

Studies on the Chironomid Midges Collected on the Shore of Shimanto River in April 1998.

Part 2. Description of Additional Species Belonging to Orthocladiinae, Diamesinae and Tanypodinae.

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Abstract: Collection of adult chironomid midges were conducted during 3 day period from April 25 to 27, 1998, in areas along Shimanto River, western Shikoku Island, Japan, in night time with light traps at the town of Nakamura and Hiromi, and in daytime by sweeping with insect net at 8 localities along the main stream of the river and its branches, from near the mouth to the upstream portions. The chironomid specimens were preserved in 70% ethanol, and first examined under a stereomicroscope for classification, and those considered necessary for detailed examinations were dissected and mounted individually on slides in gum-chloral medium. By examination of 240 slide mounted specimens, 74 were identified as belonging to 42 different species of the subfamily Chironomidae, and 24 among them were described as new species in our previous paper. The rest specimens were classified into 36 species belonging to the subfamily Orthocladiinae, including 19 new species and 5 species new or rare to Japan, 1 species of subfamily Diamesinae new to Japan, and 9 species including 3 new species and 3 species new to Japan are belonging to the subfamily Tanypodinae, or a total of 46 species, including 22 new species and 9 species new to Japan, are recorded this time as members of these 3 subgenera. It was again demonstrated that the areas along Shimanto River are very rich in the chironomid fauna, and such large numbers of new species or species new to Japan were collected and identified this time.

Key words: Chironominae, Medical entomology, New species, Shimanto River, Yusurika.

INTRODUCTION

Shimanto is the longest river in Shikoku Island, western Japan, has the maximum length of 196 km and mostly running through the mountainous areas of western part of Kochi and Ehime Prefecture, with the basin area of 2,270 square km and the total population of about 107,000. The natural environment of this area has been very well preserved, and the river is especially noted as the breeding source of many aquatic animals and plants, including rare species, but this is the first time that a survey of chironomid medges is conducted in this area.

Our collections of adult chironomids were carried out either by daytime collection with insect net, or by night collections with two light traps, at the following 10 localities indicated for each specimen in parenthesis. #1: at the side of Shimanto River near the mouth in Nakamura, with insect net. #2: Yacho Koen, Nakamura, with insect net. #3: Tombo Koen, Nakamura. #4: In the town of Nakamura, with a light trap. #5: Nishitosa Ohashi, Nishitosa-mura, with insect net. #6: Ekawasaki, Nishitosa-mura, with insect net. #7: a downstream site of a branch river Hiromigawa, with insect net. #8: by daytime collections with insect net. #9: At an upstream site of Hiromi River. #10: At Hiromi-machi, at the side of middle reach of Hiromi River, with a light trap.

The specimens collected were preserved in 70% ethanol in glass vials, and the screened under a stereomicroscope in the laboratory of Nagasaki University, and were individually mounted in gum-chloral solution after dissected and digested in hot 10% KOH solution, following the methods described in Sasa & Kikuchi (1995), and more recently improved by Suzuki. As a rule, only adult males were studied for species identification.

Out of a total of 250 specimens examined, 74 were found to be belonging to the subfamily Chironominae, and they were identified as belonging to 42 species, including 24 new species, and reported in our previous paper (Sasa, Suzuki and Sakai, 1998). In the present paper, results of examinations of the rest 176 specimens belonging to other subfamilies. They were classified into 36 species including 19 new species belonging to the subfamily Orthocladiinae, 1 species new to Japan belonging to the subfamily Diamesinae, and 9 including 3 new species and 3 species new to Japan belonging to the subfamily Tanypodinae. It should especially be noted that the present collection included species recorded from Europe but new to Japan or only rarely collected from Japan, such as *Pseudosmittia forcipata* (Goetghebuer, 1921), *Smittia leucopogon* (Meigen, 1818), *Corynoneura scutellata* Winnertz, 1846, *Thienemaniella vittata* (Edwards, 1924), *Potthastia longimana* Kieffer, 1922, *Ablabesmyia longistyla* Fitkauer, 1962, *Nilotanypus dubius* (Meigen, 1804), *Rheopelopia ornata* (Meigen, 1838), are newly recorded from this area.

Taxonomic and morphological notes on the species collected

In the following descriptions, each specimen is recorded by the box number, slide number, locality of collection by # in parenthesis, and the specimen number of each locality.

1. *Cricotopus (Cricotopus) bicinctus* (Meigen, 1818)

Six males were identified as slide mounted specimens. No. 358: 24 (#2-17), 358: 25 (#2-18), 358: 34 (#3-13), 358: 95 (#8-2), 360: 14 (#3-6), 360: 20 (#5-3). This species is characteristic in that abdominal tergites I and IV are pale, and the rest tergites are black. This is a species widely distributed in Europe, and has been recorded from more than 10 localities in Japan.

2. *Cricotopus (Cricotopus) polyannulatus* Tokunaga, 1936

Two males were identified. No. 358: 37 (#3-11), 358: 38 (#3-12). This species is characteristic in that abdominal tergites I, IV and VII are pale and the rest tergites are black. This species was recorded from Kyoto, Shikoku and Taiwan.

3. *Cricotopus (Cricotopus) seiryuabeus* sp. nov. (Fig. 1)

Four males were identified. Holotype: No. 360: 91 (#10-8-2), collected with a light trap at Hiromi. Paratypes: No. 358: 82 (#7-1), 359: 26 (#10-8), 360: 22 (#6-2). BL 4.02-4.32 (4.24 in average of 4) mm, WL 2.08-2.54 (2.34) mm, WW/WL 0.27-0.30 (0.28). Body almost entirely dark brown, scutal stripes hardly discernible by color, legs and abdominal tergites, hypopygium uniformly dark brown. Head in Fig. 1 a. Eyes highly pubescent, ER 0.36-0.43 (0.40). Antenna with 13 flagellar segments, AR 1.08-1.23 (1.17), AHR 0.49-0.54 (0.51). Palp short, P/H 0.81-0.99 (0.93). SO 7-10 (8.5), CL 8-12 (10.3). Anteprenotum (Fig. 1 b) narrow but united in the middle, with 2, 3 or 4 (mean 3.3) lateral setae. Distribution of setae on scutum and scutellum in Fig. 1 c. DM 20-30 (25.0), all minute; DL 42-52 (44.5), all minute and decumbent; PA 5 or 6 (well developed); SC 12-18, minute (unusual character).

Wing (Fig. 1 d) bare and plain, brownish, squama with 24-36 (27.7) fringe hairs, anal lobe slightly expanded. RR 0.47-0.49 (0.48), VR 1.13-1.24 (1.16), R/Cu 1.04-1.05. Costa slightly extended beyond tip of R4+5. Cu2 nearly straight. Tip of front tibia (Fig. 1 e) with a long spur, tip of middle tibia (Fig. 1 f) with two short spurs, tip of hind tibia (Fig. 1 g) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.65-0.71 (0.69), mLR 0.50-0.53 (0.52), hLR 0.56-0.60 (0.58), fTR 0.12-0.13, fBR 2.0-2.8 (2.4), mBR 2.4-3.1 (2.9), hBR 3.1-4.4 (3.6). Pulvilli absent.

Abdominal tergites (Fig. 1 h, left half) with relatively large numbers of setae, 48 on I, 38 on II and III, 50 on IV, 48 on V, 44 on VI, 42 on VII, and 34 on VIII. Hypopygium in Fig. 1 g. Small anal point (also in Fig. 1 h) present in all the specimens, widest at base and apically pointed, almost entirely clothed with microtrichia and with 2 or 3 lateral setae on both sides. Gonocoxite long and nearly parallel-sided, inner lobe (Fig. 1 h) finger-like, much longer than wide and entirely clothed by microtrichia and with short setae on inner margin. Gonostylus (Figs. 1 i, j) nearly parallel-sided, inner margin concave, with a rectangular preapical tooth.

Remarks. This species is a typical member of the subgenus *Cricotopus*, and belongs to the group with one inner lobe, and legs and abdominal tergites are uniformly dark, and thus somewhat related to *C. yatabensis* Sasa, 1979, *C. tamapullus* Sasa, 1981, and *C. togaspadix* Sasa et Okazawa, 1992, but none of them has an anal point, they all have a preapical swelling on gonostylus, and the shape of inner lobe of gonocoxite is all different from the present species.

4. *Cricotopus (Cricotopus) seiryubeceus* sp. nov. (Fig. 2)

Two males were collected by sweeping at the side of Hiromi Branch River. Holotype: No. 360: 23 (#6-3). Paratype: No. 359: 31 (#10-13). BL 3.06, 3.08mm, WL 1.72, 1.76mm, WW/WL 0.34, 0.33 (very wide). Ground color of scutum yellow, stripes, scutellum and postnotum dark brown, abdominal tergites and legs uniformly brown. Head in Fig. 2 a. Eyes highly pubescent, ER 0.27, 0.47. Antenna with 13 flagellar segments, AR 1.16, 1.25, AHR 0.51, 0.53. Palp short, P/H 0.91, 0.95. Anteprepronotum (Fig. 2 b) united in the middle, and with 3 lateral setae. Distribution of setae on scutum and scutellum in Fig. 2 c; DM 16, 12, all minute; DL 14:14, 15:13 (the numbers are relatively small and all minute), PA all 3, SC 8, 10.

Wing (Fig. 2 d) bare, plain and brownish; anal lobe obtuse, squama with 9: 7, 8: 5 fringe hairs. RR 0.52, 0.48, VR 1.11, 1.12, R/Cu 1.05, 1.05. Costa slightly extended beyond tip of R 4+5. Cu2 nearly straight. Tip of front tibia (Fig. 2 e) with a long spur, tip of middle tibia (Fig. 2 f) with 2 short spurs, tip of hind tibia (Figs. 2 g,h) with a long, and a short spur, and a comb composed of 12 free spurs. fLR 0.73, 0.71, mLR 0.51, 0.52, hLR 0.58, 0.59, fTR 0.14, 0.13, fBR 1.8, 2.2, mBR 2.5, 2.8, hBR 3.3, 3.8. Pulvilli absent.

Setae on abdominal tergites (Fig. 2 i) are arranged roughly into the anterior, posterior and lateral groups, 38 on I, 32 on II to IV, 30 on VI, and 26 on VIII. Hypopygium in Fig. 2 j, left inner lobe of gonocoxite and gonostylus in Fig. 2 k. Anal point absent. Ninth tergite with 6 short setae in a transverse row in the middle portion, posterior margin without setae. Inner lobe of gonocoxite small, oval, with 8 short setae and microtrichia. Gonostylus with a small rectangular preapical tooth.

Remarks. This species is similar in body coloration to the preceding species especially in that abdominal tergites are uniformly brown, but differs from it at least in that ground color of scutum is yellow and stripes are clearly differentiated by color being dark brown, the numbers of DL setae are much smaller (13-15 versus 42-52), and anal point is absent.

5. *Cricotopus (Cricotopus) tamapullus* Sasa, 1981

One male was collected. No. 358:23 (#2-16). BL 2.52mm, WL 1.32mm, WW/WL 0.30. ER 0.92, AR 0.79, AHR 0.46, P/H 0.81, SO 8:8, CL 10, PN 4:4, DM 20, DL 42:38, PA 4:4, SC 12, SQ 5:6, RR 0.55, VR 1.19, R/Cu 1.02, fLR 0.53, mLR 0.45, hLR 0.51, fTR 0.14, fBR 1.8, mBR 2.4, hBR 2.6.

This specimen is provisionally classified as *Cricotopus tamapullus* Sasa, 1981, and is similar to the above two species in that body, including abdominal tergites and legs, are almost entirely dark brown, but is differentiated from the two species by that AR is 0.79 and much smaller, from *C. seiryubeceus* by that DL is more numerous and scutum are entirely dark brown (the areas between scutal stripes are remarkably paler in *C. seiryubeceus*), and from *C. seiryubeceus* by that body size is much smaller, anal point is absent, the shape of gonocoxite is shorter and its inner lobe is also shorter and stouter.

6. *Cricotopus (Pseudocricotopus) seiryucedeus* sp. nov. (Fig. 3)

A male was collected at Hiyoshi-mura. Holotype: No. 359: 07 (#9-3). BL 3.29mm, WL 2.00mm, WW/WL 0.30. Ground color of scutum, and scutellum brown, stripes and postnotum

dark brown, femora yellow basally and gradually darkened towards apex, basal 2/3 of tibiae yellow and apical portion brown, tarsi yellow; abdominal tergites I and II white, III to VIII dark brown, hypopygium yellowish brown. Head in Fig. 3 a. Eyes highly pubescent, ER 0.53. Antenna with 13 flagellar segments, AR 0.70, AHR 0.42. Palp long, P/H 1.38. SO 11:12, CL 16. Anteprenotum (Fig. 3 b) united in the middle, with 6:6 lateral setae. Distribution of setae on scutum in Fig. 3 c. DM 16, all minute. Dorsolateral setae 24:24, all very small and decumbent. PA 3:3, SC 24.

