

Supplementary Study on Japanese Biting Midges, with a Description of a New Species (Diptera: Ceratopogonidae)*

By

MASAAKI TOKUNAGA

Recently I have had an opportunity to examine a set of Japanese biting midges deposited in the U. S. National Museum of Washington at the request of Dr. Willis W. Wirth. At this time I intend to supplement my reports with the observations on this material and a few additional notes on the other material deposited in our laboratory. Although the material from the U. S. Nat. Museum contains many biting midges of Okinawa, Ryukyu Islands, the publication of these midges is held at present, since these insects will be reported under the title of "Biting Midges of Ryukyu Islands" in the near future, together with those of Bernice P. Bishop Museum of Honolulu collected from other parts of the islands.

Relating to this study I am deeply indebted to Dr. W. W. Wirth. I also thank Miss E. Ohtani for the drawings of the figures and the preparation of the manuscript.

Relative lengths shown in the text are as follows: in the cases of the wing venation and leg segmentation 1 unit is 0.013 mm. and of the antennae, palps, spermathecae and male hypopygia 1 unit is 0.003 mm. The length of the wing is measured from the incision between alula and squama to the wing apex. Abbreviations used in this report are as follows: AR (antennal ratio), TR (tarsal ratio) and those of the wing venation are quite similar to those of my past reports. RL-4A or RL-8A is relative lengths of apical 4 or 8 antennal segments. RL-L is relative lengths of the leg segments, exclusive the coxa and trochanter. RL-P is relative lengths of palpal segments. RL-V is relative lengths of the wing veins R : M : stem of fMCu. Coloration showed

in the text is of the specimens mounted with balsam under transmitted light.

1. *Atrichopogon yoshimurai* Tokunaga

Tokunaga, 1940, Philip. Jour. Sci., 72 : 272.

Female :- Wing 1.82mm. by 0.66mm. Palp with sensory pore of third segment at middle, RL-P 14 : 15 : 17 : 12 : 10. Antenna (Fig. 1) with segments 3-9 oval or short-cylindrical, AR a little larger than in type, being 1.67, RL-8A 12.5 : 12.8 : 13.2 : 28 : 29.5 : 31.5 : 33:50. Scutum with 4 large and 2 small additional setae. Femora of all legs pale or yellowish on basal parts, fore TR 3.17, hind RL-L 48.8 : 48.5 : 25.5 : 10 : 7 : 5 : 5.7. Wing with anterior veins brown, macrotrichia spread as in *brunnipes* Meigen, RL-V 42 : 37 : 50, Rs : R₁ and first : second radial cell 52 : 15 and 34 : 9, fMCu under base of r-m. Abdomen dark brown, but last caudal segment and cerci yellow, spermatheca single, dark, with length 26 units.

Specimen :- 1 female, Fushimi, Kyoto, 9 Apr. 1955, Arnaud by light trap.

Distribution :- Honsyu (Kyoto).

2. *Forcipomyia (Forcipomyia) binigrimaculata* Tokunaga

Tokunaga, 1940, Tenthredo, 3 : 63.

Male :- Palp with third segment very long, slender, slightly swollen basally, sensory pore small and located on sub-basal part, RL-P 14 : 16.5 : 44 : 17 : 15.5. Wing with end of Rs not sharply oblique but somewhat round.

Female :- Body 2.28~2.67 mm. long. Wing 1.29~1.76 mm. by 0.5~0.65 mm. Color as in male. RL-P 12.3 : 14.3 : 33.5 : 15.3 : 13.5. An-

