. Shinonaga.

Male. Black but face and clypeus pale brown, antenna brown except for yellow scape, pedicel, and base of first flagellomere; maxillary palp yellow. Mesoscutum black, shining, with yellow humeral area and three brownish yellow spots (central and post-alar area) before scutellum; scutellum black, with brownish yellow central spot on posterior 3/4, sc growing on yellow spot; propleuron and katapisternum pale brown. Abdominal tergites entirely black, sternites pale brown, terminalia brownish yellow. Wing faintly tinged with brown, with brown central and pale brown preapical spots, the former in bases of cells R_1 and R_5 , extending over R_s and into upper half of M_1 , the latter starting C at middle between apices of R_1 and R_5 , extending obliquely basad in cell R_5 and ending midway between R_5 and M_1 ; halter yellow. Legs yellow, hind femur brown on apical quarter, distal tarsomeres slightly brown-tinged.

Head with or slightly longer than af ; clypeus almost quadrate, about 3/4 as wide as eye; antenna 1.7 mm long, distinctly longer than head and



Figs. 7–9. Male genitalia of *Mycetophila imperialis* n. sp. (holotype). 7, gonocoxite and gonostylus, dorsal and ventral views; 8, mesal stylomere; 9, aedeagus, dorsal view. Scale=0.1 mm.

thorax together, fourth flagellomere 2.5 times as long as wide. Mesoscutum with posteriormost dc longer than others; scutellum with two apical sc and two short marginals; postpronotum with three setae (detectable by pits only); ppl two.

Wing: Sc ending free, r-m twice as long as M petiole, R with 9–11 setulae below, M before r-m bare, forking point of CuA almost at same level of forking point of M, forks of CuA slightly converging apically. Legs: Fore basitarsus shorter than tibia, fore tibia with 2 pd, mid tibia with 0–1d, 5–6pd, 3a, 3v, hind tibia with 6pd, 6a, basitarsus of mid leg with one row and that of hind leg with two rows of distinct setulae ventrally, hind coxa with two or three posterior pale hairs at middle.

Gonocoxites almost straight on posterior ventral margin; cercus broad; dorsal lobe of ventral stylomere with five or six black long spines, ventral lobe densely covered with slender setae on dorso-lateral side and long setae on ventro-lateral side, and four or five inwardly directed black spines near inner apex; mesal stylomere composed of three processes, of which distal one clavate and setulose, median one with finger-like process and four setae at middle, basal one lobate and with long and short setae; aedeagal plate W-shaped, with ring on apex of median sclerite; aedeagus 100 μm long.

Body length 3.2 mm, wing length 3 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species resembles European *M. lunata* Meigen, 1804, and *M. dziedickii* Chandler, 1977, in having the spinose gonostylus, but the preapical marking on the wing is much smaller in this species than in the related species. There are a greater difference in the structure of gonostylus: in this species the ventral stylomere is covered densely with both very long and short slender setae, and the apical long spine on the dorsal lobe is not straight (cf. Chandler, 1977, figs. 63–69).

Etymology. The specific name refers to the type locality.

7. *Mycetophila perpauca* Laštovka

Mycetophila perpauca Laštovka, 1972: 288; Sasakawa, 2002: 30.

Imperial Palace: 2♂ 5♀, 15 Mar. & 14 Nov. 2001 (Shinonaga); 7♂9♀, 10 Mar. & 8 Nov. 2004 (Shinonaga).

Distribution. Japan (Hokkaido, Honshu); Europe.

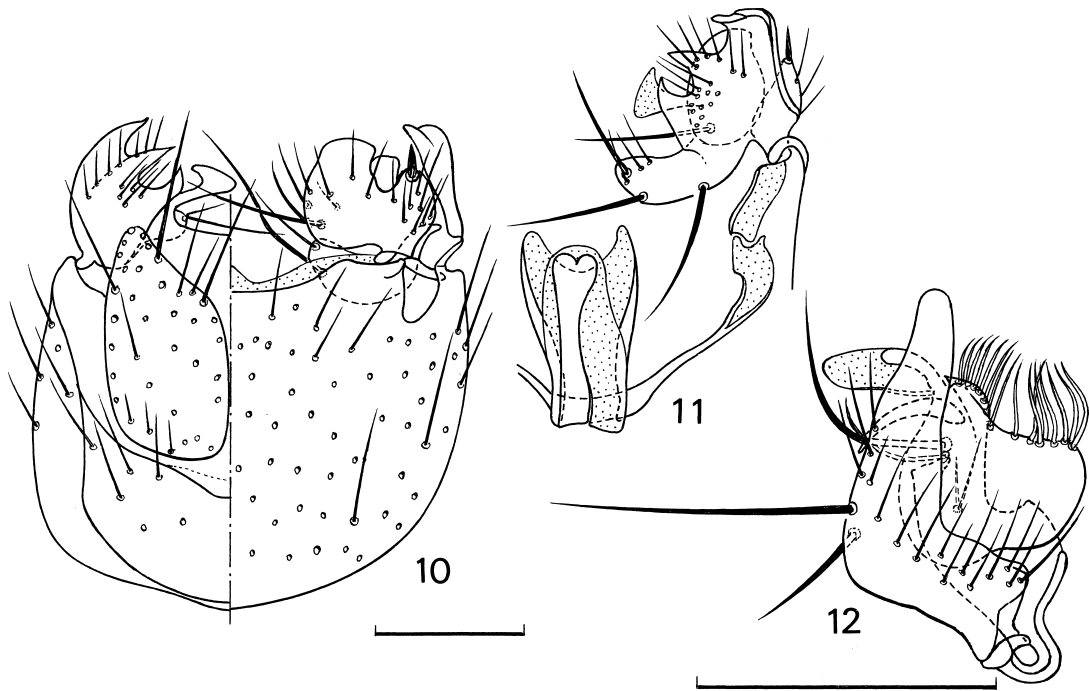
8. *Mycetophila trifurcata* Sasakawa, n. sp.

(Figs. 10–11)

Holotype: Male (NSMT-I-DIP-5968), Imperial Palace, Tokyo, 8 Nov. 2004, coll. S. Shinonaga.

Male. Frons and vertex brownish yellow, face and clypeus yellow; antenna brown but scape, pedicel, and basal two or three flagellomeres yellow; maxillary palp yellow. Mesoscutum shiny brownish yellow, paler from humeral area to lateral margin, with three blackish stripes but median one pale brown on anterior 2/3, lateral stripes adjoining to dark brown lateral markings on scutellum, basal sc growing at edge of marking; postpronotum and propleuron yellow, anepisternum and katapisternum yellowish brown, anepimeron, pleurotergite, and mediotergite brown, metakatepisternum yellow. Abdomen shiny yellow, T1–4 each with brownish black, quadrate markings on lateral sides, T5 entirely black, T6 black on basal half; sternites and terminalia yellow. Wing very faintly tinged with yellow, with pale brown central spot small, extending from both sides of Rs to middle of cell M₁ but not reaching mesally to end of r-m and M petiole; preapical spot very faint, starting before tip of R₅, obscurely extending anteriorly to tip of cell R₁, and extending obliquely midway between R₅ and M₁; halter yellow. Legs yellow, hind femur brown on apical 1/6, mid femur narrowly brownish on tip, all tarsi slightly brown-tinged.