Wing membrane bluish, very finely granular, venation in Fig. 3 d. SQ 9:9, RR 0.52, VR 1.10, R/Cu 1.08. Costa slightly extended beyond tip of R4+5, Cu2 nearly straight. Tip of front tibia with a spur (broken in this specimen). Tip of middle tibia (Fig. 3 e) with two short spurs. Tip of hind tibia (Fig. 3 f) with a long and a short spur, and a comb composed of 12 free spurs. fLR 0.63, mLR 0.47, hLR 0.55, fBR 1.5, mBB 1.6, hBR 2.9. Pulvilli absent, empodium well developed, claws stout and apically forked (Fig. 3 g, middle tarsus V).

Setae on abdominal tergites well developed, those on tergites II to VII are arranged roughly into the anterior transverse row, posterior transverse row, and lateral groups, those on III to V as in Fig. 3 h, 32 on III and 34 on IV and V in total numbers. Hypopygium in Fig. 3 i. Anal point robust, widest at base and apically rounded, with microtrichia on base but distal 4/5 bare. Ninth tergite with 6 and 7 setae on both sides of the base of anal point. Hypopygium with very complicated inner structure, as shown in Fig. 3 j. Virga not detected. Gonocoxite with two prominent inner lobes, the basal one large, quadrangular, clothed with microtrichia but without setae, the distal one finger-like, and with some 15 short setae. Gonostylus (also in Fig. 3 k) stout, with a finger-like basal process bearing two knife-like apical setae and 7 short simple setae on posterior margin, and a large rounded subapical process bearing very stout and long megaseta, two long apical and preapical setae, and 10 short setae on inner margin.

Remarks. This species belongs to subgenus *Pseudocricotopus* Nishida, 1987, since its basic structures are the *Cricotopus* type, such as eyes are highly pubescent and with dorsomedial projection, DL setae of scutum and minute and decumbent, and squama is fringed, but is quite characteristic in the structure of gonostylus, which is stout and directed backwards, and with a prominent basal process bearing setae and spines. Five species have been recorded from Japan as members of this subgenus, among which the present species is most closely related to *C. nishikiensis* Nishida, 1987, in that megaseta on gonostylus is situated in the apical portion and anal point is present, but in *nishikiensis* megaseta is longer and narrower, and basal process of gonostylus is much shorter and without spines, inner lobe of gonocoxite is simple and much lower (in the present species gonocoxite with two prominent inner lobes, the distal one long and narrow, the basal one large and quadrangular).

7. *Nanocladius quadrivittatus* Niitsuma, 1991 (Fig. 4)

A male was collected at a downstream site of Hiromi River. No. 358: 90 (#7-9). BL 1.73mm, WL 0.93mm, WW/WL 0.40 (very wide). Ground color of scutum, and scutellum pale, median and lateral stripes of scutum yellowish brown, postnotum brown, legs yellow. Abdominal tergites I, II, VI, VII and VIII pale, III, IV and V yellow. Head in Fig. 4 a. Eyes

egg-shaped, highly pubescent, ER 1.70 (very high). Antenna with 13 flagellar segments, AR 0.72, AHR 0.48. Palp short, P/H 0.95. SO only 1:1, CL 5. Antepronotum (Fig. 4 b) united in the middle, with 2:2 lateral setae. Distribution of setae on scutum and scutellum in Fig. 4 c. Scutum with a median hole bearing 2 small setae, DL 6:6. PA 1:1, SC only 2.

Wing (Fig. 4 d) very wide, membrane brownish and very finely granular, squama with 1:1 seta, anal lobe obtuse. R2+3 in contact with R4+5, Cu2 nearly straight, VR 1.24, tip of R4+5 proximal to tip of Cul, R/Cu 0.95. Tip of front tibia (Fig. 4 e) with a long spur, tip of middle tibia (Fig. 4 f) with 2 short spurs, tip of hind tibia (Fig. 4 g) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.63, mLR 0.40 (very low), fTR 0.15, fBR 2.4, mBR 2.3 (hind tarsi lost). Tarsomeres IV cordiform and shorter than V pulvilli present, brush-like (Fig. 4 h).

Distribution of setae on abdominal tergites and illustrated by Kawai (1991, Fig. 2 a), only 2 on I, and 4 on II to VIII. Hypopygium in Fig. 4 i. Anal point (also in Fig. 4 j) very narrow and needle-like, with a bilobed base bearing 2 setae. Inner lobe of gonocoxite (Fig. 4 i) narrow triangular, sharply pointed apically. Inner lobe of gonocoxite narrow triangular and sharply pointed apically, with marginal setae and microtrichia. Gonostylus widest near apex, with a large apical megaseta but without preapical tooth.

Remarks. This species was described by Niitsuma (1991) by the above name in *Jpn. J. Entom.* Vol. 39, No. 2, with the date of publication of June 25, while another paper describing presumably the same species by the name of *Nanocladius pulcher* sp. nov. was published by Kawai (1991) in *Jpn. J. Limnology* in Vol. 52, No. 3, with the date of publication of July 1991.

8. *Nanocladius seiryudeeus* sp. nov. (Fig. 5)

A male was collected in the city of Nakamura with a light trap. No. 358: 64 (#4–24). BL 1.68mm, WL0.99mm, WW/WL 0.36 (very wide). Scutum almost entirely brown and stripes hardly discernible by color, scutellum also brown, postnotum dark brown, abdominal tergites largely yellowish brown but caudal 2/3 of VI and VII as well as hypopygium pale; all coxae and trochanters, front femur and oral half of front tibia brown, the distal leg portions yellow. Head in Fig. 5 a. Eyes highly pubescent, roughly oval, inner margin slightly concave, ER 1.65 (very high). Antenna with 13 flagellar segments, AR 0.73, AHR 0.42. Palp short, P/H 0.95. SO 2:2, CL 8. Antepronotum (Fig. 5 b) united in the middle, with one lateral seta on right side but left side without seta. Scutum with a small median pale spot bearing 2 short setae, DL 5:5, PA 2:2, SC 0 (Fig. 5 c)

Wing (Fig. 5 d) bare, both squamae with only one seta, anal lobe obtuse; R2+3 in contact with R4+5, VR 1.20, R/Cu 0.98. Tip of front tibia (Fig. 5 e) with a long seta, 35 microns long and 2.0 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 5 f) with 2 short spurs. Tip of hind tibia (Fig. 5 g) with a long and a short spur, and a comb composed of 12 free spurs. fLR 0.64, mLR 0.46, fTR 0.16, fBR 2.8, mBR 3.8 (hind tarsi lost). Pulvilli well developed, brush-like (Fig. 5 h, middle tarsi IV and V).

Abdominal tergites (Fig. 5 i) with small numbers of setae, 8 on I, 10 on II, 8 on III and IV, and 10 on V to VIII. Hypopygium in Fig. 5 j. Anal point narrow and needle-like, with

pointed apex. Inner lobe of gonocoxite about as long as wide and with rounded margin bearing 7 short setae and microtrichia. Gonostylus simple, without preapical tooth and with a hyaline rectangular apical process, but megaseta such as seen in the former species is absent.

Remarks. This specimen is also a typical member of the genus *Nanocladius*, and similar in structure to the former species, *N. quadrivittatus*, in that eyes without dorsomedial extension and highly pubescent, dorsolateral setae of scutum well developed, squama with only 1 fringe seta, wing is very wide, abdominal tergites with very small numbers of setae, and anal point is very narrow and sharply pointed. However, this specimen differs from the former species, *N. quadrivittatus*, especially in that thorax is almost entirely dark brown or brown, abdomen largely brown, basal portions of legs brown and distal portions yellow, ninth tergite without a pair of lobes at the base of anal point, inner lobe of gonocoxite broad and rounded, and gonostylus without the typical rounded megaseta. Four species have been recorded as members of this genus from Japan and Korea (key in Sasa & Kikuchi, 1995, p. 152), and the present species can easily be differentiated by combination of the above characters.

9. *Paratrichocladius rufiventris* (Meigen, 1830)

Four males were collected at the side of a branch river, Kubogawa. No. 358:57 (#4-17), 358:77 (#6-2), 359:13 (#9-9), 360:61 (#6-2-2). This is a species widely distributed in Europe, and has been collected more than 10 localities in Japan.

10. *Eukiefferiella seiryuefea* sp. nov. (Fig. 6)

Five males were collected, all by sweeping at the side of a branch river, Kubogawa, on April 26, 1998. Holotype: No. 360: 75 (#8-10-3). Paratypes: No. 359: 01 (#8-8), 359:03 (#8-10), 360:73 (#8-8-3), 360:74 (#8-10-2). BL 1.68-1.84 (1.80 in average of 5)mm, WL 0.88-1.00 (0.95)mm, WW/WL 0.36-0.39 (0.37, very wide)mm. Ground color of scutum pale, stripes brown and clearly discernible, scutellum pale, postnotum brown, legs almost uniformly yellow; abdominal tergites largely brownish yellow, with narrow pale bands along oral margin. Head in Fig. 6 a. Eyes highly pubescent, oval, without dorsomedial extension and inner margin convex, ER 1.46-1.72 (1.59). Antenna all composed of 12 flagellar segments, AR 0.34-0.43 (0.37), AHR 0.27-0.36 (0.32). P/H 0.81-0.92 (0.88). SO all 2, CL 4, 5, or 6 (4.6). Anteprepronotum (Fig. 6 b) united in the middle, PN 0 or 1 (0.9). Distribution of setae on scutum and scutellum in Fig. 6 c; DM 6-8 (7.2), DL 6-8 (6.9), SC 2, 3 or 4 (3.0).

Wing (Fig. 6 d) bare, very finely granular. Squama bare, anal lobe obtuse; costa extended beyond tip of R4+5 proximal to tip of Cul, RR/Cu 0.83-0.89 (0.85); Cu2 straight. Tip of front tibia (Fig. 6 e) with a long spur. Tip of middle tibia (Fig. 6 f) with 2 short spurs. Tip of hind tibia (Fig. 6 g) with a short and a long spur, and a comb composed of 10 free spurs. fLR 0.36-0.42 (0.39 in average, unusually small), mLR 0.38-0.41 (0.40, also very small), hLR 0.44-0.46 (0.45), fTR 0.14-0.16 (0.15), fBR 2.4-2.5, mBR 2.4-2.9 (2.6), hBR 2.5-2.9 (2.7). Pulvilli absent.

Abdominal tergites (Fig. 6 h) with small numbers of setae, 10 on I, 8 on II to V, and 6 on VI to VIII. Hypopygium in Fig. 6 i. Anal point absent. Virga composed of 4 stout codes 30 microns long in the holotype. Ninth tergite with a peculiar transverse ridge (internal

structure) near posterior margin. Inner lobe of gonocoxite (also in Fig. 6 j) longer than wide, rounded, and with short setae on dorsal side and along the margin. Gonostylus (also in Fig. 6 j) simple, slender and straight, without preapical tooth.

Remarks. This species is considered as belonging to the *coerulescens* group of the genus *Eukiefferiella* in the sense of Sasa & Kikuchi (1995, p. 157), since R2+3 in contact with R4+5, R/Cu < 1.0, squama bare, eyes pubescent, and anal point is absent. This species is most closely related to *E. coerulescens* (Kieffer, 1926) and *E. togaentertia* Sasa et Okazawa, 1992, but differs essentially from both species in the shape of inner lobe of gonocoxite being longer than wide (much wider than long in the latter two species, cf. Pinder, 1978, Fig. 105D for *coerulescens*, Sasa & Okazawa, 1992, p. 111 and Fig. 15 for *E. togaentertia*). This species is especially characteristic in that abdominal tergites with very small numbers of setae, and leg ratio (LR) is very small.

11. *Eukiefferiella seiryufegea* sp. nov. (Fig. 7)

Two males were identified. Holotype No. 358:06 (#1–6), collected at the side of Shimanto River near its mouth in Nakamura, by sweeping with insect net. Paratype: No. 359:02 (#8—9), also in Nakamura by sweeping.

Male. BL 1.64, 1.69, WL 0.98, 1.06, WW/WL 0.37, 0.38 (very wide). Scutum, distal half of tergites VI and VII yellow; coxae, trochanters and basal half of femora brown, the rest distal leg portions yellow. Head in Fig. 7 a. Eyes highly pubescent, egg-shaped and without dorsomedial extension, ER 1.76, 1.71. Antenna with 13 flagellar segments, AR 0.66, 0.56, AHR 0.48, 0.44. Palp short, P/H 0.83, 0.81. SO 1:1, 2:2, CL 8, 6. Anteprepronotum (Fig. 7 b) united in the middle, with 2:2, 0:0 lateral setae. Distribution of setae on scutum and scutellum in Fig. 7 c. Scutum with a median pale hole bearing two minute setae. DL 5:5, 5:6, PA 1:1, 2:2, SC 2, 0 (very unusual).

Wing bare, plain, venation in Fig. 7 d. Squama bare. R2+3 in contact with R4+5. Costa extended beyond tip of R4+5, which is proximal to tip of Cul, R/Cu 0.94, 0.91. VR 1.20, 1.23. Tip of front tibia (Fig. 7 e) with a long spur, tip of middle tibia (Fig. 7 f) with two short spurs, tip of hind tibia (Figs. 7 g,h) with a long and a short spur, and a comb composed of 10 free spines. fLR 0.67, 0.64, mLR 0.44, 0.47, hLR 0.58, 0.56, fTR 0.16, 0.16, fBR 1.6, 2.9, mBR 3.1, hBR 3.6. All legs with brush-like pulvilli (Fig. 7 i: middle tarsus V; Fig. 7 j: hind tarsus V).