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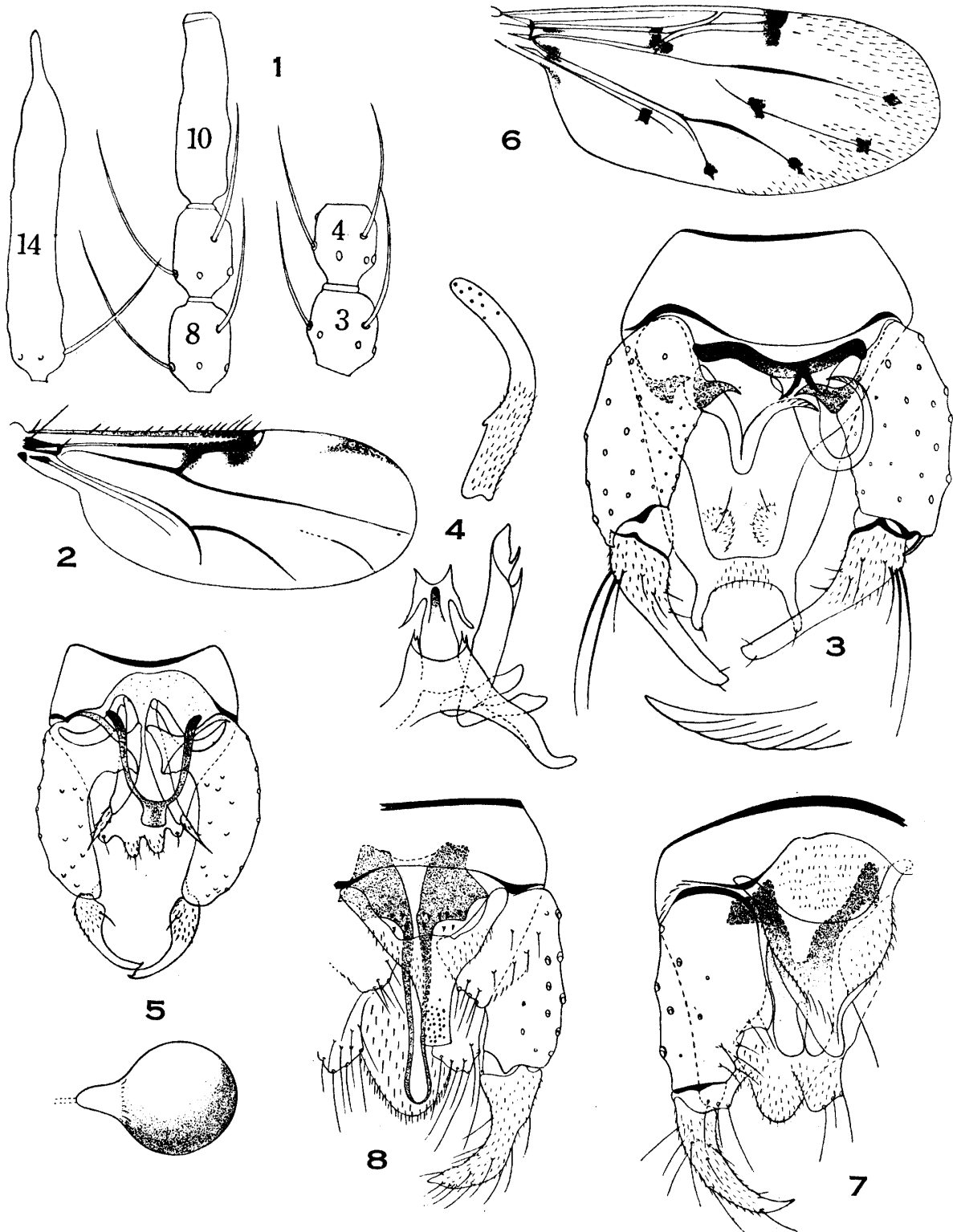


Fig. 1 : *Atrichopogon yoshimurai* (female)-antennal segments. 2 : *Ceratopogon minimus* (female)-wing. 3 : *Culicoides crassipilosus* (male)-hypopygium and tip of paramere. 4 : *Alluaudomyia sagaensis* (male)-style, aedeagus and paramere. 5 : *A. shogakii*(male)-hypopygium and spermatheca. 6 : *Ibid.* (female)-wing. 7 : *Palpomyia serripes*(male)-hypopygium. 8 : *Bezzia japonica* (male)-hypopygium.

tenna entirely dark brown, with segments 3~9 bottle-like, short-oval, with short neck parts distinct, AR 0.75~0.79, RL-8A 17 : 16.5 : 16 : 18.8 : 19 : 19 : 19.5 : 29.8. Legs dark brown, with both ends of femora and tibiae narrowly yellow, RL-L 40 : 39.3 : 15.5 : 11 : 8.3 : 6.5 : 5.4 (TR 1.21~1.63) in fore, 48.8 : 52 : 11.3 : 17.5 : 9.3 : 6.8 : 5.5 (TP 0.59~0.67) in middle, 54.5 : 57 : 12.1 : 22 : 11.5 : 7.8 : 5.8 (TR 0.53~0.57), hind tibial comb with 10~11 apical bristles, no scales. Wing without striped scales, with yellow spots at base before arculus and on costal area just beyond radial cell, costa ending before middle of wing (53.1 : 121.3), RL-V 25.8 : 22.8 : 44.3, Rs : R₁ 17 : 12, second radial cell almost as long as stem (7.8 : 8.5), round on apibal margin, fMCu under costal end. Abdomen with tergites brown, sternites pale, pleural membranes very pale, cerci pale brown, spermathecae equal, elongate-oval, 1+25.5 units by 15.5 units and 1+22.5 units by 15 units.