Frons with long af and or; antenna 1.5 mm long, distinctly longer than head and thorax together, scape with two dorso-apical setae, pedicel with one seta and two or three setulae dorso-apically, fourth flagellomere 1.4–1.6 times as long as wide, each flagellomere covered with yellow-



Figs. 10–12. Male genitalia of *Mycetophila trifurcata* n. sp. (holotype, 10–11) and stylomeres of *Mycetophila unicolor* Stannius (12, ventral view). Scale=0.1 mm. See Figs. 1–2.

ish hairs. Mesoscutum with a pair of dc before scutellum distinctly longer than prsc; postpronotum with five setae, ppl four; anepisternum with five mspl; anepimeron with two setae; scutellum with long basal and apical sc.

Wing: Sc ending free, r-m about 1.5 times as long as M petiole, R with 10 or 11 setulae below, M before r-m below bare, M_2 diverging from CuA_1 apically, forking point of CuA slightly before that of *M*. Legs: Fore basitarsus about $2/3$ length of tibia; fore tibia with 1a, 2 pd, mid tibia with 1ad, 5–6d, 2–3p, 3a and 3v, hind tibia with 5d, 1ad, 6a and 5–6 short p.

Gonocoxites with postero-ventral margin almost straight; gonostylus with ventral stylomere bilobed posteriorly, with a spine on tip of lateral lobe and long seta at inner base, dorsal stylomere trifurcate distally and densely setose, mesal stylomere with three long setae; aedeagal plate largely membranous, only weakly sclerotized on lateral sides; aedeagus 120 μ m long.

Body length 3 mm, wing length 3.2 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species belongs to the *signata*-group with the black stripes on yellow mesoscutum and the presence of a stout spine on the ventral stylomere. It differs from *M. signata* Meigen, 1830, in the coloration of the thoracic pleura and the fifth abdominal tergite, and the structure of the dorsal stylomere. The trifurcate dorsal stylomere of this species shows the similarity to that of *M. tridentata* Lundström, 1911, which belongs to the different species-group, but the anterior abdominal tergites of this species are provided with the blackish markings laterad of the central yellow area, while in *tridentata* entirely yellow.

Etymology The specific name refers to the 'trifurcate' dorsal stylomere.

9. *Mycetophila unicolor* Stannius

See Sasakawa (2005: 289); newly recorded from the Imperial Palace.

Imperial Palace: 1 ♂, 15 Mar. 2001 (Shinona-

ga); 3♂, 8 Nov. 2004 (Shinonaga).

This black species with the central wing spot has the peculiar gonostylus (Fig. 12), that is, the dorsal stylomere is provided with two apical processes, and one long, curved seta and two short setae, the ventral stylomere is L-shaped, bearing one long and one short setae at the corner and many setae in an irregular row, the mesal stylomere is lobate and arranged with 16 or 17 weakly sinuate marginal setae.

Distribution. Japan; Europe.

10. *Mycetophila vittipes* Zetterstedt

Mycetophila vittipes Zetterstedt, 1852: 4191.

Imperial Palace: 2♂1♀, 8 Nov. 2004 (Shinonaga).

This small, black species differs from *M. edwardsi* in the following points: wing length 2.9 (♂)–3.2 (♀) mm; preapical wing marking small, not touching tip of R₁ and ending before M₁; maxillary palp yellow; humeral area distinctly yellow; gonostylus with one strong, sinuous spine dorsally and 3–5 straight spines ventrally (cf. Landrock, 1927: pl.13, fig. 50; Laštovka, 1963: figs. 5–6).

Distribution. Japan (new record); Europe, Russia.

11. *Allodia (Allodia) angulata* (Lundström)

Imperial Palace: 1♂1♀, 8 Nov. 2004 (Shinonaga).

Brachycampta angulata Lundström, 1913: 308.

Allodia angulata: Landrock, 1927: 119.

This black species is characteristic in having the yellow antennal scape and pedicel, maxillary palp, triangular markings on T2–4 and legs, and the pruinose lateral side of mesoscutum. Wing is 3 mm long, short Sc terminating in R, and forking point of CuA situated slightly before base of M petiole. The brownish yellow gonostylus is blackened apically and protruded on the dorsal and ventral apices (dorsal protrusion more distinct than the ventral).

Distribution. Japan (new record); Europe.

12. *Allodia (Brachycampta) quadrata* Sasakawa

Allodia (Brachycampta) quadrata Sasakawa, 2003: 102.

Imperial Palace: 5♂, 8 Nov. 2004 (Shinonaga).

Distribution. Japan.

13. *Anatella intricata* Sasakawa, n. sp.

(Figs. 13–15)

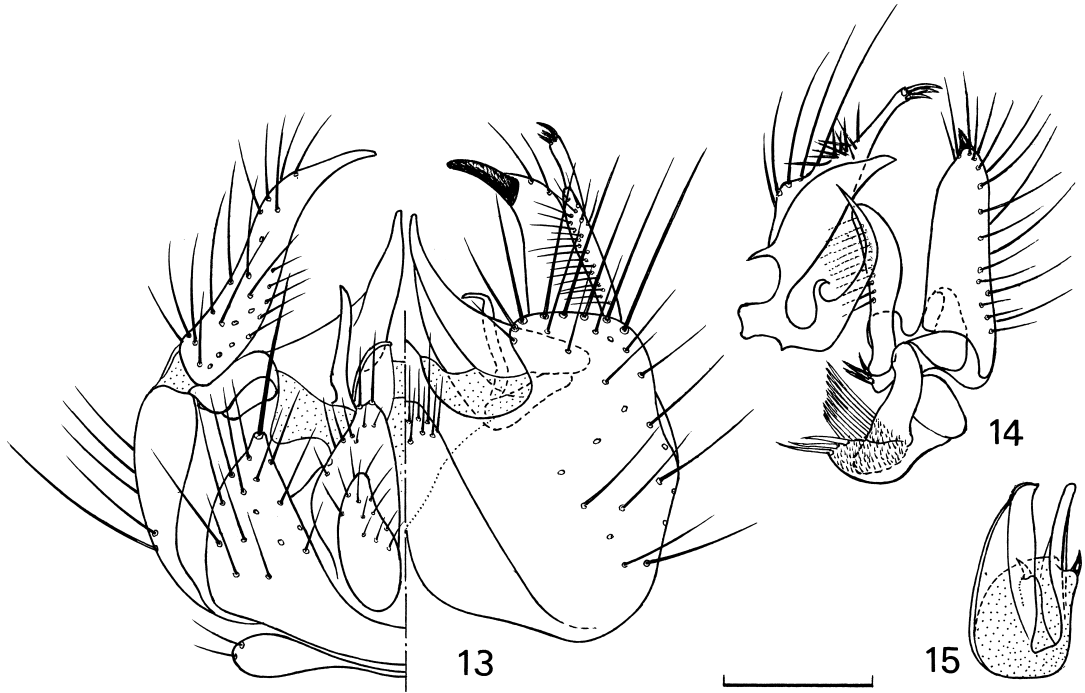
Holotype: Male (NSMT-I-DIP-5969), Imperial Palace, Tokyo, 8 Nov. 2004, coll. S. Shinonaga.