Abdominal tergites (Fig. 7 k) with very small numbers of setae, 6 on I, 8 on II to VIII, and 6 on IX. Hypopygium in Fig. 7 m. Anal point (also in Fig. 7 n) small, narrow and sharply pointed like a needle, arising on a broad rounded lobe bearing 4 marginal setae. Inner lobe of gonocoxite (also in Fig. 7 n) small and globular. Gonostylus (also in Fig. 7 n) simple, widest near apex, with a megaseta but without preapical swelling.

Remarks. These specimens belong to the *tokuokasia* group of the genus *Eukiefferiella* in the sense of Sasa & Kikuchi (1995), since R2+3 is in contact with R4+5, squama bare, eyes pubescent, and anal point is present. It is closest to *E. tokuokasia* Sasa, 1989, in that AR is about 0.7, costa is extended beyond tip of R4+5, tip of R4+5 is proximal to tip of Cul, pulvilli present, beyond tip of R4+5 is proximal to tip of Cul, pulvilli present, gonostylus is

nearly straight and without preapical tooth, and anal point is narrow, apically pointed and situated on lobe bearing marginal setae, but *tokuokasia* differs essentially from the present species in that DM is multiple (6 in number), inner lobe of gonocoxite is acutely angulate, anal point is situated near oral margin of 9th tergite, and the ridge at the base of anal point is paired (single and rounded in the present species).

12. *Eukiefferiella tamaflava* Sasa, 1981

A male was collected. No. 360:99 (#10-19-3). BL 2.01mm, WL 1.22mm, WW/WL 0.36 (very wide). Eyes bare, ER 1.51. Antenna with 13 flagellar segments, AR 0.51, AHR 0.38. P/H 0.87. SO 4:4, CL 9, PN 2:2, DM 0, DL 8:8, PA 3:3, SC 6. Squama with 4:5 fringe hairs, R 2+3 in contact with R4+5, VR 1.36, R/Cu 0.95. fLR 0.82, mLR 0.50, fTR 0.18, fBR 3.5. Anal point long, widest at base and apically pointed, with 1:1 lateral setae on the base, clothed with microtrichia except apical portion. Inner lobe of gonocoxite broad and rounded. Gonostylus slender, without preapical tooth.

The above characters are almost coincident with those of *E. tamaflava*, which was recorded first from upstream sites of Tama River containing clean waters, and later also from mountain streams in Toyama and Nagano.

13. *Orthocladius (Orthocladius) seiryugeheus* sp. nov. (Fig. 8)

A male was collected with a light trap at Nakamura. Holotype: No. 358:63 (#4-23). BL 2.04mm, WL 1.20mm, WL 1.20mm, WW/WL 0.33. Ground color of scutum pale, stripes and postnotum dark brown, scutellum pale, legs and abdominal tergites yellow. Head in Fig. 8 a. Eyes bare, reniform and without dorsomedial extension, ER 1.24. Antenna with 13 flagellar segments, AR 0.73, AHR 0.43. Palp short, P/H 0.84. SO 1+4, 1+4, CL 6. Anteprepronotum (Fig. 8 b) united in the middle, PN 0:0. Distribution of setae on scutum and scutellum in Fig. 8 c; DM 0, DL 5:5, PA 3:3, SC 2, all very small.

Wing (Fig. 8 d) without macrotrichia but with moderate punctation, SQ 6, anal lobe nearly rectangular. Costa only slightly extended beyond tip of R4+5. RR 0.50, VR 1.17, R/Cu 1.20. Cu2 nearly straight. Tip of front tibia (Fig. 8 e) with a long spur, 40 microns long and 1.5 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 8 f) with 2 short spurs. Tip of hind tibia (Fig. 8 g) with a long and a short spur, and a comb composed of 10 free spines. fLR 0.62, mLR 0.51, hLR 0.53, fTR 0.16, fBR 2.5, mBR 2.8, hBR 3.6. Pulvilli absent.

Setae on abdominal tergites (Fig. 8 h) are rather small in the numbers, 24 on I, 32 on II and III, 40 on IV, 36 on V, 32 on VI, and 24 on VII and VIII. Hypopygium in Fig. 8 i. Anal point widest at base and tapering towards pointed apex, with 3:3 lateral setae. Virga small, composed of numerous short codes. Inner lobe of gonocoxite single, small, narrow and rounded, with 2 short setae on inner margin and 4 short setae on lateral margin. Gonostylus simple, inner margin concave, without preapical swelling.

Remarks. In this specimen, wing is bare but with moderate punctation, squama fringed, Cu2 nearly straight, and anal point with lateral setae, and was first regarded as belonging to the genus *Paratrissocladius* Zavrel, 1973, but is now considered better to be classified provisionally into the subgenus *Orthocladius* of the genus *Orthocladius*, which includes

species with more variable characters. However, it is again quite unusual as a member of this group in that the numbers of setae on scutum, scutellum and abdomen are extremely small (DM 0, DL only 5, SC only 2), eyes without dorsomedial extension, inner lobe of gonocoxite is simple (usually double in this group), small and narrow, and gonostylus is strongly curved.

14. *Psectrocladius seiryuhei* sp. nov. (Fig. 9)

Two males were collected at Nakamura with a light trap. Holotype: No. 358:59 (#4-19), 360:52 (#4-9-2). Body length (BL) 2.82, 3.02mm, wing length (WL) 1.35, 1.50mm, WW/WL 0.34, 0.32. Scutum, scutellum and postnotum almost entirely black, legs and abdominal tergites dark brown. Head in Fig. 9 a. Eyes bare, with a wedge-shaped dorsomedial extension, ER 0.74, 0.93. Antenna with 13 flagellar segments, antennal ratio (AR) 0.76, 0.73, antennal hair ratio (AHR) 0.38, 0.46. Palp 1.02, 1.19 times as long as the width of head. SO all 12, CL 6, 8. Anteprepronotum (Fig. 9 b) united in the middle, with 4:5, 5:5 lateral setae. Distribution of setae on scutum and scutellum in Fig. 9 c; DM 14, 12, all relatively well developed, DL 20:21, 23:25, all well developed, PA 8:8, 10:10, SC 19, 16.

Wing (Fig. 9 d) bare, brownish, anal lobe slightly produced, squama with 16, 12 fringe hairs. RR 0.63, 0.63, 0.63, VR 1.23, 1.21, R/Cu 1.09, 1.06. Costa rather strongly extended beyond tip of R4+5, Cu2 nearly straight. Tip of front tibia (Fig. 9 e) with a long spur, 52 microns long and 1.44 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 9 f) with 2 short spurs, 17 and 13 microns long. Tip of hind tibia (Fig. 9 g) with a long (59 microns) and a short (24 microns) spur, and a comb composed of 12 free spines. fLR 0.68, 0.68, mLR 0.45, 0.46, hLR 0.56, 0.55, fTR 0.15, 0.13, fBR 3.6, 3.7, mBR 4.3, 4.7, hBR 4.8, 5.1. Tarsi IV cylindrical, as usual, and longer than tarsi V. Tarsi V flattened laterally, as usual, pulvilli well developed, pad-like, bearing brush-like setae (Fig. 9 h, hind tarsus V).

Setae on abdominal tergites (Fig. 9 i, left half) are nearly evenly distributed, 36 on I, 50 on II to VI, 40 on VII, and 32 on VIII. Hypopygium in Fig. 9 j. Anal point and virga absent, ninth tergite with a broad and rounded ridge, bearing 4 marginal and 9 dorsal setae in the holotype. Inner lobe of gonocoxite (Fig. 9 k) small and narrow, finger-like, bearing many marginal and dorsal short setae. Gonostylus simple, slender, without preapical swelling.

Remarks. This species is considered as belonging to the genus *Psectrocladius* Kieffer, 1906, since wings are bare and plain, squama fringed, eyes bare, Cu2 nearly straight, and pulvilli are well developed. They are however, quite unusual as members of this genus in that anal point is absent. According to the review of this genus compiled by Cranston *et al.* (1989, p. 230), it is classified into 4 subgenera, and the present species is apparently closest to subgenus *Allopectrocladius*, since acrostichals (dorsomedian setae) on scutum is present and middle tibia with two terminal spurs, the shorter one about 2/3 as long as the longer one, but does not fit to this subgenus in that tarsi V is laterally flattened and anal point is absent (dorsoventrally flattened, anal point present). It is also stated in this review that anal point is absent in *P. zetterstedti* Brundin, and species with such an unusual character is found in the subgenus *Psectrocladius*, in which all the species have only one terminal spur on middle tibia. Therefore, the present species seems not to belong to any of the above previously known

subgenera.

15. *Limnophyes minimus* (Meigen, 1818)

Twenty two (22) males are provisionally classified into this species.

No. 358:05 (#1-5), 358:07 (#1-7), 358:33 (#3-7), 358:88 (#7-7), 358:89 (#7-8) 359:18 (#9-14), 359:43 (#10-25), 360:02 (#1-2), 03 (#1-3), 04 (#1-4), 360:08 (#2-4) 360:13 (#3-5), 360:17 (#4-3), 360:56 (5-5-2), 360:60 (#5-11-2), 350:64 (#7-7-2), 360:65 (#7-8-2), 360:66 (#7-8-3); No. 358:22 (#2-15), 358:69 (#5-5), 358:75 (#5-11), 360:26 (#5-6).

16. *Limnophyes prolongatus* (Kieffer, 1921)

Three males were collected by sweeping at Hiyoshi-mura, on April 26, 1998. No. 359: 14 (#9-10), 359:15 (#9-11), 360:79 (#9-11-2). BL 2.14, 2.34, 2.18mm, WL 1.23, 1.30, 1.30mm, WW/WL 0.33, 0.32, 0.32. Scutum, scutellum and postnouv almost uniformly black, legs and abdomen dark brown. Eyes bare, reniform, ER 1.64, 1.35, 1.36. Antenna with 13 flagellar segments, AR 0.44, 0.41, 0.55, AHR 0.36, 0.40, 0.45. Palp short, P/H 0.89, 0.79, 0.88. SO 1+4:1+4, 1+3:1+3, 1+4:1+4, CL 16, 20, 16. Anteprepronotum united in the middle, with 1:1, 2:2, 1:1 dorsomedial and 4:4, 3:3, 4:4 basolateral setae. DM all 0, DL 42:40, 38:40, 34:36, among which 4:4, 4:4, 3:3 in the humeral areas and 10:10, 7:7, 7:7 in the prescutellar areas are short and lamellar. PA 7:8, 6:6, 6:6, SC 6, 5, 6.

Wing bare but highly granular, squama with 4:5, 4:4, 3:3 fringe hairs. RR 0.30, 0.34, 0.29, VR 1.32, 1.22, 1.36, R/Cu 1.03, 1.07, 1.02. Costa extended much beyond tip of R4+5. Cu 2 short and strongly curved at about middle. fLR 0.48, 0.50, 0.49, mLR 0.46, 0.47, 0.49, hLR 0.58, 0.59, 0.57, fTR 0.11, 0.12, fBR 2.7, 3.0, mBR 3.6, 4.1, 3.3, hBR 5.1, 4.1, 3.7. Pulvilli absent.

Setae on abdominal tergites are relatively small in the numbers, 18 on I, 30 on II, III and IV, 24 on V, 22 on VI, 20 on VII, and 18 on VIII. Anal point absent but posterior margin of ninth tergite broadly produced posteriorly in the middle. Virga conspicuous, composed of two 30 microns long stout codes situated on a cup. Inner lobe of gonocoxite long, narrow and conical. Gonostylus simple, widest at about basal 1/3, tapering towards apex and apically curved inwards, without megaseta and with 2 or 3 setae arising near apex of inner margin.

Remarks. The above structure and measurement data are almost coincident with those of *L. prolongatus* Kieffer, 1921, recorded from Europe by Edwards (1929), Goetghebuer (1940), Brundin (1947) and Pinder (1978). This species was recorded also by Tokunaga (1965) from Kyoto in winter, and described and illustrated by Sasa (1988) with specimens collected from Lake Toya, Hokkaido.

17. *Limnophyes seiryuijeus* sp. nov. (Fig. 10)

A male was collected with a light trap at Nakamura. Holotype: No. 360:14 (#4-2). BL 1.76mm, WL 0.94mm, WW/WL 0.34. Head in Fig. 10a. Eyes bare, reniform, ER 1.56. Antenna with only 10 flagellar segments, AR 0.66, AHR 0.41. Palp short, P/H 0.80. SO 1+3:1+3, CL 14. Anteprepronotum (Fig. 10 b) united in the middle, the median portions with darkly pigmented ridges, PN 2:2. Distribution of setae on scutum and scutellum in Fig. 10 c; DM 0, DL 12:15, all simple and without lamellar setae. PA 5:7, SC 7.