Specimens :- 3 males and 4 females, Kyoto-City, 26 Nov. to 5 Dec. 1954, Arnaud by light trap and 29 sept. and 25 Nov. 1953, Shogaki by light trap.

Distribution :- Honsyu (Kyoto).

3. *Forcipomyia (Forcipomyia) bipunctata* Linne

Linne, 1767, Syst. Nat. Ed., 12(2) : 978 (*Tipula bipunctata*). Tokunaga, 1940, Tenthredo, 3 : 80.

Female :- Body 2.08mm. long. Wing 1.5mm. by 0.59mm. Palp with third segment with sensory pore on sub-basal slightly swollen part, RL-P 10 : 15 : 29 : 14 : 10. Antenna with segments 3~9 elongate-oval, not highly differing in shape and size from segments 10~13, with neck parts very short, AR 0.68, RL-8A 16 : 16 : 16 : 17.5 : 16 : 16 : 17 : 25. Thorax with sclerites almost entirely brown. Legs with coxae brown, other segments yellow, hind tibial comb with 8 apical bristles, no striped scales ; RL-L 36 : 36 : 13.7 : 12 : 7 : 6 : 5 (TR 1.14) in fore, 45 : 44 : 12 : 14.2 : 8 : 6 : 5 (TR 0.85) in middle, 50 : 49 : 16 : 17 : 10 : 7 : 5 (TR 0.94) in hind leg. Wing without striped scales, with yellowish white spot at base before arculus and semicircular spot covering second

radial cell, costa ending at middle of wing (60 : 115), RL-V 32 : 28 : 51, Rs to R₁ 17 : 10, second radial cell as long as slit-like first cell (8 : 9) and ending into round tip, fMCu under costal end. Abdominal tergites brown, last 2 segments and cerci yellow, spermathecae oval, unequal, brown, without chitinized neck parts, 55 units by 35 units and 35 units by 25 units.

Specimen :- 1 female, Kyoto-City, 25 Nov. 1953, Shogaki by light trap.

Distribution :- Europe, N. America and Honsyu (Kyoto).

4. *Forcipomyia (Proforcipomyia) yoshimurai* Tokunaga

Tokunaga, 1940, Tenthredo, 3 : 91.

Male :- Wing 1.26 mm. by 0.38 mm. Palp very slender, third segment very slightly swollen basally, with small sensory pore before middle, RL-P 7 : 12 : 25 : 13 : 8. Legs with fore TR 1.56~1.67, middle 1.11, hind tibial comb with 6 apical bristles. Wing with second radial cell subtriangular, shorter than stem (7 : 10).

Specimen :- A male, Kyoto-City, 7 Oct. 1953, Shogaki by light trap.

Distribution :- Honsyu (Kyoto).

5. *Forcipomyia (Trichohelea) sp. inc.* J-No. 1

Female :- Body 1.2mm. long. Wing 0.84mm. by 0.4mm. Generally dark brown with knees of all legs very pale, spermathecae very unequal. Palp very short, third segment short-oval, with large sensory pore at middle, RL-P 7 : 9 : 11 : 7 : 6. Antenna mainly pale brown, with segments 3~9 discoidal, AR 1.67, RL-8A 6 : 6 : 7 : 13.5 : 15 : 15 : 15 : 22. Thorax almost entirely dark brown. Legs mainly pale brown, coxa more brownish, both ends of femora and tibiae widely far paler, all tarsi white, without scales ; hind tibial comb with 7 apical bristles, RL-L 22 : 22 : 13 : 4.5 : 4 : 3 : 3 (TR 2.9) in fore, 27.5 : 25 : 12 : 4.5 : 3.5 : 2.5 : 2.5 (TR 2.8) in middle and 28 : 25 : 15 : 6 : 4 : 3 : 2.8 (TR 2.6) in hind leg, hind basitarsus as long as following 4 segments together. Wing short-oval, with bare areas along veins obscure, without striped scales, costa ending

slightly beyond middle of wing (42 : 69.5), RL-V 16 : 14 : 30, Rs to R₁ 19 : 11, second radial cell triangular, as long as slit-like first cell (9.5 : 9.5), fMCu under tip of R₁. Halter yellowish white. Abdomen brown, with cerci paler, spermathecae brown, very unequal, one elongate-pyriform, 1+17 units by 11 units, one round, small, 1+13 units by 13 units, both with curved short neck part.