Male. Head brownish black but face and clypeus yellowish brown; antenna brown but scape and pedicel yellow, each with brownish spot on dorsal side; maxillary palp yellow but second palpomere slightly brown-tinged. Thorax brown, pleura paler; mesoscutum mat, humeral margin of scutum and dorsal margin of postpronotum narrowly yellow. Abdomen brownish black, T1–4 with yellow triangles antero-laterally, narrowing posteriorly and not reaching posterior margin of each tergite; sternites pale brown; terminalia brownish yellow. Wing very faintly fuscous, posterior veins pale yellowish brown; halter yellow. Legs yellow, apices of all tibiae and tarsi slightly brown-tinged.

Head with long vt; face and clypeus each about 1/3 as wide as eye; antenna 1.1 mm long, longer than head and thorax together, pedicel with long dorso-apical seta, basal flagellomeres each as long as or slightly longer than wide. Mesoscutum with dc indistinct excepting posteriormost one; postpronotum with one long seta, ppl two (detectable by pits).

Wing: Sc short, ending at base of R, r-m 4/5 length of M petiole, R₅ straight, forking point of CuA just below that of M. Legs: Hind coxa with a seta at base; mid femur with posterior ventral fringe short, less than half as long as femoral width; anterior and dorsal setae on hind tibia longer than those on others; fore basitarsus almost as long as tibia.

T9 with strong seta on each postero-lateral tip; cercus small; S8 oval. Gonocoxites with excavations posteriorly on ventral side, bearing strong setae along each postero-lateral margin and a tuft



Figs. 13–15. Male genitalia of *Anatella intricata* n. sp. (holotype). 13, gonocoxite and gonostylus; 14, gonostylus and stylomeres; 15, aedeagus, dorso-lateral view. Scale=0.1 mm.

of short setae at middle; gonostylus with dorsal stylomere apically curved inward, pointed and blackened; ventral stylomere divided into three processes, of which outer one with long setae dorsally but slender hairs ventrally, spine-like setae in a group at middle and three short spines on tip; mesal stylomere with distal process which is hairy on inner side and three short spine-like setae at base, and two lobes, of which proximal one densely setose and with three spine-like setae on tip; aedeagal plate membraneous basally, bearing a pair of spines; aedeagus 110 μm long.

Body length 2.4 mm, wing length 2.3 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species has the bicolored abdomen as in European *Anatella flavomaculata* Edwards, 1925, *A. dampfi* Landrock, 1924, and *A. schmitzi* Landrock, 1925, but in this new species the mesoscutum is paler, the forking point of CuA is situated on the same line with that of M, and the outer mid-tibial spur is about

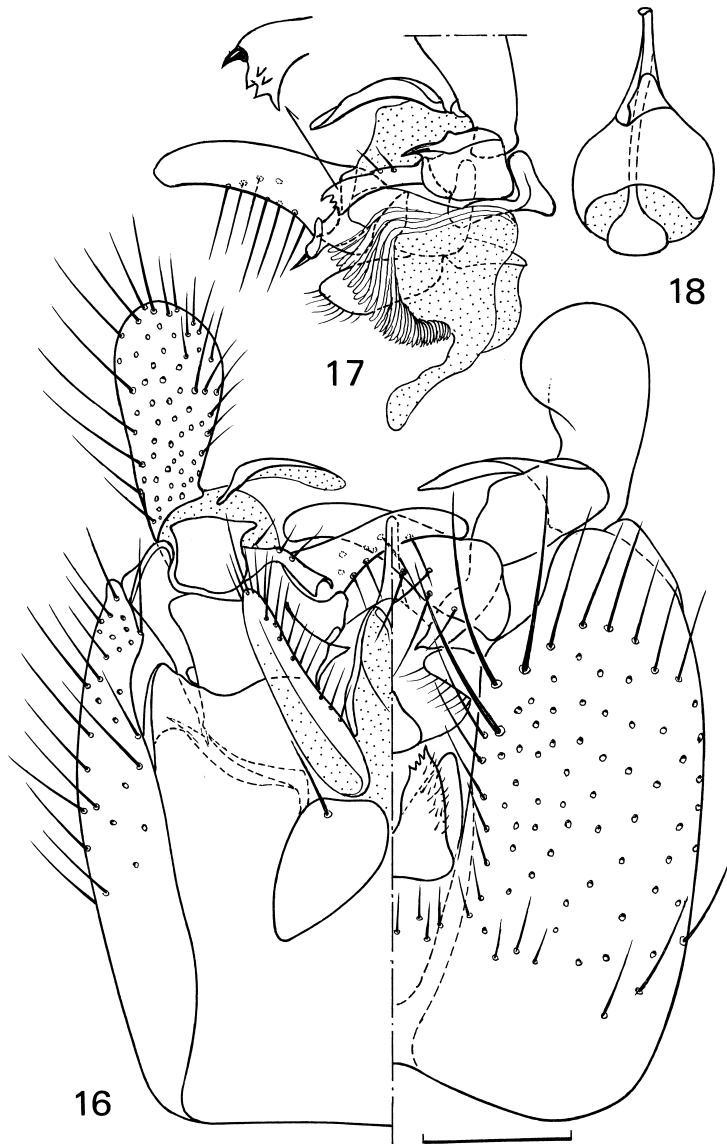
2/3 as long as the inner, the dorsal stylomere of gonostylus is elongated and pointed on tip, and the ventral stylomere is composed of three different processes in shape. The gonocoxites with five strong ventro-distal bristles and deep excavations laterad of the ventro-median process are similar to those of *A. dampfi*, but the gonostylus and aedeagus differ distinctly from those of *A. dampfi* (cf. Chandler, 1977: fig. 16).

Etymology. The specific name refers to the complicated (Latin, *intricatus*) gonostylus.

14. *Anatella* sp.