Wing (Fig. 10 d) bare but conspicuously granular, squama with 1:2 fringe hairs. Costa slightly extended beyond tip of R4+5. RR 0.34, VR 1.33, R/Cu 1.00. Anal lobe nearly flat, Cu 2 very short and strongly curved. Tip of front tibia (Fig. 10 e) with a long and simple spur, tip of middle tibia (Fig. 10 f) with 2 short spurs, tip of hind tibia (Fig. 10 g) with a long and a short spur, and a comb composed of only 8 free spines. fLR 0.48, mLR 0.43 (both very short), hLR 0.53, fTR 0.13, fBR 2.0, mBR 2.4, hBR 2.6. Pulvilli vestigial.

Setae on abdominal tergites (Fig. 10 h) are small in the numbers, 10 on I, 14 on II, 16 on III to VI, 14 on VII, and 12 on VIII. Hypopygium in Fig. 10 i. Anal point (also in Fig. 10 j, with posterior margin of ninth tergite) widest at base and tapering towards sharply pointed apex, 30 microns long and 12 microns wide at the base, situated at about the center of ninth tergite and the tip does not extend beyond its posterior margin, entirely clothed with microtrichia but without lateral setae and basal ridge. Virga (Fig. 10 k) composed of one long (18 microns) and stout code and one shorter code. Ninth tergite with 6 short setae on posterior margin. Inner lobe of gonocoxite (Fig. 10 m) narrow but with a very long base, occupying about basal 2/3 of the inner margin of gonocoxite, and the posterior margin triangular and sharply pointed, bearing numerous short setae. Gonostylus nearly parallel-sided, inner margin broadly expanded towards apex, with a long megaseta preapically.

Remarks. This specimen belongs to the group of *Limnophyes* with small numbers of simple dorsomedian setae (none of them lamellar), but is peculiar in having conspicuous, long, narrow and apically sharply pointed anal point entirely clothed with microtrichia on the central portion of ninth tergite, which has never been observed in the previously recorded species of this genus.

18. *Limnophyes tamakitanoides* Sasa, 1981

Two males were collected. No. 358:98 (#8-5), 360:11 (#3-3). This is a species first collected at a rather polluted, downstream part of Tama River, Tokyo, but later collected also from unpolluted sites of a number of rivers in Japan.

19. *Okinawayusurika seiryujekia* sp. nov. (Fig. 11)

Eight males were collected by sweeping at 4 different sites along the river. Holotype: No. 360:54 (#5-2-2). Paratypes: No. 358:04 (#1-4), 358:34 (#3-8), 358:66-68 (#5-2-4), 358:78 (#6-3), 360:55 (#5-4-2). BL 2.76-2.94 (2.85 in average of 8) mm, WL 1.46-1.53 (1.50) mm, WW/WL 0.28-0.30 (0.29). Ground color of scutum brown, stripes dark brown, scutellum brown, postnotum black, legs and abdominal tergites brown. Head in Fig. 11 a. Eyes bare, both with a wedged shaped dorsomedian extension, ER 0.83-0.96 (0.89). Antenna with 13 flagellar segments, AR 1.48-1.59 (1.53), AHR 0.51-0.63 (0.58). Palp (also in Fig. 11 b) composed of 5 segments, the first segment without seta, P/H 1.00-1.17 (1.09) and slightly longer than width of head, the 3rd segment with a long, narrow and sharply pointed apical process extending beyond the junction with 4th segment. SO 8, 10 or 12 (10.0), CL 6-13, most frequently 8, mean 8.6. Anteprepronotum (Fig. 11 c) united in the middle, with 4-8 (6.0) lateral setae. Distribution of setae on scutum and scutellum in Fig. 11 d; DM 4-8 (6.0), DL 18-21 (19.6). PA 5-10 (7.5), SC 8-10 (8.6)), all well developed, long and stout.

Wing (Fig. 11 e) bare but conspicuously granular, bluish, anal lobe obtuse, squama with

6–9 (7.0) fringe hairs. RR 0.46–0.56 (0.49), VR 1.17–1.34 (1.24), R/Cu 1.03–1.08 (1.05). Costa not extended beyond tip of R4+5, Cu2 nearly straight. Tip of front tibia (Fig. 11 f) with a long spur, 81 microns and 2.1 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 11 g) with a short (9 microns) and a longer (27 microns) spur, and a comb composed of 6 (in the holotype) or 4 (in the paratypes) free spines. Tip of hind tibia (Fig. 11 h) with a long (66 microns) and a short (30 microns) spur, and a comb composed of 14 free spines. fLR 0.59–0.73 (0.63), mLR 0.48–0.51 (0.49), hLR 0.57–0.62 (0.59), fTR 0.13–0.14, fBR 2.4–3.2 (2.7), mBR 2.6–3.3 (2.9), hBR 2.8–4.3 (3.5). Front tarsus V as in Fig. 11 i, pulvilli vestigial.

Setae on abdominal tergites as in Fig. 11 j (left half); tergite I with 48, II with 60, III to VI with 64, VII with 56, and VIII with 48 setae in the holotype. Hypopygium in Fig. 11 k, enlarged view of ridge on ninth tergite, inner lobe of gonocoxite, and gonostylus in Fig. 11 m. Anal point is absent, but ninth tergite with a broad, rounded and chitinized ridge bearing 8 marginal setae. Virga composed of two narrow codes 40 microns long. Inner lobe of gonocoxite small, rounded, about as long as wide, and bearing short and strong setae. Gonostylus with convex inner margin, widest at about basal 1/3, without preapical tooth.

Remarks. This species is considered as a member of *Okinawayusurika* Sasa et Hasegawa, 1988, of the *Linnophyes* complex of subfamily Orthocladiinae, since wing membrane conspicuously granular, Cu2 is straight, and middle tibia with a terminal comb like those of hind tibia. It is related to *O. otsurui* Sasa et Hasegawa, 1988 and to *O. togapilosa* Sasa et Okazawa, 1992, in that anal point is absent and squama is fringed, but differs from both especially in that the third segment of palp has a long distal process extending beyond the base of 4th segment, and inner lobe of gonocoxite is small, semicircular and bearing short but strong setae.

20. *Metriocnemus (Metriocnemus) seiryukeleus* sp. nov. (Fig. 12)

A male was collected by sweeping with insect net at the side of Hiromi Branch River in Hiyoshi-mura, on April 26, 1998. Holotype: No. 359: 08 (#9–4). BL 2.94mm, WL 1.52mm, WW/WL 0.31. Ground color of scutum, and scutellum pale, stripes and postnotum brown, legs and abdomen brownish yellow. Head in Fig. 12 a. Eyes bare, each with a long dorsomedial extension, ER 0.41. Antenna with 13 flagellar segments, AR 0.84, AHR 0.46. P/H 1.17. SO 11:11, CL 10. Anteprepronotum (Fig. 12 b) narrowly united in the middle, with 4:4 lateral setae. Distribution of setae on scutum and scutellum in Fig. 12 c; DM 18, DL 12:13, PA 6:6, SC 8, all relatively long and well developed.

Wing (Fig. 12 d) almost entirely clothed with macrotrichia, squama with 5:7 fringe hairs, anal lobe obtuse. R2+3 closely set and almost in contact with R4+5, RR 0.80. VR 1.14. Costa much extended beyond tip of R4+5, which is proximal to tip of Cul, R/Cu 0.96. Cu 2 slightly curved at about distal 1/3. Tip of front tibia (Fig. 12 e) with a long spur, 50 microns and 1.4 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 12 f) with 2 short spurs, 20 and 25 microns long. Tip of hind tibia (Fig. 12 g) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.85, mLR 0.46, hLR 0.63, fTR 0.14, fBR 3.8, mBR 3.9, hBR 4.8. Tarsi I and II of middle and hind legs without terminal

pseudospur. Pulvilli vestigial (Fig. 12 h, front tarsus V).

Abdominal tergites (Fig. 12 i) with relatively small numbers of setae as a member of this genus, 24 on I, 26 on II, 48 on III and IV, 44 on V and VI, 40 on VII and 36 on VIII. Hypopygium in Fig. 12 j. Anal point robust, widest at base and nearly parallel-sided in distal 2/3, with 10 lateral setae and microtrichia on basal 2/3, and apically bare and rounded. Virga small, broad and very low, composed of 8 short codes situated on a cup. Inner lobe of gonocoxite conspicuous, about as long as wide and rounded, with short setae. Gonostylus simple, inner margin slightly concave, without preapical tooth.

Remarks. This specimen is a member of genus *Metriocnemus* van der Wulp, since wing is clothed with macrotrichia, gonostylus simple, eyes bare, Cu2 only slightly curved, and costa is strongly extended beyond tip of R4+5. This specimen is most closely related to *M. cavicola* Kieffer among the European species of this genus in that wing membrane densely clothed with macrotrichia, gonocoxite with a pronounced inner lobe, and AR is nearly 1.0, but in *M. cavicola* anal point is short and triangular, and inner lobe of gonocoxite is much broader and lower. This specimen is also closely related among the Japanese species of this genus to *M. ryutanus* Sasa et Hasegawa, 1988 collected on Okinawa Island, in that tarsi without pseudospurs and anal point is robust and with lateral setae, but in *M. ryutanus* anal point is constricted at about distal 1/3 (not constricted in the present species), without the peculiar virga such as present in the this species, inner lobe of gonocoxite is lower and broader, and gonostylus is widest at apex (widest at about middle and apically tapered in the present species).

***Tosacladius*, subgenus nov.**

A new subgenus within the genus *Metriocnemus* van der Wulp, 1874, Type species: *Metriocnemus seiryulemeus*, sp. nov. Includes another 5 species, all collected from Japan; *seiryumeneus*, also collected in Shimanto River basin and recorded in this paper, and 3 other species, *amamianomalis* Sasa, 1990, *togaminor* Sasa et Okazawa, 1992, and *togapullus* Sasa et Okazawa, 1992. They all show basic structures typical as members of the genus *Metriocnemus* van der Wulp, 1874, but differ from all the other previously know species of this genus by the absence of anal point.

21. *Metriocnemus (Tosacladius) seiryulemeus* sp. nov. (Fig. 13)

Two males collected by sweeping with insect net Yachou Koen, Nakamura, on April 25, 1998. Holotype: No. 358:17 (#2-10). Paratype: No. 358:19 (#2-11). BL 2.34, 2.43mm, WL 1.34, 1.26mm, WW/WL 0.30, 0.30. Ground color of scutum, and scutellum yellow, stripes and postnotum brown, legs and abdominal tergites brownish yellow. Head in Fig. 13 a. Eyes bare, each with a long dorsomedial extension, ER 0.64, 0.57. Antenna with 13 flagellar segments, AR 0.73, 0.73, AHR 0.44, 0.46. P/H 1.08, 1.04. SO all 14, CL both 10. Anteprepronotum (Fig. 13 b) united in the middle, with 3:3, 4:4 lateral setae. Distribution of setae on scutum and scutellum in Fig. 13 c; DM 24, 20, DL 28:28, 22:20, PA 8:8, 8:9, SC 10, 8, all well developed.

Wing (Fig. 13 d) with macrotrichia on almost entire surface and on principal veins, squama with 3:3, 5:6 fringe hairs. R2+3 almost in contact with R4+5. Costa strongly ex-

tended beyond tip of R4+5, which is much proximal to tip of Cul, R/Cu 0.87, 0.86. FCu much distal to R-M, VR 1.19, 1.24. Cu2 only slightly curved at about distal 1/3. Tip of front tibia (Fig. 13 e) with a long spur, tip of middle tibia (Fig. 13 f) with 2 short spurs, tip of hind tibia (Fig. 31 g) with a long, and a short spur, and a comb composed of 11 free spines. fLR 0.83, 0.77, mLR 0.54, 0.55 (relatively high), hLR 0.69, 0.57, fTR 0.14, 0.15, fBR 4.0, 4.0, mBR 4.2, 3.5, hBR 3.5, 3.4. Pulvilli very small, brush-like.

Abdominal tergites (Fig. 13 h) with relatively small numbers of setae nearly evenly distributed, 32 on I, 48 on II and III, 54 on IV and V, 48 on VI and VIII, and 40 on VIII. Hypopygium in Fig. 13 i. Anal point is absent, an unusual character as a member of this genus. Virga composed of a bundle of 16 short and thin codes, not situated on a cup. Inner lobe of gonocoxite low, broad and rounded. Gonostylus simple, inner margin concave, widest at about middle and without preapical tooth.

Remarks. This species is also considered as a member of the genus *Metriocnemus*, since wing with macrotrichia, gonostylus simple, eyes bare, Cu2 nearly straight, and costa is strongly produced beyond tip of R4+5. However, species of this genus previously recorded from the European Region all have well developed anal point (Cranston *et al.*, 1989, p. 213), and only 3 species recorded from Japan are known to be devoid of anal point, *i. e.* *M. amamianomalis* Sasa, 1990, *M. togaminor* Sasa et Okazawa, 1992, and *M. togapullus* Sasa et Okazawa, 1992. In the first species, AR is 0.13–0.15 and extremely small, and it is 2.81 and gonocoxite without inner lobe in the third species. Therefore, the present species is most closely related to the second species, in which AR is 1.00 and inner lobe of gonocoxite is present. However, *M. togaminor* differs from the present species in that inner lobe of gonocoxite is much broader and occupying more than 2/3 of its inner margin, R2+3 is in contact with R1, virga is much longer than wide, and the numbers of setae on head, and scutum, scutellum and abdominal tergites are much larger.