Specimen :- 1 female, Kyoto-City, Honsyu, 2 Sept. 1953, Shogaki by light trap.

Distribution :- Honsyu (Kyoto).

6. *Ceratopogon minimus* Keffer

Kieffer, 1925, Faun. Fran., 11 : 70. Tokunaga, 1940, Philip. Jour. Sci., 72 : 260.

Female :- Wing 0.88mm. by 0.35mm. RL-P 4 : 10 : 8.5 : 5 : 8. Antenna with basal short flagellar segments oval to subcylindrical, fuscus on apical parts, segments 11~14 almost entirely fuscus except for paler bases, AR 1.1~1.46, RL-8A 7.7 : 8.5 : 8.5 : 11.8 : 11.3 : 14 : 13.3 : 17.8. Legs with femora and tibiae pale brown, but extreme bases of femora and apices of tibiae almost white as in tarsi, hind tibial comb with 6 apical bristles, TR 1.66~2.0 in fore, 2.14~2.27 in hind leg, tarsal spurs : middle leg with 2 apical on basitarsus, single apical on following 2, hind leg with single apical on basal 3 segments. Wing with small ill-defined fuscus clouds and dark stigma-like spot as in figure 2, RL-V 22 : 20 : 25, costa ending at middle of wing (32 : 67.5), R₁ absent. Abdomen with spermatheca single, dark, oval, 4.5+22 units by 18 units, with recurved neck part.

Specimen :- 1 female, Kyoto-City, Honsyu, 29 Sept. 1953. Shogaki by light trap.

Distribution :- Europe and Honsyu (Kyoto and Nagano).

7. *Culicoides crassipilosus* Tokunaga

Tokunaga, 1937, Tenthredo, 1 : 276.

Female :- Wing 1.39mm. by 0.59mm. Eyes bare ; antenna with AR 1.14~1.48, segments 2~9 spherical to oval, each with 3 sensory pores on distal part, last 5 segments without these pores. Thorax with sclerites almost entirely brown,

scutellum with 4 large bristles and 8 small additional setae. Hind tibial comb with 5 apical bristles, TR 2.0~2.1 in fore, 2.35~2.6 in middle and 1.95~2.0 in hind leg. Wing with macrotrichia on basal radial cell, costa extending far beyond middle of wing length (69 : 107), RL-V 37 : 31 : 44, second to first radial cell 14 : 11, M₃₊₄ to Cu₁ 35 : 20, fMCu under or beyond origin of r-m.

Male :- Wing 1.2~1.39 mm. by 0.43~0.44 mm. General color pale brown, paler than in female. RL-P 6 : 9 : 20 : 9 : 9. Scutellum with 4~5 large bristles and 2~4 small additional setae. Legs pale brownish yellow, hind tibial comb with 4 apical bristles, RL-L 115.5 : 115 : 58.5 : 27.5 : 11 : 15 (TR 2.0~2.2) in fore, 140 : 137.5 : 73.5 : 34 : 19.5 : 11 : 14 (TR 2.1~2.2) in middle and 137.5 : 149 : 66 : 36.5 : 21.5 : 12.5 : 13 (TR 1.74~1.87) in hind leg. Wing slender, pale brownish yellow, with macrotrichia very sparse, spread on arical area beyond costal end or r-m, anal cell bare or with only a few trichia, costa ending beyond middle of wing (61 : 99.5), RL-V 34 : 36.5 : 50.5, first radial cell slit-like, second cell obsolete, R₁ at this area atrophied and Rs of second cell as long as first radial cell, M₃₊₄ to Cu₁ 13.5 : 28, fMCu under middle of Rs. Abdomen with tergites entirely brown. Hypopygium (Fig. 3) brown, with ninth tergite elongate, tapered, anal points slender ; aedeagus with bar-like basal sclerite and median lobe very slightly developed and with a small V-shaped thickening ; parameres large, slender, strongly curved ventrad and finely striated on apical tip.

Specimens :- 1 female and 2 males, Nukabira, Hokkaido, 12~13 July, 1959, Ono by light trap.

Distribution :- Honsyu (Mie-Ken) and Hokkaido (Nukabira).