Imperial Palace: 4 ♀, 8 Nov. 2004 (Shinonaga).

This black species is related to European *A. nigriclava* Strobl, 1895, in the coloration of body and halter, but an accurate identification seems undesirable until the male specimens become available.



Figs. 16–18. Male genitalia of *Brevicornu digitata* n. sp. (holotype). 16, gonocoxite and gonostylus; 17, gonostylus and stylomeres; 18, aedeagus. Scale=0.1 mm.

15. *Brevicornu (Brevicornu) digitata* Sasakawa, n. sp.

(Figs. 16–18)

Holotype: Male (NSMT-I-DIP-5970), Imperial Palace, Tokyo, 15 Mar. 2001, coll. S. Shinonaga.

Male. Head with frons and vertex black, silvery pollinose; face brown, clypeus yellow distally; antenna brown but scape, pedicel, and base

of first flagellomere yellow; maxillary palp yellow. Mesoscutum mat, pale brown, darkened postero-mesally, yellowish antero-laterally, and densely whitish-dusted on lateral sides; scutellum dark brown; pleura brown except for yellowish postpronotum and propleuron. T1–4 dorsally pale brown but lateral 1/6 of T1–2, 1/4 of T3 and 1/3 of T4 of whole width and posterior margins yellow, T5 dark brown and T6 black except for

yellow posterior margins; S1–4 yellow, S5–6 pale brown; terminalia yellowish brown. Wing hyaline, faintly yellow-tinged anteriorly, anterior veins (C and R) yellowish brown, posterior veins (M and CuA) yellow, A colorless; halter yellow. Legs yellow, hind coxa with brown postero-basal spot, all femora each with brown spot or short stripe on ventro-basal side, hind femur brown on apical quarter, all tarsi brown-tinged.

Frons covered with white setulae, but or black and long; eye sparsely hairy; antenna 1.5 mm long, longer than head and thorax together, pedicel with long dorso-apical seta, fourth flagellomere about twice as long as wide; palpomeres 2–4 ratios as 4 : 5 : 10, second palpomere twice as wide as third. Mesoscutum with only two pairs of pale dc before scutellum, pa and sa black, extremely long; ppl long three and short one; pleurotergite with several long setae centrally; metakatepisternum with seta; scutellum with two apical sc.

Wing: Sc very short, ending in R, r-m only a little longer than M petiole, forking point of CuA slightly before middle of M petiole. Legs: Mid coxa with one postero-apical seta, hind coxa with one postero-basal and one postero-apical setae; mid tibia with 3d, 5–6pd and 9a, hind tibia with 5d, 5pd and 10a.

T9 separated into two sclerites, with one or two setae at posterior corner. Gonocoxites separated on ventral side, with ventral median sclerite deeply incised posteriorly and spinulose on tip; gonostylus with dorsal stylomere broadened apically, densely setose; ventral stylomere digital, curving mesally and with slender setae; mesal stylomere composed of five processes and one striated membranous lobe, median process spinulose apically and with few setulae; aedeagus 80 μ m long, slightly bent downwards on tip.

Body length 3 mm, wing length 2.7 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species belongs to the *griseicolle*-group in having two long sc, four ppl and the lobate median sclerite just caudad of postero-ventral margin of gonocoxites. In Zaitzev's key

(1988) this species runs to *B. chinense* Zaitzev in the length of the subulate process of mesal stylomere, but it differs well from which in the shape of the median sclerite situated beyond postero-ventral margin of the gonocoxites and the other structures of the mesal stylomere. Also, this species is similar to the species of the *ruficornis*-group in the shapes of fourth antennal flagellomere (longer than wide) and gonostylus (especially broad dorsal stylomere), differing from them in number of sc and shape of ventro-median sclerite on the gonocoxites.

Etymology. The specific name refers to the ventral stylomere of gonostylus curved inward as a finger (Latin, *digitus*).

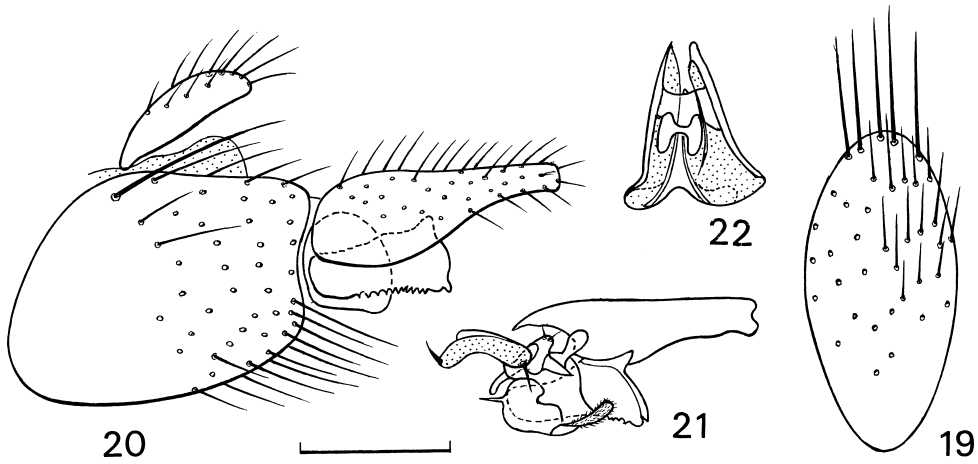
16. *Cordyla triloba* Sasakawa, n. sp.

(Figs. 19–22)

Holotype: Male (NSMT-I-DIP-5971), Imperial Palace, Tokyo, 8 Nov. 2004, coll. S. Shinonaga.

Male. Head brown; antenna pale brown but scape yellow and pedicel brownish yellow; maxillary palp entirely yellow. Thorax yellowish brown; mesoscutum mat, grayish dusted, with pale brown median patch on posterior 1/3; pleurotergite and mediotergite pale brown; scutellum brown excepting lateral margin yellow. T1–4 dark brown, T5–6 black, all T with yellow posterior margins, T1–2 yellow on lateral 1/6 of whole tergal width, T3–4 each with yellow large triangle (dark area on dorsal side also triangular); S1–4 yellowish brown, S5–6 brown; terminalia and cercus yellow. Wing hyaline, veins pale yellowish brown; halter yellow, brown-tinged apically. Legs yellow, hind femur brown on apical quarter, all tarsi slightly brown-tinged.

Antenna 2+10-segmented, scape 1.4 times as long as pedicel, flagellomeres about 0.5 mm long, second to fourth flagellomeres each about twice as wide as long, 10th flagellomere 2.3 times as long as wide. Maxillary palp with second to fourth palpomere ratios as 8:7.5:10. Mesoscutum with posteriormost dc and pa longer than lateral setae; anepisternum with five setae along posterior margin; postpronotum and



Figs. 19–22. Male 8th sternite (19) and genitalia of *Cordyla triloba* n. sp. (holotype, 20–22). 19, 8th sternite; 20, gonocoxite, gonostylus and stylomere, lateral view; 21, stylomeres; 22, aedeagus. Scale=0.1 mm.

proepisternum covered with short setae, of which ventral three ppl more or less long; pleurotergite with many long setae centrally.