22. *Metriocnemus (Tosaccladius) seiryumeneus* sp. nov. (Fig. 14)

A male was collected with a light trap in the town of Nakamura, on April 24, 1998. Holotype: No. 358: 58 (#4–18). BL 3.44mm, WL 1.84mm, WW/WL 0.30. Ground color of scutum yellow, stripes brown, scutellum yellow, postnotum dark brown, legs uniformly yellow, abdominal tergites brownish yellow. Head in Fig. 14 a. Eyes bare, each with a prominent dorsomedial projection, ER 0.49. Antenna with 13 flagellar segments, AR 1.37, AHR 0.58. P/H 1.05. SO 12:12, CL 14. Anteprepronotum (Fig. 14 b) united in the middle, with 5:5 lateral setae. Distribution of setae on scutum and scutellum in Fig. 14 c. DM 16, DL 16:16, PA 11:13, SC 16.

Wing (Fig. 14 d) bearing macrotrichia mainly on the distal half; squama with 12:12 fringe hairs, costa extended much beyond tip of R4+5; RR 0.29 VR 1.18 R/Cu 1.07; Cu2 nearly straight. Tip of front tibia (Fig. 14 e) with a long spur, 68 microns long and 1.6 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 14 f) with two short spurs. Tip of hind tibia (fig. 14 g) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.84, mLR 0.54, hLR 0.60, fTR 0.13, fBR 0.40, mBR 0.48, hBR 0.65. Pulvilli vestigial (Fig. 14 h, hind tarsus V).

Setae on abdominal tergites (Fig. 14 i) are relatively numerous and nearly evenly distributed, 56 on I, 92 on II to IV, 86 on V and VI, 72 on VII, and 44 on VIII. Hypopygium in Fig. 14 j. Anal point and virga absent, ninth tergite without dorsal lobe and with 18 short setae arising in the middle portion. Gonocoxite without inner lobe (an unusual character), and bearing short setae in the basal and inner portion. Gonostylus simple, without preapical swelling.

Remarks. This specimen is considered also as belonging to the new subgenus, *Tosacladius*, of the genus *Metriocnemus*, since wing with macrotrichia, gonostylus simple, eyes bare, Cu2 straight, and costa is extended much beyond tip of R4+5, and anal point is absent. However, it differs from the above species as well as from the 3 species already recorded from Japan as members of this new subgenus in that AR is 1.37 and larger, ninth tergite with a group of long setae in the central portion, and inner lobe of gonocoxite is absent.

23. *Paraphaenocladius impensus* (Walker, 1856) (Fig. 15)

Three males were collected by sweeping with insect net at Yachou Koen, Nakamura. Holotype: No. 360:41 (#2:12:2). Paratypes: No. 360:42 (#2-12-3), 358:32 (#3-6). BL 2.34, 2.34, 2.28mm, WL 1.14, 1.12, 1.22mm, WL 1.14, 1.12, 1.22mm, WW/WL 0.28, 0.31, 0.30. Ground color of scutum pale, stripes brown, scutellum pale, postnotum dark brown, legs and abdomen brownish yellow. Head in Fig. 15 a. Eyes bare, inner margin concave, ER 0.93, 0.75, 0.67. Antenna with 13 flagellar segments, AR 0.69, 0.74, 0.75, AHR 0.44, 0.46, 0.48. P/H 1.00, 0.92, 1.00. SO 10:10, 11:11, 10:10, CL 8, 11, 10. Anteprepronotum (Fig. 51 b) united in the middle, PN 8:8, 5:5, 4:4. Distribution of setae on scutum and scutellum in Fig. 15 c. DM 14, 24, 20, DL 20:21, 21:20, 23:22, PA 6:8, 6:7, 7:7, SC 8, 8, 5.

Wing (Fig. 15 d) entirely clothed with macrotrichia, SQ all 4, anal lobe obtuse, costa extended beyond tip of R4+5, which is much proximal to tip of Cu1, R/Cu 0.90, 0.86, 0.85. R2+3 in contact with R4+5, VR 1.17, 1.18, 1.21. Tip of front tibia (Fig. 15 e) with a long spur, 45 microns long and 1.5 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 15 f) with 2 short spurs. Tip of hind tibia (Fig. 15 g) with a long and a short spur, and a comb composed of 12 free spurs. Pulvilli vestigial. fLR 0.81, 0.78, mLR 0.54, 0.53, 0.57, hLR 0.70, 0.69, 0.70, fTR 0.16, 0.15, fBR 3.4, 3.5, mBR 3.6, 3.7, 4.8, hBR 4.7, 5.8, 6.2.

Abdominal tergites (Fig. 15 h, right half) with relatively small numbers of setae nearly evenly distributed, 24 on I, 30 on II and III, 36 on IV, 40 on V and VI, and 36 on VII and VIII. Hypopygium in Fig. 15 i. Anal point (also in Fig. 15 j) widest at basemiddle 1/3 nearly parallel-sided, abruptly constricted at about distal 1/3, the distal portion narrow, parallel-sided and apically rounded, basal half clothed with microtrichia and the distal half without microtrichia, with 7 lateral setae on both sides. Virga small, 10 microns wide and 8 microns high, composed of 8 short codes situated on a cup. Gonocoxite long, inner lobe situated near base and with rounded margin, bearing numerous short setae. Gonostylus simple, with a small rectangular preapical tooth.

Remarks. This species is considered as belonging to the genus *Paraphaenocladius* Thienemann, 1924, since the basic structures are the Orthoclaadiinae form, wing with macrotrichia, gonostylus simple, eyes are bare, Cu2 nearly straight, and tip of R4+5 is proximal to

tip of Cul. In the present specimens, AR is 0.69–0.74, anal point is widest at base, with lateral setae and microtrichia on basal half, and distal 1/3 is abruptly constricted and bare, parallel-sided and apically rounded, and other structures and measurement data fit to the description of *P. impensus* (Walker, 1856) given by the European workers, and also by Sasa & Okazawa (1992) with specimens collected from Kurobe River, Toyama.

24. *Epoicocladius seiryuopeus* sp. nov. (Fig. 16)

A male was collected by sweeping at Ekawasaki, on 26 April, 1998. Holotype: No. 358: 73 (#5–9). BL 1.80mm, WL 1.00mm, WW/WL 0.40 (very wide). Ground color of scutum, and scutellum yellow, stripes and postnotum dark brown, legs and abdomen yellow. Head in Fig. 16 a. Eyes bare, reniform, ER 1.73. Antenna with 13 flagellar segments, AR 0.55, AHR 0.34. Palp short, P/H 0.74. SO 3:3, CL 5. Anteprepronotum (Fig. 16 b) tapering towards middle and slightly separated, each with 1 lateral seta. Distribution of setae on scutum and scutellum in Fig. 16 c; DM 0, DL 4:5, PA 2:2, SC 2.

Wing (Fig. 16 d) bare, brownish and plain. Squama bare, anal lobe obtuse. Costa extended much beyond tip of R4+5. RR 0.70, VR 1.21, R/Cu 1.02. Cu2 strongly curved at about the middle. Tip of front tibia (Fig. 16 e) with a long spur, 34 microns long and 1.6 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 16 f) with two very short spurs. Tip of hind tibia (Fig. 16 g) with a long and a short spur, and a comb composed of 11 free spines. fLR 0.53, mLR 0.49, hLR 0.53, fTR 0.09, fBR 3.2, mBR 3.4, hBR 4.6. Pulvilli absent.

Abdominal tergites (Fig. 16 h) with small numbers of setae, 6 on I, 12 on II to IV, 14 on V and VI, and 12 on VII and VIII and VIII. Hypopygium in Fig. 16 i. Anal point absent, ninth tergite with a broad rounded lobe in the middle bearing 6 marginal setae. Virga prominent, composed of 7 codes, 37 microns long. Inner lobe of gonocoxite broad and rounded, with numerous short setae on posterior margin. Gonostylus simple, widest at about distal 1/3, without preapical swelling.

Remarks. This specimen is considered as belonging to the genus *Epoicocladius* Zavrel, 1924, since last palpal segment is long, eyes, wing membrane and squamae are all bare, R2+3 is separated from R1 and R4+5, costa extended, Cu2 is strongly curved, and gonocoxite with only one inner lobe. Larvae of this genus are known to be epizootic on body of Ephemeroptera in the European and Nearctic regions, but all 18 species recorded as members of this genus from Japan by Sasa and coworkers are known only by adult males and classified into it on morphological bases, and a key was compiled by Sasa (1998, p. 108). The present species belongs to the group with R/Cu >1.0 and anal point is absent, and is most closely related to *E. yufuniveus* Sasa et Suzuki, 1991, in that ninth tergite without broad and rounded posterior projection, but in *E. yufuniveus* body is almost entirely white, AR is 1.47 (only 0.55 in the present species), DM is 6 (0 in the present species), and fLR and mLR are larger than 0.5.

25. *Pseudosmittia forcipata* (Goetghebuer, 1921) (Fig. 17)

A male was collected by sweeping at Hiyoshi-mura on April 26, 1998. Holotype: No. 359: 17 (#9–13). BL 1.64mm, WW/WL 0.34. Ground color of scutum yellow, stripes brown,

scutellum yellow, postnotum brown, legs and abdominal tergites brownish yellow. Head in Fig. 17 a. Eyes bare, reniform and without dorsomedial projection, ER 1.44. Antenna with 13 flagellar segments, AR 0.74, AHR 0.42. Palp long, P/H 1.19. SO 2+3:2+3, CL 6. Anteprenotum (Fig. 17 b) united in the middle, with 1:1 lateral seta. Distribution of setae on scutum and scutellum in Fig. 17 c. DM 2, Very short and arising on a median pale hole. DL 7:7, PA 3:4, SC 4.

Wing (Fig. 17 d) bare, membrane plain, squama bare, anal lobe obtuse. Costa not extending beyond tip of R4+5, which is much proximal to tip of Cul, R/Cu 0.89. R2+3 separated, ending near to tip of R4+5 than to tip of R1, RR 0.73. FCu much distal to R-M, VR 1.52, very high. Cu2 short and nearly straight. Tip of front tibia (Fig. 17 e) with a long spur, tip of middle tibia (Fig. 17 f) with 2 short spurs, tip of hind tibia (Fig. 17 g) with a long, and a short spur, and a comb composed of 13 free spines. fLR 0.45 (unusually small), mLR 0.50, hLR 0.53, fTR 0.11, fBR 4.0, mBR 3.5, hBR 3.2. Pulvilli absent.

Setae on abdominal tergites (Fig. 17 h., right half) very small in numbers, 2 on I, 12 on II to IV, 10 on V and VI, and 6 on VII and VIII. Hypopygium in Fig. 17 i. Anal point (also in Fig. 17 j) small, narrow, arising on a U-shaped base and tapering towards pointed apex, clothed with microtrichia except on the tip. Gonocoxite with 3 inner lobes as in Fig. 17 k, the basal one narrow and with numerous short setae, the middle and ventral one long, apically pointed and with short setae, the distal and dorsal one is composed of a narrow apically rounded lobe and a distal broad lobe with dotted marks. Gonostylus simple, widest at base and tapering towards apex.

Remarks. This specimen belongs to the genus *Pseudosmittia* Goetghebuer in its basic structure, and to its group with 3 inner lobes on gonocoxite. The structure of hypopygium, including the shape of 3 inner lobes, are coincident with *P. forcipata* (Goetghebuer) illustrated by Pinder (1978, Fig. 136D) and is provisionally classified as belonging to this species, but according to Goetghebuer (1940, p. 106) AR is 1.2 in the European specimen and much higher than 0.74 of the present specimen. This species is a new record to Japan.

26. *Pseudosmittia nishiharaensis* Sasa et Hasegawa, 1988 (Fig. 18)

A male was collected at Yachou Koen, Nakamura, on April 25, 1998. No. 358:21 (#2-14). BL 2.334mm, WL 1.09mm, WW/WL 0.31. Scutum, scutellum, postnotum and abdominal tergites largely dark brown, legs brownish yellow. Head in Fig. 18 a. Eyes bare, reniform, ER 1.84 (very wide). Antenna with 13 flagellar segments, AR 1.38, AHR 0.59. Palp very short, P/H 0.71. SO 6:6, CL 8. Anteprenotum (Fig. 18 b) widely separated, PN 1:1. Distribution of setae on scutum and scutellum in Fig. 18 c; DM 2, small and situated in a central hole of scutum; DL 12:12, PA 4:5, SC 6.

Wing (Fig. 18 d) bare, membrane plain, squama bare. Costa slightly extended beyond tip of R4+5, which is proximal to tip of Cul, R/Cu 0.94. RR 0.52, VR 1.67 (very high). Cu 2 very short and straight. Anal lobe obtuse. Tip of front tibia (Fig. 18 e) with a long spur, 45 microns long and 1.7 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 18 f) also with only one spur, 36 microns long and 1.25 times as long as the diameter of middle tibia at the tip (not 2 short spurs as in most species of this group). Tip of

hind tibia (Fig. 18 g) with a long and a short spur, and a comb composed of 12 free spines. Tarsi I to IV of all legs with one apical spur. Pulvilli absent. fLR 0.61, mLR 0.52, hLR 0.56, fTR 0.15, fBR 2.9, mBR 3.5, hBR 4.1.