8. *Alluaudomyia sagaensis* Tokunaga

Tokunaga, 1940, Philip. Jour. Sci., 72 : 257. Okada, 1942. Trans. Nat. Hist. Soc. Formosa, 32 : 316.

Male :- Probably Okada's Formosan variety, *tripartita*, but different in following points of hypopygium : aedeagus with harpoon-like tip of median lobe, caudal lobe of paramere 3-dentate

and style less arcuate as in figure 4.

Specimens :- 1 male, Midoro-Pond. Kyoto, 9 Aug. 1954, Arnaud by light trap.

Distribution :- Formosa and Honsyu (Kyoto).

9. *Alluaudomyia shogakii* sp. nov.

Medium-sized brown and yellowish white species with wing markings similar to those of *N. American bella* Coquillett and leg markings to those of Oriental *maculosipennis* Tokunaga.

Male :- Body 2.03mm. long. Wing 1.3mm. by 0.42mm.

Palpal segments 1~2 yellow, 3~4 pale brown, 5 brown, common sensory pore absent, RL-P 6 : 10 : 11 : 9.5 : 14. Antenna with scape dark brown, segments 2, 12~14 and apical part of segment 11 brown, other parts yellowish white including plumose hairs, segments 11~14 and 2~10 in proportion of 102 : 120, RL-8A 12 : 11.8 : 11.4 : 11.4 : 18 : 26 : 28.5 : 29.

Thorax brown, scutum with dark confluent spots at bases of setae, scutellum yellow, brown on middle part, with 4 bristles, lateral margins of scutum, pleural membranes and lateral stripes beneath wing bases yellow. Fore coxa and all trochanters yellowish brown, middle and hind coxae brown, tarsi mainly yellowish white, coloration of femora and tibiae mainly as in *maculosipennis*, but middle femur with broad sub-basal brown band instead of middle band of other legs, first tarsal segments of fore and hind legs uniformly brown, fore and hind legs without tarsal apical spurs, but basal 2 tarsal segments of middle leg each with two spurs, claws finely bifid at extreme tips, hind tibial comb with 7 apical bristles ; RL-L 32 : 29 : 13.5 : 6.5 : 3 : 2 : 4 in fore, 42 : 36.5 : 23 : 7.5 : 3 : 2.5 : 4 in middle, 34 : 32.5 : 15.5 : 6.5 : 3.5 : 2.5 : 4 in hind leg. Wing glassy hyaline, with small dark spots similar to those of *bella*, veins M_1 and M_{3+4} somewhat brownish on basal half, macrotrichia extremely sparse, arranged in a line closely along margins of cells R_5 and M_1 . RL-V 32 : 30 : 46, Rs 1.4 times of R_1 (17 : 12), second radial cell about half as long as stem, M_{1+2} 3 or 4 times of r-m, fMCu under tip of R_1 . Halter yellowish white, but tip of knob slightly fuscous.

Abdomen with tergites brown, pleural sides pale, sternites pale, but posterior sternites brown. Hypopygium (Fig. 5) brown, but ninth tergite, styles and caudal lobes of parameres yellow, ninth sternite with large caudal emargination, tergite with anal points round at apices ; coxite slender, arcuate, with basal triangular process, style small, arcuate, pubescent only on basal part ; aedeagus with slender marginals clerite, parameres slender, with basal arm arcuate, caudal lobe 1.5 times as long as basal arm, with poorly pubescent lanceolate appendage at tip.

Female :- Body 1.76mm. long. Wing 1.43 mm. by 0.59 mm. Coloration as in male, but head yellowish pale brown, scutum yellow, scutellum yellowish white, postscutellum yellow on lateral parts, abdomen almost entirely yellowish white.

RL-P 7 : 10 : 10 : 10 : 12. Antenna with scape brown, segments 2 and 10~14, neck or apical parts of other segments pale brown, basal parts before verticils white, AR 0.88, RL-8A 13 : 14 : 14.5 : 18 : 17.8 : 17.2 : 16 : 22. Scutellum with two lateral and two median setae. Hind tibial comb with 7 apical bristles, RL-L 33 : 31 : 12 : 6 : 3 : 3 : 7 in fore, 45 : 40 : 20 : 7.5 : 3.5 : 3 : 7 in middle, 37 : 35 : 16 : 6 : 3.2 : 3 : 6.5 in hind leg, last tarsal segment and two claws in proportional length of 29 : 27 : 14 in fore, 27 : 28 : 15 in middle and 25 : 22 : 10 in hind leg. Wing as in Fig. 6. Abdomen almost white, subgenital sternite brown, spermatheca (Fig. 5) single, brown, round, 7+17.5 units by 18 units, neck part yellow.