Wing: C ending at tip of R_5 , r-m only a little longer than R_s and nearly 1/4 length of M petiole, M_2 ending before wing margin (the distance about 1/7 of its whole length), forking point of CuA beyond that of M. Legs: Hind tibia with 11–12a, 4–5 pd; mid and hind tibiae each with comb of 3–4 setulae on inner apex; fore basitarsus almost as long as tibia.

S8 oval, with six long marginal setae. Gonocoxite of normal shape, cercus about 1/2 length of gonocoxite; gonostylus with dorsal stylomere rather long, narrowing apically; ventral stylomere broadened apically, with serration of minute teeth on ventral side; mesal stylomere divided into three projections, distal one projected on both apico-lateral ends, median one small and distinctly projected mesally, and basal one largely membranous with a spine-like seta on basal apex.

Body length 2.7 mm, wing length 2.3 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species resembles Norwegian *C. bomloensis* Kjaerandsen and Kurina, 2004, in having ten antennal flagellomeres and the comb-like setulae on inner apices of the mid and hind tibiae, but differs distinctly from which in the

coloration of maxillary palp, thorax and abdomen, the wing venation and the structure of mesal stylomere.

Etymology. The specific name refers to three projections (Latin, *tres+lobus*) of the mesal stylomere.

17. *Cordyla crassicornis* Meigen

Cordyla crassicornis Meigen, 1818: 275.

Imperial Palace: 1 ♀, 15 Mar. 2001 (Shinonaga).

This species is easily recognizable by the entirely black body, brownish black second palpomere, and brownish femora (dorsally brown but yellowish brown on ventral side) with darker apices, and vein M_2 quite reaching to the wing margin.

Distribution. Japan (new record); Europe.

18. *Exechia arisaemae* Sasakawa

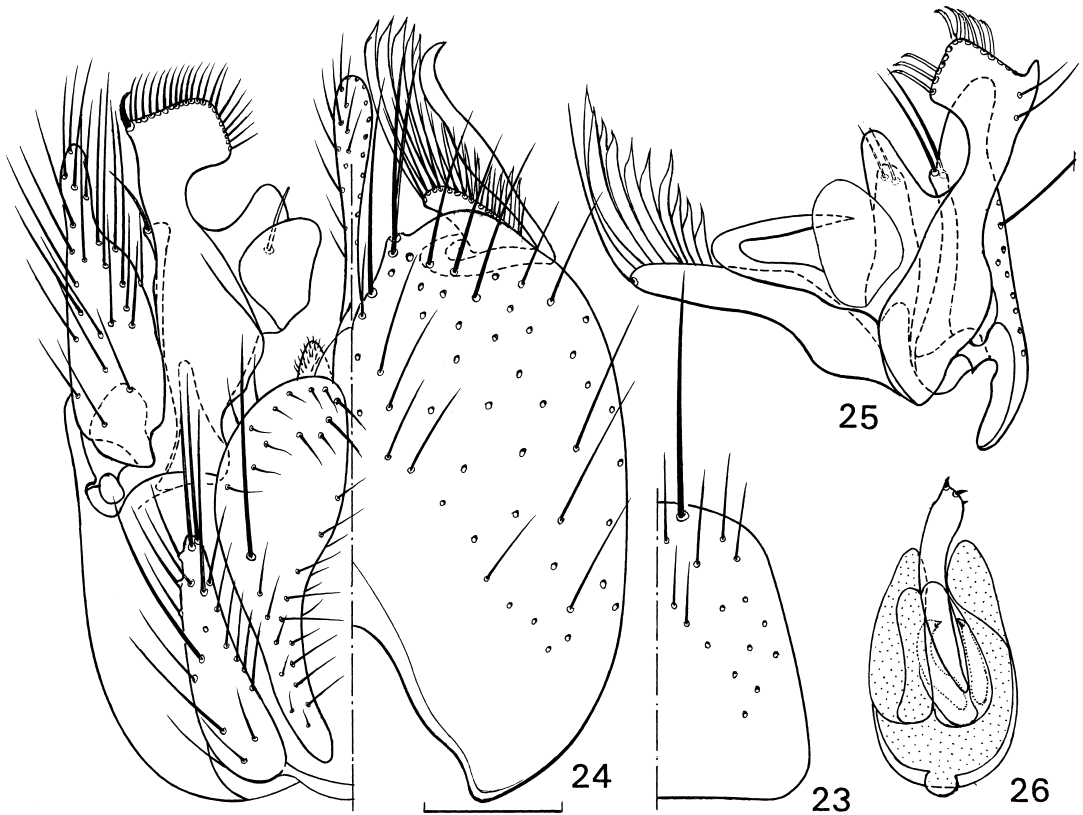
Exechia arisaemae Sasakawa, 1993: 784.

Imperial Palace: 2 ♀, 8 Nov. and 7 Dec. 2000 (Shinonaga); 1 ♂ 1 ♀, 14 Nov. 2001 (Shinonaga); 9 ♂ 20 ♀, 8 Nov. 2004 (Shinonaga).

Distribution. Japan.

19. *Exechia latisetata* Sasakawa, n. sp.

(Figs. 23–26)



Figs. 23–26. Male 8th sternite (23) and genitalia (24–26) of *Exechia latiseta* n. sp. (paratype). Scale=0.1 mm.

Holotype: Male (NSMT-I-DIP-5972), Imperial Palace, Tokyo, 18 Oct. 2004, coll. S. Shinonaga. Paratypes: 1 ♀, same data as holotype; 1 ♂, Imperial Palace, 14 Nov. 2001, coll. Shinonaga.

Male. Head with frons and vertex black, face, clypeus, and maxillary palp yellow; antenna with scape, pedicel, and first and second flagellomeres yellow, third yellowish basally, other flagellomeres yellowish brown to pale brown. Mesoscutum mat, yellowish brown but yellow on lateral sides, with three brown stripes, whitish-gray dusted; postpronotum and propleuron yellow; pleura and mediotergite brown, the latter silvery pruinose antero-laterally; scutellum dark brown but yellow marginally. Abdominal tergites dark brown, darkened posteriorly, T1–3 with yellow posterior margins, T2–3 with yellow large triangles antero-laterally, T4 entirely brownish black, T5–6 black; S1–3 yellow, S4–6 yellowish brown. Wing faintly brownish-tinged, veins yellowish brown; halter yellow. Legs yellow, fore and mid femora narrowly and hind femur distinctly (basal 2/5 of whole length) brown in ventral base, all tarsi pale brown.