Setae on abdominal tergites (Fig. 18 h) are small in the numbers, 0 on I, 12 on II to IV, 10 on V to VII, and 12 on VIII. Hypopygium in Fig. 18 i. Anal point roughly V-shaped, widest at base and rather pointed apically, almost entirely clothed with microtrichia, and with 4 or 5 lateral setae. Ninth tergite with 6 setae near posterior margin, which is concave in the middle. Virga small, inverted V-shaped. Inner lobe of gonocoxite single, longer than wide and apically rounded. Gonostylus simple, inner margin concave and with 3 setae, without preapical swelling.

Remarks. This species also belongs to the genus *Pseudosmittia*, since wing membrane bare, squama without fringe hairs, costa not extended beyond tip of R4+5, which is situated much proximal to tip of Cul, FCu much distal to R-M, Cu2 is very short but straight. It belongs to the group with only one inner lobe on gonocoxite, and is closest among the European species of this genus to *P. curticosta* (Edwards) in that anal point is well developed, but in *P. curticosta* AR is 1.0 (smaller), anal point is smaller and without lateral setae, inner lobe of gonocoxite is much smaller, and gonocoxite is widest at apex (cf. Pinder, 1978, 137D). On the other hand, the present specimen is almost coincident in the structure and measurement data to *P. nishiharaensis* Sasa et Hasegawa, 1988, which has so far been collected only from the Okinawa Islands, southern Japan (type specimens by Sasa & Hasegawa, 1988, on Miyako, later by Sasa, 1990, on Okinawa). This species is especially characteristic in that anteprenotum is widely separated in the middle and with only one lateral seta, scutum with a median hole bearing 2 short setae, middle tibia with only 1 terminal seta, anal point is large, V-shaped and with lateral setae, and inner lobe of gonocoxite is single. The values of AR are 0.82–0.94 in the type specimens, smaller than in the present specimen.

27. *Pseudosmittia seiryupequea* sp. nov. (Fig. 19)

A male was collected at Ekawasaki, on April 26, 1998. Holotype: No. 358:80 (#6–5). BL 1.70mm, WL 0.91mm, WW/WL 0.36. Scutum, scutellum and postnotum largely dark brown, only humeral areas slightly paler; legs largely yellow, abdomen brown. Head in Fig. 19 a. Eyes bare, reniform and without dorsomedial extension, ER 1.40. Antenna with 13 flagellar segments, AR 0.68, AHR 0.42, without apical seta. P/H 1.08. SO 3:3, CL 6. Anteprenotum (Fig. 19 b) separated in the middle, with 1:1 lateral seta. Distribution of setae on scutum and scutellum in Fig. 19 c; DM 2, DL 10:8, PA 3:3, SC 4.

Wing (Fig. 19 d) membrane bare, brownish and finely granular, squama bare, anal lobe obtuse. Costa not extended beyond tip of R4+5, which is much proximal to tip of Cul, R/Cu 0.86. RR 0.70, VR 1.44 (very high). Cu2 nearly straight. Tip of front tibia (Fig. 19 e) with a long spur, 31 microns long and 1.5 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 19 f) with two short spurs. Tip of hind tibia (Fig. 19 g) with a long, and a short spur, and a comb composed of 14 free spines. fLR 0.52, mLR 0.51, hLR 0.59, fTR 0.14. Tarsomeres I to IV of middle and hind legs each with one short and curved spur. Pulvilli absent.

Setae on abdominal tergites (Fig. 19 h) very small in the numbers, 6 on I, 8 on III, 12 on III to V, and 14 on VI to VIII. Hypopygium in Fig. 19 i. Anal point (also in Fig. 19 j) is represented by a small, low, longitudinal ridge bearing short setae. Virga conspicuous, composed of 4 strong codes 20 microns long situated on a cup. Inner lobes of gonocoxite (Fig. 19 k) quite characteristic, the basal ventral lobe (A) is wide, inner margin concave, and thickly clothed with setae; the middle and dorsal one (B) is finger-like with short setae along inner margin; the distal one (C) situated near the tip of inner margin of gonocoxite, small, rounded and with one short seta. Gonostylus (also in Fig. 19 k) simple, widest at base and without preapical swelling.

Remarks. This species also belongs to the genus *Pseudosmittia* with 3 inner lobes on gonocoxite, but is essentially different from the previously recorded species of this group in that anal point is represented by a low longitudinal ridge on ninth tergite, and the shape and structure of the three inner lobes of gonocoxite, the basal one broad, inner margin concave, and entirely clothed with short, spine-like setae, the middle one narrow and finger-like, and the distal one is situated near apex of inner margin of gonocoxite, conical and bearing only one short seta.

28. *Pseudosmittia seiryuquerea* sp. nov. (Fig. 20)

A male was collected at Tombo Koen, Nakamura, on April 25, 1998. Holotype: No. 358:35 (#3–9). BL 2.24mm, WL 1.18mm, WW/WL 0.31. Scutum largely dark brown, humeral areas paler, scutellum brown, postnotum dark brown, legs yellow, abdominal tergites largely dark brown. Head in Fig. 20 a. Eyes bare, reniform, ER 1.55. Antenna with 13 flagellar segments, AR 1.39, AHR 0.5. Palp short, P/H 0.89. SO 1+5:1+5, CL 5. Anteprepronotum (Fig. 20 b) separated in the middle, with 5:5 (very many) lateral setae. Distribution of setae on scutum and scutellum in Fig. 20 c; DM 16, distributed along midline of scutum (not 2 in the central hole, as in most other species of this genus); DL 13:13, PA 6:6, SC 6. Wing (Fig. 20 d) bare, finely granular, anal lobe obtuse. Squama bare. Costa not extended beyond tip of R4+5, which is situated proximal to tip of Cul, R/Cu 0.93. RR 0.63, FCu much distal to R-M, VR 1.57. Cu2 very short, and nearly straight. Tip of front tibia (Fig. 20 e) with a long spur, 48 microns and 1.8 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 20 f) with 2 relatively long spurs, both 30 microns long and 1.25 times as long as the diameter of middle tibia at the tip. Tip of hind tibia (Fig. 20 g) with a long, and a short spur, and a comb composed of 14 free spines. fLR 0.46, mLR 0.46, hLR 0.57, fTR 0.11, fBR 3.0, mBR 3.2, hBR 4.0. Tips of tarsi I to IV of all legs with a short, simple and curved terminal seta. Pulvilli absent.

Setae on abdominal tergites (Fig. 20 h) are 12 on I, 24 on II to IV, 26 on V to VII, and 24 on VIII, and those on II to VI are roughly arranged into an oral and a caudal transverse rows. Hypopygium in Fig. 20 i. Anal point large, composed of a basal V-shaped base and a shorter parallel-sided and apically rounded horn, with 8 dorsolateral setae. Virga conspicuous, composed of 4 stout codes 30 microns long. Inner lobe of gonocoxite absent (an unusual character of this genus), inner half of gonocoxite thickly clothed with conspicuous microtrichia on ventral side. Gonocoxite simple, widest at about middle, without preapical

swelling.

Remarks. This specimen also belongs to the genus *Pseudosmittia*, since eyes, wing membrane and squamae are bare, $R/Cu > 1.0$, costa not extended, Cu_2 very short and straight, and gonostylus is simple. It is somewhat related among the European species also to *P. curticosta* (Edwards) in that inner lobe of gonocoxite is simple and anal point is well developed, but *P. curticosta* differs from the present species in that AR is about 1.0 and smaller, inner lobe of gonocoxite is low and small but present, and gonostylus is widest at apex. Among the species recorded from Japan, it is somewhat related to the above species, *P. nishiharaensis* Sasa et Hasegawa, 1988, but differs essentially from it at least in the absence of inner lobe on gonocoxite.

29. *Pseudosmittia (Nikismittia) itachibifurca* Sasa et Kawai, 1987

Two males were collected at Yachou Koen and Tombo Koen, Nakamura. No. 360:07 (#2–3), 360:12 (#3–4). BL 1.67, 1.75mm, WL 1.02, 1.00mm, WW/WL 0.29, 0.32. Scutum, scutellum and postnotum dark brown, legs and abdomen brown. ER 1.70, 1.42, AR 0.76, 0.81, AHR 0.39, 0.47, P/H 0.86, 1.00, SO 4:4, 3:3, CL 6, 8. Anteprepronotum separated in the middle, both 1:1 lateral seta. DM 2, minute and arising in a median pale hole; DL 7:7. 5:6, PA 3:3, 2:3, SC 4, 4. Squama bare, RR 0.61, 0.59, VR 1.38, 1.31, R/Cu 0.87, 0.88. Costa not extended, anal lobe obtuse, Cu_2 strongly curved. fLR 0.41, 0.38 (very low), mLR 0.46, 0.47, hLR 0.50, 0.52, fTR 0.12, 0.13, fBR 2.5, 2.2, mBR 3.6, 3.3, hBR 8.2, 3.8. Anal point large, broad and almost rectangular, with lateral setae. Inner lobe of gonocoxite acutely angulate. Gonostylus with a long lateral branch and bifurcate at about distal 1/3, and roughly Y-shaped.

This species was originally described and figured by Sasa & Kawai (1987) with type specimens collected at the side of Itachi River, Toyama, and is especially characterized by the structure of gonostylus being bifurcate at about distal 1/3. A subgenus, *Nikismittia*, was created by Sasa (1998) with this and 3 additional species as its member, all recorded only from Japan with such a peculiar structure of gonostylus.

30. *Smittia leucopogon* (Meigen, 1818) (Fig. 30)

A male was collected with a light trap at Hiromi on April 27, 1998. No. 359:42 (#10–24). BL 2.64mm, WL 1.46mm, WW/WL 0.30. Scutum, scutellum and postnotum entirely black, legs and abdominal tergites dark brown. Head in Fig. 30 a. Eyes pubescent, reniform, ER 1.31. Antenna with 13 flagellar segments, AR 1.31 (larger than in the two other species), with an apical seta. Palp short, P/H 0.90. SO 6:6, forming a transverse row between eyes (in the other two species, supraorbital setae are absent between eyes). AR 1.31 (larger than in the following 2 species). CL 10. Anteprepronotum (Fig. 30 b) united in the middle, without lateral seta. Distribution of setae on scutum and scutellum in Fig. 30 c; DM 8, all minute (they are absent in the following 2 species of this genus), DL 8:9, PA 3:3, SC 4.

Wing (Fig. 30 d) bare, brownish and not granular, squama bare, anal lobe obtuse. Costa extending much beyond tip of R_{4+5} , which is slightly distal to tip of Cu_1 , R/Cu 1.03. RR 0.50, VR 1.36 (very high). Cu_2 strongly curved at about middle. Tip of front tibia (Fig. 30 e) with a long spur. Tip of middle tibia (Fig. 30 f) with a short spur, and a rudimentary spur. Tip of hind tibia (Fig. 30 g) with a long spur, and a comb composed of 14 free spines, but

without a short spur present in most other species of this group. fLR 0.54, mLR 0.49, hLR 0.59, fTR 0.12, fBR 3.1, mBR 2.9, hBR 3.4. Pulvilli absent.

Setae on abdominal tergites (Fig. 30 h, right half) are more numerous than in the other two species, 40 on I to III, 48 on IV to VI, 40 on VII, and 36 on VIII. Hypopygium in Fig. 30 i. Anal point widest at base and slightly tapering towards rounded apex, almost entirely clothed with microtrichia, like in *S. aterrima*. Inner lobe of gonocoxite small, semicircular, with a short seta but without microtrichia. Gonostylus simple, with a semicircular preapical tooth.

Remarks. This specimen has structures typical as a member of genus *Smittia*, and anal point is entirely clothed with microtrichia, and thus closely related to the cosmopolitan species *S. pratora* (Goetghebuer), but since the preapical swelling of gonostylus is not broad but narrow and semicircular, it is provisionally classified as *S. leucopogon* (Meigen) following the key of Pinder (1978). This species is a new record to Japan.

31. *Smittia seiryuwewea* sp. nov. (Fig. 31)

A total of 13 males were collected. Holotype: No. 358:79 (#6-4), collected by sweeping at Ekawasaki on April 24, 1998. Paratypes: No. 358:70 (#5-6), 358:71 (#5-7), 360:18 (#5-1), 360:57 (#5-7-3), 360:58 (#5-7-2), 360:59 (#5-7-4), at Nishitosa; 360:62 (#6-4-2), 360:63 (#6-4-3), at Ekawasaki; 360:70 (#8-6-2), 360:71 (#8-6-3), at Kubokawa; 360:889 (#9-13-5) at Hiyoshimura, all by sweeping.