This is similar in the wing markings to *bella* Coquillett and in the leg markings to *maculosipennis* Tokunaga, but highly specific in the structure of the male hypopygium differing from other known species.

Holotype :- Male, Kyoto-City, Honsyu, 29 Sept. 1953, Shogaki by light trap. *Allotype* :- Female with holotype.

Distribution :- Honsyu, Japan.

10. *Palpomyia nipponica* Tokunaga

Tokunaga, 1939, Tenthredo, 2 : 297.

Female :- Wing 2.28mm, by 0.85mm. RL-P 10 : 15 : 18 : 16 : 20. Scutum with minute frontal

tubercle, scutellum with 4 strong bristles and many additional setae. Fore femur strong and with 11~12 ventral spines, hind tibial comb with 8~9 apical bristles, TR 2.2 in fore, 3.4~3.5 in middle, 2.9 in hind leg, tarsal apical spurs: 3 basal segments of middle leg and segment 2 of hind with 2, last tarsal segment with ventral bristles 2 in middle and 4~5 in hind leg, claws of hind leg without basal tooth, longer than other claws, about 2/3 of last tarsal segment (39:60). Spermathecae: 2 oval, unequal, 2+40 units by 30 units and 2+30 units by 23 units, 1 vestigial.

Specimen :- 1 female, Kyoto-City, Aug. 1954, Arnaud.

Distribution :- Honsyu (Osaka and Kyoto).

11. *Palpomyia serripes* Meigen

Meigen, 1818, Syst. Besch. Eur. Zweifl. Ins., 1: 81. Tokunaga, 1939, Tenthredo, 2: 301.

Male :- Wing 1.04 mm. by 0.33 mm. Head entirely dark brown, with palp in proportion of 5:7:11:8:12.5. Thorax brown, scutellum with 4 strong and many additional small setae. Legs mainly yellowish brown, but basal 2 or 3 tarsal segments pale yellow; fore femur with 3 ventral spines on apical third, middle and hind each with 1 preapical spine, middle tarsal segments 1~3 each with two apical spurs, hind tibial comb with 5 apical bristles, TR 2.1 in fore, 3.2 in middle and 2.4 in hind leg. Wing with veins very pale, RL-V 28:30:34.5, Rs to R₁ 25:12, second to first radial cell 15:8, tMCu under middle of first radial cell. Halter brown. Abdomen pale brown, slightly fuscus; hypopygium (Fig. 7) brown, with parameres H-shaped, styles

arcuate and tapered.

Specimen :- 1 male, Yamanaka-Pass, Shiga-Ken, 29 July 1954, Arnaud.

Distribution :- Europe and Honsyu (Kyoto and Shiga-Ken).

12. *Bezzia japonica* Tokunaga

Tokunaga, 1939, Tenthredo, 2: 280.

Male :- Wing 1.38~1.5 mm. by 0.43~0.48 mm. RL-P 6:12:15:8:10, Antennal segments 11~14 to 2~10 together 104.5:126, RL-8A 10.8:10.8:10.8:11.8:17:23.5:27.8:33.8. Scutellum with 2 large and many small setae. Hind femur somewhat paler at apex, fore femur with faint brown cloud on sub-basal area, hind tibial comb with 5~6 apical bristles, fore femur with 1~2 (usually 2) spines, basal 3 tarsal segments of middle leg each with 2 apical spurs, RL-L 33:29:16.8:8.5:4.3:3.3:6.4 (TR 1.98) in fore, 46.5:42.3:25.8:11.5:5.4:4:6.8 (TR 2.24) in hind leg. Wing with RL-V 36.5:37.5:43.5, Rs to R₁ 40:16.5, fM₁₊₂ just before r-m, fMCu under origin of r-m or just beyond it. Hypopygium as in figure 8.

Specimens :- 2 males, Midoro-Pond, Kyoto, 13 Apr. 1955, Arnaud by light trap.

Distribution :- Honsyu (Kyoto).

日本産刺咬性糠蚊類に関する追加研究

徳永雅明

日本産刺咬性糠蚊類11既知種に就いての知見を補充し, *Culicoides crassipilosus* の雌性を確定し, 併せて京都産の1新種 (*Alluaudomyia shogakii*) を発表する。