Frons with or rather long; face 1/4 as wide as eye, narrower than clypeus; clypeus almost as wide as basal antennal flagellomere; antenna 1.3–1.4 mm long, slightly longer than head and thorax together, pedicel with long dorso-apical seta, fourth flagellomere as long as wide; palpomere ratios as 2.5:3:4:7. Mesoscutum with two rows of distinct dc, pa extremely long and almost as long as apical sc; scutellum with a pair of setae just before bases of apical sc; postpronotum with 2 (–3) setae, ppl two; pleurotergite with slender setae centrally; metakatepisternum with two short setae posteriorly.

Wing: Sc short and ending free, R_5 curved on apical half, r-m thrice as long as M petiole, M_1 sinuate, M fork diverging apically. Legs: Hind

lowish brown; halter yellow. Legs yellow, fore and mid femora narrowly and hind femur distinctly (basal 2/5 of whole length) brown in ventral base, all tarsi pale brown.

coxa with one postero-basal and two postero-apical setae, hind tibia with 5–6d, 10a and 5p, fore basitarsus slightly longer than tibia (4.5 : 5).

T9 extremely projected on both lateral ends, bearing several long setae; cercus broadened distally, with long seta at middle; S8 with two distal bristles. Gonocoxites narrowly separated on ventral side and with long clavate sclerite between coxites; gonostylus with dorsal stylomere narrowed distally and with long setae, ventral stylomere with 13 or 14 flattened setae; mesal stylomere composed of four processes, of which lateral one with dense setae along apical margin, median two each with two setae, and inner one doubled up; aedeagal plate largely membranous, with a pair of spinules on ventral processes; aedeagus 150 μm long, with few spinules on tip.

Body length 3.8 (holotype)–4.1 mm, wing length 3.2 (holotype)–3.6 mm.

Female. Distinctly paler than male, head and thorax yellowish brown, mesoscutum with stripes indistinct, abdominal tergites brown but broadly yellow on lateral sides; ovipositor yellowish brown.

Distribution. Japan.

Remarks. This species is immediately recognizable by the trivittate mesoscutum, and the presence of long and narrow median sclerite between the gonocoxites on ventral side, and the flattened setae on the ventral stylomere. The coloration of body and the wing venation are similar to those of European *E. bicincta* (Staeger, 1840), but their gonostyli are quite different from each other.

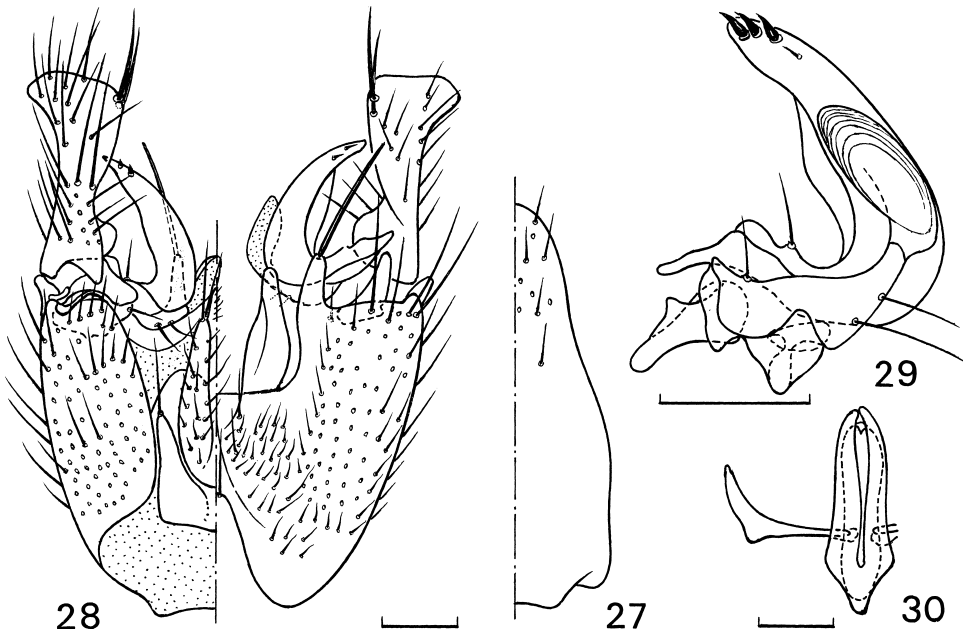
Etymology. The specific name refers to the broad setae (Latin, *latus*+*seta*) on the ventral stylomere.

20. *Exechia quadriloba* Sasakawa, n. sp.

(Figs. 27–30)

Holotype: Male (NSMT-I-DIP-5973), Imperial Palace, Tokyo, 8 Nov. 2004, coll. S. Shinonaga.

Male. Head with frons and vertex yellowish brown, face, clypeus, and maxillary palp yellow; antenna brownish yellow but scape, pedicel, and basal two or three flagellomeres yellow. Mesoscutum yellowish brown, darkened postero-mesally, with anterior and lateral margins yellow; scutellum, laterotergite, and mediotergite pale brown, postpronotum and propleuron yellow, anepister-



Figs. 27–30. Male 8th sternite (27) and genitalia (28–30) of *Exechia quadriloba* n. sp. (holotype). Scale=0.1 mm.

num and katepisternum yellowish brown, anepimeron brownish yellow. T1 brown, T2–4 each with brown quadrate marking excepting yellow lateral 1/4 of whole width of T2, 1/3 of T3 and 2/5 of T4, T5–6 dark brown except for yellow posterior margin of T5 and posterior half of T6; gonocoxite yellowish brown, dorsal sty-
lomere yellow. Wing faintly yellowish-tinged, with two pale brown spots, of which preapical spot starting R_5 , about 1/6 as wide as length of R_5 , narrowing posteriorly and ending in M_2 and extending obscurely to C beyond tip of R_1 , other posterior one oval, extending just behind forking point to basal half of CuA_2 , and slightly and narrowly brownish along posterior base of R_5 and around forking point of M; veins brownish yellow except for yellow CuA_1 ; halter yellow. Legs yellow, mid and hind femora indistinctly brownish on tips, all tarsi brown-tinged.

Head with vt longer than others; clypeus densely covered with brown setulae; face 4/5 as wide as eye; antenna 1.3 mm long, slightly shorter than head and thorax together, pedicel with long dorso-apical seta, fourth flagellomere slightly longer than wide; maxillary palpomere ratios as 2.5 : 3 : 5 : 10. Mesoscutum with dc distinctly shorter than antero-marginal and lateral setae; scutellum with two long apical sc and two short setae just before bases of apicals; postpronotum with one short and one long setae, ppl three; pleurotergite with a row of long and short setae; metakatepisternum setulose posteriorly.