BL 1.86-2.04 (1.95 in average of 13) mm, WL 1.01-1.20 (1.11) mm, WW/WL 0.30-0.34 (0.32). Body almost entirely dark brown, including thorax, legs and abdominal tergites. Head in Fig. 31 a. Eyes pubescent, reniform, ER 1.12-1.45 (1.29). Antenna with 13 flagellar segments, AR 0.71-0.89 (0.80), AHR 0.38-0.49 (0.44), with an apical seta. Palp short, P/H 0.82-0.95 (0.89). Inner supraorbital setae all 0, laterals 3-6 (4.2). CL 10-16 (13.0). Anteprepronotum (Fig. 31 b) united in the middle, without setae. Distribution of setae on scutum and scutellum in Fig. 31 c. DM all 0, DL 10-15 (13.5), PA 5 or 6 (5.5), SC 2-4 (3.6). Wing (Fig. 31 d) bare, finely granular, squama bare, anal lobe obtuse. RR 0.48-0.71 (0.59), VR 1.30-1.45 (1.38), R/Cu 0.96-1.02 (0.99). Tip of front tibia (Fig. 31 e) with a long spur, tip of middle tibia (Fig. 31 f) with 2 short spurs, tip of hind tibia (Fig. 31 g) with a long and a short spur, and a comb composed of 11-12 simple spines. fLR 0.51-0.54 (0.52), mLR 0.42-0.45 (0.43), hLR 0.54-0.57 (0.55), fTR 0.11-0.13 (0.12), fBR 1.8-2.6 (2.2), mBR 2.8-4.6 (3.7), hBR 3.4-5.0 (4.2). Pulvilli absent.

Setae on abdominal tergites (Fig. 31 h) are 22 on I, 26 on II and III, 28 on IV to VI, 26 on VII, and 24 on VIII. Hypopygium in Fig. 31 i. Anal point bare, narrow, parallel-sided and apically rounded. Inner lobe of gonocoxite small, bare and semicircular. Gonostylus simple, with a short and semicircular preapical tooth.

Remarks. This species belongs to the genus *Smittia* Holmgren, 1876, and to the group with pubescent eyes, long and bare anal point, and a prominent preapical swelling on gonostylus, and is somewhat related to the common species *S. nudipennis* (Goetghebuer, 1913) in that inner lobe of gonocoxite is small, rounded and bare, but differs from it in that preapical swelling of gonostylus is short and rounded (long and extending more than half of its inner margin in *nudipennis*), AR is 0.71-0.89 and much smaller (1.03-1.30 in *nudipennis*

according to Sasa, 1985), and DM is absent.

32. *Smittia seiryuwexea* sp. nov. (Fig. 32)

Three males were collected by sweeping at Hiyoshi-mura on April 26, 1998. Holotype: No. 360:86 (#9-13-2). Paratypes: No. 360:87 (#9-13-3), 360:88 (#9-13-4). BL 1.88, 1.89, 1.92mm, WL 1.09, 1.10, 1.05mm, WW/WL 0.31, 0.13, 0.34. Scutum, scutellum and postnotum almost uniformly black, legs brown, abdominal tergites entirely dark brown. Head in Fig. 32 a. Eyes pubescent, reniform and very narrow in frontal view, ER 1.56, 1.81, 1.30. Antenna with 13 flagellar segments, with an apical seta, AR 0.38, 0.46, 0.34 (very small). P/H 1.00, 0.97, 0.92. SO composed of 1 inner and 3, 4 or 5 (mean 4.0) laterals (inner seta is absent in the other two species). CL 8, 7, 4. Anteprepronotum (Fig. 32 b) united in the middle, all with one small lateral seta (this seta is absent in the other two species). Distribution of setae on scutum and scutellum in Fig. 32 C; DM 0, DL 10:10, 13:11, 10:9, PA 3:3, 3:4, 3:3, SC 4, 4, 6. Wing (Fig. 32 d) bare, not granular, squama bare, anal lobe obtuse. Costa extending much beyond tip of R4+5, which is above or slightly proximal to tip of Cu1, R/Cu 0.98, 0.98, 1.02. VR 1.23, 1.32, 1.30, RR 0.38, 0.33, 0.29. Cu2 strongly curved. Tip of front tibia (Fig. 32 e) with a long spur, tip of middle tibia (Fig. 32 f) with two short spurs, tip of hind tibia (Fig. 32 g) with a long and a short spur, and a comb composed of 8 free spines. fLR 0.44, 0.44, 0.46, mLR 0.39, 0.41, 0.41, hLR 0.53, 0.52, 0.53 (LR all very small; fTR 0.13, 0.13, 0.14, fBR 2.7, 3.1, 3.7, mBR 3.4, 3.1, 4.7, hBR 5.0, 4.9. Pulvilli absent.

Abdominal tergites (Fig. 32 h) with relatively small numbers of setae, 12 on I, 18 on II to IV, and 16 on VII and VIII. Hypopygium in Fig. 32 i. Anal point long and stout, nearly parallel-sided and apically rounded, with an U-shaped base. Inner lobe of gonocoxite small, semicircular, and bearing numerous short setae (almost bare in the former species). Gonostylus simple, nearly parallel-sided, without preapical swelling.

Remarks. This species also belongs to the genus *Smittia*, and to the group with pubescent eyes and with long and bare anal point, and thus similar in structure to *S. nudipennis* and to the former species, but differs from both in that AR is extremely small, values of LR are all very small, anal point is stout and parallel-sided, inner lobe of gonocoxite is setigerous, and gonostylus without preapical swelling.

33. *Corynoneura kibunespinosa* Sasa, 1989

A male was collected by sweeping at Hiyoshi-mura, on April 26, 1998. No. 359:12 (#9-8). BL 1.38mm, WL 0.69mm, WW/WL 0.59 (extremely wide). Scutal stripes, scutellum and postnotum brown, the humeral areas and the narrow area between median and lateral stripes of scutum yellow, median stripes not divided along midline; legs yellow; abdominal tergites I and II white, III to hypopygium brownish yellow. Eyes bare, reniform, ER 1.55 (very high). Antenna with only 9 flagellar segments, last segment very short, 78 microns long and about as long as the combined length of 2 preceding segments of 80 microns, AR 0.25, AHR 0.30, last segment with a group of short sensory setae at the tip and with relatively long flagellar setae extending beyond tip of antenna. Palp very short, P/H 0.59. SO 0:0, CL 8. Anteprepronotum connected in the middle, with 1:1 lateral seta (in most other species of this genus anteprepronotum without seta). DM 0, DL 6:6, PA 2:2, SC 2.

Wing bare but granular, venation typical as a member of this genus. Veins R are fused to a short and thickened stem. FCu much distal to R-M, VR 1.79. Squama bare, anal lobe nearly flat. Tip of front tibia with a long spur, tip of middle tibia with 2 short spurs, tip of hind tibia strongly expanded, with a long and a short spur, and a comb composed of 20 (very many) free spines. fLR 0.56, mLR 0.57, hLR 0.53, fTR 0.12, fBR 2.8, mBR 4.2, hBR 3.0. Tarsomeres IV of all legs cordiform and shorter than tarsomeres V, pulvilli absent.

Abdominal tergites I to VII with only one seta, excepting VII which has 3 setae. Anal segment with a Y-shaped, hypopygium-like process arising from the ventral side. Inner lobe of gonocoxite broad and reaching to near its tip. Gonostylus simple but strongly curved at about basal 1/3, with a large megaseta but without preapical swelling.

Remarks. This specimen belongs to group B of Edwards (1929, p. 369), since tip of antenna with a group of sensory setae, and hypopygium has a chitinized anal-point like process on the ventral side of hypopygium. This specimen is considered as belonging to *C. kibunespinosa* Sasa, 1989, as its second record, which was originally described with two specimens collected from Kibune River, Kyoto. However, the type specimens of this species differs from the present specimen in that abdominal tergites I to IV are entirely yellow and V to VII with a pale area, anteprenotum without setae, and gonostylus is curved near its tip (curved near the base in the present specimen).

Note. There are misprints referring to the figures of hypopygium of this species in our previous papers. Plate 16, Fig. 35 in page 102 of Sasa (1998) and Plate 83 I of Sasa & Kikuchi (1995, p. 295) were misprinted as *kibunelata* and should be corrected to *kibunespinosa*, and those in Plate Fig. 36 and Plate 84 A were misprinted as *kibunespinosa*, and should be corrected to *kibunelata*.

34. *Corynoneura scutellata* Winnertz, 1846 (Fig. 21)

Two males were collected by sweeping on April 25, 1998; No. 358: 40 (#3-14), at Tombo Koen. No. 358:26 (#2-19), at Yacho Koen, both Nakamura-shi. BL 1.32, 1.84mm, WL 0.72, 0.84mm, WW/WL 0.38, 0.39. Scutum, Scutellum and postnotum almost uniformly dark brown, legs brownish yellow, abdominal tergites largely brown and II to VII each with a pale band along oral and caudal margins. Head in Fig. 21 a. Eyes bare, reniform, ER 1.53, 1.47. Antenna with only 10 flagellar segments, AR 0.59, 0.66, AHR 0.36, 0.38, last segment 150 microns long and as long as the combined length of 5 preceding segments, with a group of short sensory setae on distal 1/4, the proximal long setae reaching to near tip of antenna. Palp very short, P/H 0.50, 0.47. SO 0:0, 0:0, CL 6, 8. Anteprenotum (Fig. 21 b) united in the middle, PN all 0. Distribution of setae on scutum and scutellum in Fig. 21 c; DM 0, 0, DL 4:5, 5:5, PA 2:2, 2:2, SC 2, 2. Wing (Fig. 21 d) bare, venation typical as a member of *Corynoneura*. Squama bare, anal lobe nearly flat. VR 2.88, 2.48, R/Cu 0.36, 0.41. Tip of front tibia (Fig. 21 e) with a long and simple spur, tip of middle tibia (Fig. 21 f) with two short spurs, tip of hind tibia (Fig. 21 g) strongly expanded, with a long and a short spur, and a comb composed of 4 (very many) simple spines. Tarsomeres I, II and III of all legs with a short simple terminal spine. Tarsomere IV of all legs cordiform and shorter than tarsomere V (Fig. 21 h, hind leg). fLR 0.58, 0.57, mLR 0.55, 0.57, hLR 0.54, 0.54, fTR 0.12, 0.10, fBR

2.2, 2.0, mBR 2.8, 2.2, hBR 2.7, 2.7.

Setae on abdominal tergites (Fig. 21 i) are 2 on I, 1 on II to V, 3 on VI and VII, and 1 in VIII. Hypopygium in Fig. 21 j (left gonostylus is lost). Ninth tergite without anal point-like process. Posterior margin of ninth tergite slightly concave in the middle and with 6 short marginal setae. Small virga present, composed of 3 simple codes. Gonocoxite without inner lobe. Gonostylus strongly expanded and widest at about middle, with a megaseta but without preapical swelling.

Remarks. These specimens belong to genus *Corynoneura*, and is almost identical with the figures and descriptions of *C. scutellata* Winnertz, 1846, given by Edwards (1929) and Pinder (1978), especially in that antenna is composed of 10 flagellar segments, last antennal segment relatively long and with a group of short sensory setae on its apical portion, and gonocoxite without prominent inner lobe. This is the type species of genus *Corynoneura* and was recorded as "common" in England by Edwards (1929), but has not yet been recorded from Japan. The classification of this genus was also reviewed in details by Schlee (1968) and Hirvenoja & Hirvenoja (1988).

35. *Corynoneura seiryuresea* sp. nov. (Fig. 22)

A male was collected by sweeping at Ekawasaki, on April 26, 1998. Holotype: No. 358:81 (#6–6). BL 1.16 mm, WL 0.64 mm, WW/WL 0.44. Ground color of scutum white, stripes, scutellum and postnotum dark brown, halteres yellow, legs yellow, abdominal tergites I and II yellow, the rest tergites largely brown. Head in Fig. 22 a. Eyes bare, reniform, ER 1.28. Antenna with only 7 flagellar segments, AR 0.69, AHR 0.38, last segment with a rosette of short sensory setae near apex, and with long flagellar setae reaching beyond tip of antenna. Palp very short, P/H 0.45. SO 0:0, CL 7. Anteprepronotum (Fig. 22 b) widely separated, PN 0:0. Distribution of setae on scutum and scutellum in Fig. 22 c; DM 0, DL 6:6, PA 2:2, SC 2.

Wing (Fig. 22 d) with venation typical as *Corynoneurini*, SQ 0:0, VR 2.94, R/Cu 0.29. Tip of front tibia (Fig. 22 e) with a long spur, tip of middle tibia (Fig. 22 f) with two short spurs, tip of hind tibia (Fig. 22 g) strongly expanded, with a long and a short spur, and a comb composed of 11 free spines. fLR 0.45 (very small), mLR 0.51, hLR 0.53, fTR 0.15, fBR 2.5, mBR 2.8, hBR 2.8. Tarsomeres IV cordiform and shorter than tarsomeres V. Pulvilli absent.

Setae on abdominal tergites (Fig. 22 h) are 0 on I, only 1 on II to IV and VIII, and 3 on VII. Hypopygium in Fig. 22 i. Anal point absent, posterior margin of ninth tergite slightly concave in the middle and with 2 setae on the tip of two low lobes. Inner lobe of gonocoxite prominent, situated near apex, and bearing short setae. Gonostylus simple, short, inner margin concave and without preapical swelling.