Wing: Sc short and ending free, R_5 curving posteriorly at end, r-m almost twice as long as M petiole, M_1 sinuate, M fork diverging at ends. Legs: Hind coxa with one postero-basal and two postero-apical setae, mid coxa with postero-apical seta, hind tibia with 6d, 12a and 5p, fore basitarsus longer than tibia (5 : 4).

T9 deeply excavated posteriorly, with setae on both lateral apices; S8 subconical, narrowing posteriorly, longer than coxite. Gonocoxites united on ventral side, densely setulose at middle, with two pairs of distal projections, of which inner one with spine-like seta; gonostylus with dorsal sty-
lomere broadened apically, bearing two

strong setae at inner apical corner; ventral sty-
lomere somewhat V-shaped, with three spines near apex; mesal sty-
lomere apically ovoid and membranous, with three setae basally; aedeagal plate narrow; aedeagus 250 μ m long, pointed on tip.

Body length 4 mm, wing length 3.6 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species is unique in the presence of two wing markings and four distal projections on ventral side of the gonocoxites.

Etymology. The specific name refers to the four ventro-distal projections (Latin, *quattuor*+*lobus*) of gonocoxites.

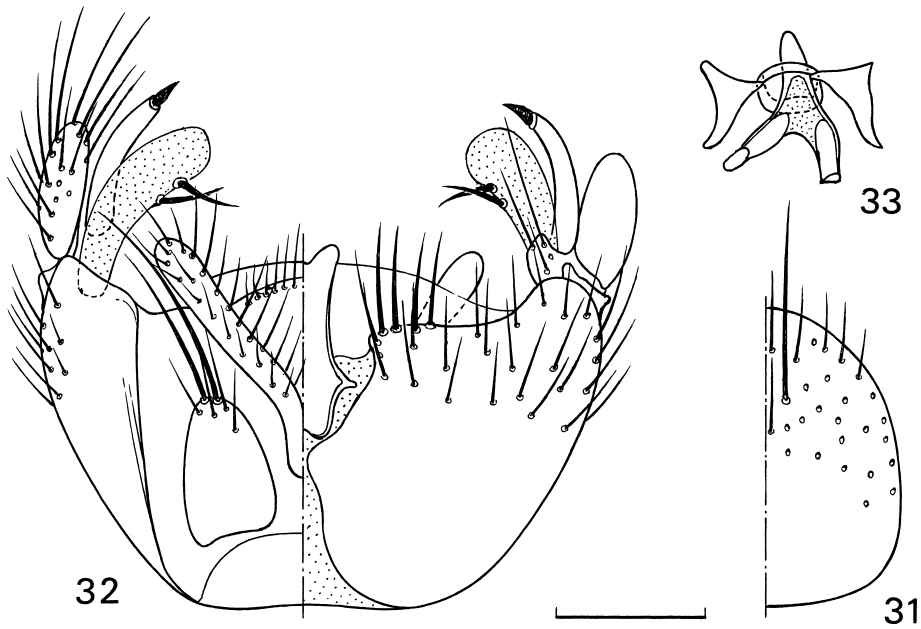
21. *Exechia ypsilon* Sasakawa, n. sp.

(Figs. 31–33)

Holotype: Male (NSMT-I-DIP-5974), Imperial Palace, Tokyo, 18 Oct. 2004, coll. S. Shinonaga. *Paratype:* 1 ♂, same locality as holotype, 8. Nov. 2004, coll. Shinonaga.

Male. Head black, face and clypeus brown-tinged, frons and clypeus whitish gray pruinose; antenna dark brown but scape, pedicel, and base of first flagellomere yellow; maxillary palp orange yellow. Thorax brownish black, whitish-gray dusted; mesoscutum mat, with indistinctly blackish central and lateral lines on dc-rows or those united into only a median vitta; postpronotum and propleuron yellowish brown to pale brown, dorsal margin of postpronotum yellow. T1–3 brownish black, T4–6 black, lateral margin of T2 narrowly yellowish, T3 with dark area triangular and yellow on antero-lateral parts; terminalia brown. Wing grayish-tinged, veins yellowish brown; halter yellow. Legs yellow but hind femur with brown stripe on ventro-basal 1/3, tibiae slightly brown-tinged, tarsi and spurs brownish black.

Frons and clypeus covered with whitish setulae; face about 3/5 width of eye; clypeus slightly projected antero-ventrally; antenna 1.2 mm long, slightly longer than head and thorax together, scape with long dorso-apical seta, fourth flagel-



Figs. 31–33. Male 8th sternite (31) and genitalia (32–33) of *Exechia ypsilon* n. sp. (paratype). Scale=0.1 mm.

lomere slightly longer than wide; palpomere ratios as 3:3:5:9. Mesoscutum with dc longer than setulae, pa shorter than sc but longer than sa or ia; scutellum with two apical sc; postpronotum with two long setae, ppl two; pleurotergite with a few slender setae and setuale, metakatepisternum with two short setae posteriorly.

Wing: Sc short and ending free, R_5 slightly curved on apical half, r-m nearly thrice as long as M petiole, M fork diverging apically. Legs: Hind coxa with one postero-dorsal and two postero-ventral setae, hind tibia with 4–5d, 7–8a and 4–5p, fore basitarsus slightly longer than tibia.

T9 separated into two oval sclerites, with two long apical setae; S8 broad oval, with two long setae near apex. Gonocoxites separated by postero-median sclerite on ventral side; gonostylus with dorsal stylomere small, ventral stylomere curved inwards and with a spine on tip, mesal stylomere composed of two lobes, of which large membranous one with two stout setae near apex, other basal lobe small and with four long setae; aedeagal plate well-developed on lateral sides and ringed at middle; aedeagus 130 μm long, Y-shaped, with basal sclerites divergent.

Body length 3.2 mm, wing length 2.8 (holotype)-3 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species is similar to European *E. dorsalis* (Staeger, 1840) in general appearance, but it has yellow lateral margin on T2 and yellow lateral triangular spots on T3. A very characteristic ventro-median sclerite between the gonocoxites is somewhat similar to that of *E. parvula* (Zetterstedt, 1852) (cf. Landrock, 1927: pl. 7, fig. 62, as *E. nana* Staeger) in shape, but the gonostylus is peculiar in both species, respectively.

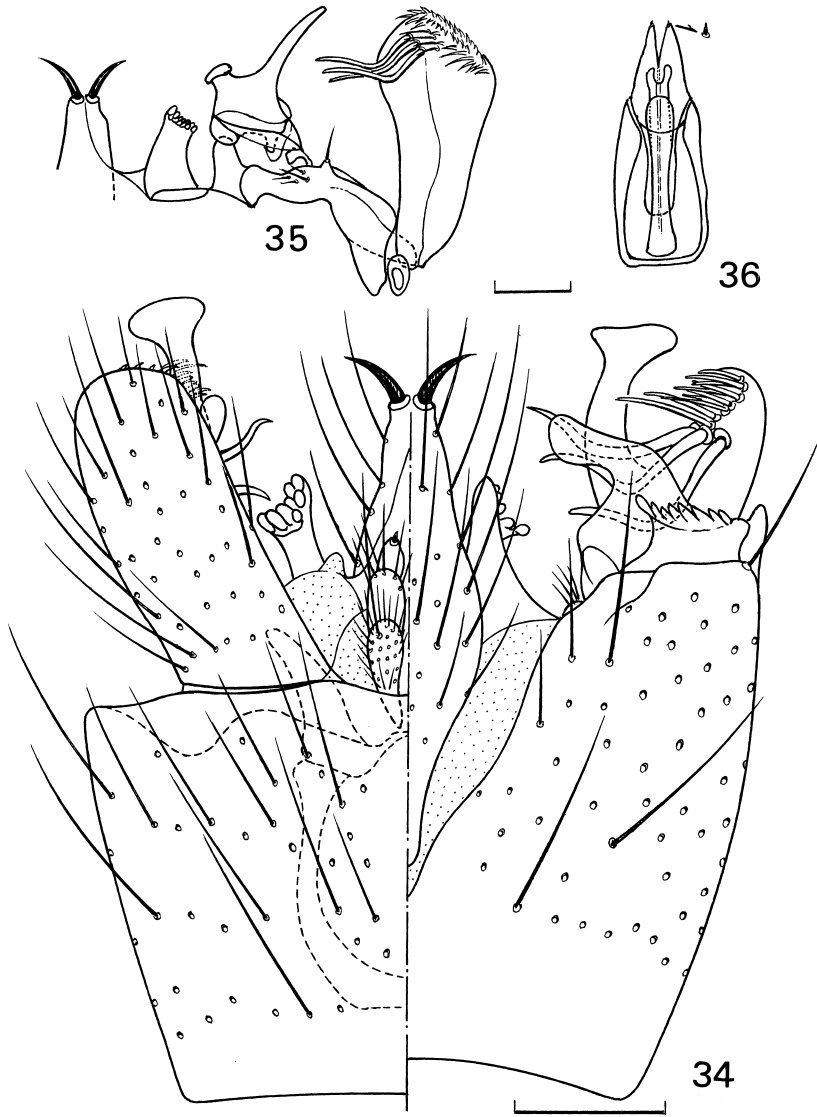
Etymology. The specific name refers to the ypsiloid (Greek, *upsilon*) aedeagus.

22. *Pseudobrachypeza spinimentula* Sasakawa, n. sp.

(Figs. 34–36)

Holotype: Male (NSMT-I-DIP-5975), Imperial Palace, Tokyo, 16 May 2002, coll. S. Shinonaga.

Male. Head with frons brown but yellow along anterior margin, with black spots around



Figs. 34–36. Male genitalia of *Pseudobrachypeza spinimentula* n. sp. (holotype). Scale=0.1 mm.

ocelli; face and clypeus slightly brown-tinged, maxillary palp yellow; antenna yellow, flagellomeres with brown apical rings (gradually broadened toward apical flagellomeres but only yellow at base in apical two or three flagellomeres). Mesoscutum and scutellum yellowish brown, mat, sparsely grayish pollinose, with humeral area yellow; pleura brown but postpronotum, propleuron, and pleurotergite except for ventral part yellow, mediotergite pale brown antero-laterally. T1–4 yellow and with brownish black poste-

rior margins (posterior 1/3 on dorsal side of T1, 1/4–1/5 of T2–4) which are broadened laterally, T5 entirely black, T6 black on posterior half except for yellow central triangular area and narrow posterior margin; terminalia dark brown, dorsal stylomere of gonostylus blackened; sternites yellow but S5–6 brown on lateral sides. Wing hyaline, faintly tinged with yellow anteriorly, posterior veins yellowish; halter whitish yellow. Legs yellow, but ventro-distal margin of mid femur, ventro-proximal margins of mid and hind

femora, and apex of hind femur blackish brown.

Frons with long setae above level of ocelli; face and clypeus slightly wider than half of eye width; antenna 1.5 mm long, longer than head and thorax together, scape with several long setae on ventro-apical margin, pedicel with one long dorso-apical seta, fourth flagellomere slightly longer than wide. Mesoscutum covered with brownish yellow setulae, and with brown posterior-most dc and pa distinctly longer than anterior and lateral setae; postpronotum with three long setae along posterior margin, ppl three or four, pleurotergite with four or five brown setae which are longer than others along ventral margin; scutellum with four sc, apical sc 1.5 times as long as preapical.

Wing: Sc rather long and ending free, R_1 only a little longer than $1/4$ of R_5 , M fork converging apically, forking point of CuA distinctly before that of M, base of CuA_1 colorless, CuA petiole about $1/3$ length of CuA_1 , A very short. Legs: Mid tibia with 4–5d, 6a and 3v, hind tibia with 6–8d and 8–10a, basitarsi of mid and hind legs each with a ventral row of 6–8 distinct setulae; spur ratios as 1 : 1.3, 1.8 : 1.2, 2.

Gonocoxites with deep incision on ventral side, bearing a row of eight teeth on each posterior or lateral tip; cercus very small, with long apical seta; ventral sclerite between gonocoxites narrow, with two dorsally directed spines on tip; gonostylus with dorsal stylomere broad, bearing three long, curved setae near apex and four dense rows of about 50 spinules on tip; ventral stylomere with 12 black knob-like spines; mesal stylomere composed of two lobes, of which basal one setulose at middle and ventral one distinctly projected as black spine-like process; aedeagal plate narrow, with minute spine on tip of lateral sclerite; aedeagus about 260 μm long.

Body length 3.7 mm, wing length 3.4 mm.

Female. Unknown.

Distribution. Japan.

Remarks. This species is easily distinguished by the coloration of abdomen and the structures of male genitalia from *P. helvetica* (Walker, 1856) and *P. pseudohelvetica* Plassmann, 1984. It

is noticeable that the gonostylus of this species shows the similarity with that of *Neoempheria bispinosa* Sasakawa, 2004 (cf. Sasakawa, 2004: figs. 1–2) in structures.

Etymology. The specific name refers to the apically spinose penis (Latin, *spina* + *mentula*).

Acknowledgements

I wish to express my sincere gratitude to Dr. Satoshi Shinonaga, Tokyo Medical and Dental University, Tokyo, for allowing me to examine many fungus gnats collected by himself in the Imperial Palace. My special thanks are due to Drs. Mamoru Owada and Akihiko Shinohara, National Museum of Nature and Science, Tokyo, for their kindness undertaken in the preparation of this paper.

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