Remarks. This species is morphologically a typical member of the genus *Corynoneura*, and belongs to the group with rosette of sensory setae on the tip of antenna and with inner lobe on gonocoxite. However, all the previously known species of this group have at least 10 flagellar segments on antenna, and species with only 7 segments such as in this species has not been recorded. The shape of inner lobe of gonocoxite, and the extremely small value

of fLR being only 0.45, are another characteristics of this species.

36. *Thienemanniella vittata* (Edwards, 1924) (Fig. 23)

Two males were collected by sweeping on April 26, 1998, both at Kubokawa. No. 359:04 (#8-11), 360:72 (#8-8-2). BL 1.52, 1.68mm, WL 0.88, 0.96mm, WW/WL 0.39, 0.39. Ground color of scutum pale, stripes, scutellum and postnotum brown, legs yellow, abdominal tergites I, II and III pale, IV and V largely brownish yellow, IV and VII brownish for oral 1/3 and pale for caudal 2/3, VIII and hypopygium brownish. Head in Fig. 23 a. Eyes reniform, ER 1.94, 1.56. Antenna with 12 flagellar segments, AR 0.53, 0.60, AHR 0.42, 0.45. Palp short, P/H 0.73, 0.82. SO 0:0, 0:0, CL 10, 8. Anteprepronotum (Fig. 23 b) slightly separated, with 3:2, 2:3 lateral setae. Distribution of setae on scutum and scutellum in Fig. 23 c; DM 0, 0, DL 8:8, 8:8, PA 2:2, 3:3, SC 2. 2.

Wing (Fig. 23 d) bare, venation typical as a species of *Corynoneurini*. Squama bare, anal lobe nearly flat; VR 1.69, 1.85, R/Cu 0.44, 0.40. Tip of front tibia (Fig. 23 e) with a long spur, tip of middle tibia (Fig. 23 f) with 2 short spurs, tip of hind tibia (Fig. 23 g) not expanded, with a long and a short spur, and a comb composed of 12 free spines. fLR 0.72, 0.73 (very high), mLR 0.56, 0.64 (very high), hLR 0.73, 0.64, fTR 0.13, 0.13, fBR 2.5, 2.6, mBR 3.0, 2.9, hBR 2.8, 4.3. Tarsomeres IV are cordiform and shorter than tarsi V, pulvilli absent.

Setae on abdominal tergites (Fig. 23 h) are 4 on I, 3 on III, 4 on III, 5 on IV and V, 4 on VI and VII, and 2 on VIII, the numbers are very small but larger than in those of species of the genus *Corynoneura*. Hypopygium in Fig. 23 i. Ninth tergite without anal point and virga. Gonocoxite with a prominent rectangular and long inner lobe bearing short setae. Gonostylus simple, without preapical swelling.

Remarks. These specimens show morphological structures typical as members of the tribe *Corynoneurini*, genus *Thienemanniella* Kieffer, 1911, since wing veins are the *Corynoneura* type and tip of hind tibia is not expanded like in *Corynoneura*. It belongs to the group with pubescent eyes and with inner lobe on gonocoxite. They roughly fit to the descriptions of *T. vittata* given by Edwards (1929) and Pinder (1978), especially in the structure of antenna and hypopygium, and are provisionally identified as belonging to this species. However, the above mentioned peculiar body coloration, especially the distribution of brown and pale marks on abdominal tergites is not mentioned in these papers. *T. vittata* is a species widely distributed in Europe, but was not recorded from Japan by Tokunaga (1936) in his review on this group, and there has been only a collection record of a single specimen from Lake Biwa by Sasa & Kawai (1987).

DIAMESINAE

37. *Potthastia longimana* Kieffer, 1922 (Fig. 24)

A male was collected on April 26, 1998, by sweeping at the side of Hiromi Branch River. No. 358: 85 (#7-4). BL 3.80mm, WW/WL 0.35. Ground color of scutum yellow, stripes brown, scutellum yellow, postnotum and abdomen brown. Front femur brown, front tibia largely yellow and with a proximal and a distal brown ring, front tarsi largely yellowish brown. Middle and hind femora largely yellow and each with a distal brown ring, tibiae lar-

gely yellow and with proximal and distal brown rings, tarsomere I largely yellow and each with a brown distal ring, tarsomeres II to V brown. Head in Fig. 24 a. Eyes bare, each with a wedge-shaped dorsomedial projection, ER 0.94. Antenna with 13 flagellar segments, AR 1.63, AHR 0.51, with a long apical seta. Palp long, P/H 1.18. Supraorbital setae without inner verticals, and with 6:6 lateral setae. CL 20. Small frontal tubercles present. Anteprototum (Fig. 24 b) united in the middle, with 10:12 lateral setae. Distribution of setae on scutum and scutellum in Fig. 35 c. DM 0, DL 15:15, PA 6:6, SC 12.

Wing (Fig. 24 d) with venation typical as Diamesinae. SQ 56:56. Anal lobe strongly produced inwards. Costa does not extend beyond tip of R5. RR 0.40, VR 0.94, R/Cu 1.13. Cu 2 nearly straight. Tip of front tibia (Fig. 24 e) with a long spur, tip of middle tibia (Fig. 24 f) with 2 short spurs, tip of hind tibia (Figs. 24 g,h) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.96, mLR 0.58, hLR 0.64, fTR 0.15, fBR 1.6, mBR 2.5, hBR 2.7. Tarsomeres I and II of middle and hind legs with 2 terminal spurs, other tarsomeres without terminal spur. Tarsomeres IV are cordiform and shorter than tarsomere V in all legs, pulvilli absent (Fig. 24 i, front leg).

Setae on abdominal tergites (Fig. 24 j, left half) are very many, 108 on I, II and III, 116 on IV, 112 on V, 92 on VI, 72 on VII, and 60 on VIII. Hypopygium in Fig. 24 k. Anal point and virga absent, ninth tergite with a broad and rounded lobe in the middle near posterior margin, with long lateral setae and a transverse row of 22 short setae. Gonocoxite without inner lobe, and with short setae on and near inner margin. Gonostylus simple, widest near base, without preapical swelling.

Remarks. The above morphological characters of the present specimen indicate that it belongs to the genus *Potthastia* Kieffer, 1922, since the wing venation and terminal structure of tibiae are typical as a member of Diamesinae, tarsomeres IV are cordiform and shorter than tarsomeres V, eyes are bare and each with a wedge-form dorsomedial projection, and head without inner verticals. The above stated morphological and measurement data are almost coincident with the common European species of this genus, *P. longimana* Kieffer, 1922, which was recorded from Japan only in Kyoto by Tokunaga (1965) by the name of *Diamesa (Psilodiamesa) campestris* (Edwards, 1924).

TANYPODINAE

38. *Ablabesmyia longistyla* Fittkau, 1962. (Fig. 33)

Three males were collected, 2 with a light trap in the town of Nakamura, 1 by sweeping at the side of Hiromi River. No. 358:49 (#4-9), 360:24 (#6-4), 360:44 (#4-9-2). BL 3.52, 3.82, 4.12mm, WL 2.08, 2.04mm, WW/WL 0.33, 0.31. Ground color of scutum yellow, stripes brown, scutellum yellow, postnotum brown, abdominal tergites largely yellow but VI, VII and VIII with a brown area in the basal portion. Femora with 3 pale basal, middle and apical rings and 2 brown rings between them, tibiae with 3 brown rings and 3 pale rings, tarsi I with 2 basal and middle pale rings and 2 middle and distal brown rings, tarsi II to V largely pale and each with a distal brown ring.

Head in Fig. 33 a. Eyes bare, ER 0.41, 0.38, 0.45. Antenna with 14 flagellar segments,

the apical segment very short, AR 1.67, 1.56, 1.62, AHR 0.53, 0.61, 0.58. Palp long, P/H 1.60, 1.39, 1.32. SO 33:30, 35:33, 33:37, CL 34, 38, 40. Antepronotum (Fig. 33 b) separated, with 10:11, 8:10, 14:14 lateral setae. DM 68, 58, 66, DL 36:34, 34:36, 39:41, PA 33:41, 23:22, 31:26, SC 48, 42, 51. Wing with macrotrichia on almost entire surface and 6 dark marks including on the cross vein R-M. Tip of front tibia (Fig. 33 c) with 1, tip of middle tibia (Fig. 33 d) with 2, and tip of hind tibia (Fig. 33 e) with 2 spurs, and a comb composed of only 7 free spines. Hypopygium in Figs. 33 e, f. Gonocoxite with a pair of ventral and dorsal processes, both barbed apically, and the former only 1.2 or 1.3 times as long as the latter. Gonostylus very long, rectangularly curved at about basal 1/4, with serrated apex.

Remarks. The structure and measurement data of these specimens are almost description and the key and illustration by Pinder (1978). This species differs from the next common species, *A. monilis*, in that ventral appendage of gonocoxite is straight and only 1/3 longer than the dorsal appendage. This species is a new record to Japan.

39. *Ablabesmyia monilis* (Linnaeus, 1763) (Fig. 34)

Two males were collected. No. 358:02 (#1-2), by sweeping at the side of Shimanto River near its mouth in Nakamura, another No. 359:28 (#10-10), collected with a light trap at Hiromi. BL 3.82, 4.10mm, WL 1.98, 2.14mm, WW/WL 0.30, 0.32. Body coloration similar to the above species. ER 0.51, 0.47, AR 0.85, AHR 0.51, P/H 1.39, 1.27. SO 26:29, 26:29, CL 38, 40, PN 8:8, 8:7, DM 44, 75, DL 30:29, 44:41, PA 17:18, 23:26, SC 32, 48, SQ 42:48, 42:45, RR 0.43, 0.39, VR 0.85m 0.85, R/Cu 1.11, 1.11, fLR 0.81, mLR 0.71, 0.72, hL 0.82, fTR 0.14, fBR 4.0, mBR 5.7, hBR 5.7. Antepronotum (Fig. 34 a) united in the middle, with 8:8, 8:7 lateral setae. Tips of front, middle and hind tibiae as in Figs 34 b, c, d, terminal scales narrower than in the former species, terminal comb of hind tibia composed of 12 free spines, more numerous than 7 of the former species. Hypopygium in Figs. 34 e, f; ventral process of gonocoxite 1.8 times as long as the dorsal process, and longer than in the former species.

This is a species recorded widely from Europe, and also from a number of localities in Japan. The species belonging to *Ablabesmyia* is especially characteristic in the coloration of legs, in the structure of basal processes, and in having very long and curved gonostylus, and this species are differentiated from other species of this genus in that ventral process of gonostylus is long and curved, about twice as long as dorsal process.

40. *Conchapelopia seiryusetea* sp. nov. (Fig. 25)

Two males were collected on April 26, 1998, with a light trap in the town of Nakamura, near the mouth of Shimanto River. Holotype: No. 358:52 (#4-12). Paratype: No. 360:46 (#4-12-2). BL 4.38, 4.14mm, WL 2.38, 2.26mm, WW/WL 0.30, 0.32. Ground color of scutum pale, stripes uniformly brownish yellow and without dark spots such as seen in most other species of this genus. Scutellum pale, postnotum brownish yellow; legs uniformly yellow; abdominal tergites largely yellow but IV, V and VI largely brown and with pale bands along oral and caudal margins. Head in Fig. 25 a. Eyes bare, each with a long and parallel-sided dorsomedial extension, ER 0.19, 0.26 (very narrow). Antenna with 14 flagellar segments, AR 1.89, 1.88, AHR 0.60, 0.58. Palp very long, P/H 1.51, 1.53, 5 segmented, the first segment with 2 long setae. SO all 16, composed of the inner verticals, upper transverse row, and

postorbital row. CL 19, 20. Anteprepronotum (Fig. 25 b) separated in the middle, with 8:8, 8:10 lateral setae. DM 40, 48, DL 30:30, 28:28, PA 16:18, 16:18, SC 30, 26.

Wing (Fig. 25 c) clothed with macrotrichia on almost entire surface. Squama with 26:26, 36:38 fringe hairs, anal lobe nearly rectangular. Costa not extended beyond tip of R4+5, which is distal to tip of Cul, R/Cu 1.15, 1.09. R2+3 separated from R1 and R4+5, divided near the tip and R2 is connected with R1, RR 0.43, 0.44, VR 0.85, 0.87. Tip of front tibia (Fig. 25 d) with one spur, tip of middle tibia (Fig. 25 e) with two spurs, tip of hind tibia (Figs. 25 f, g) with a long and a short spur, and a comb composed of 8 simple spines. fLR 0.85, 0.84, mLR 0.56, 0.56, hLR 0.75, fTR 0.12, 0.13, fBR 4.1, 3.6, mBR 3.6, hBR 3.8. Pulvilli absent.

Hypopygium is unfortunately obliquely mounted in both specimens and the entire structure is unable to illustrate. Posterior margin of ninth tergite (Fig. 25 h) with a rounded lobe in the middle flanked by two processes bearing short setae. Shaft of basal lobe of gonocoxite (Fig. 25 i) roughly L-shaped, distal process bearing 7 apical simple setae, and 4 rectangularly curved preapical process. Gonostylus (Fig. 25 j) long, constricted in the middle portion, without preapical swelling.

Remarks. The structures of head, wings, legs and hypopygium indicate that these specimens belong to the genus *Conchapelopia* Fittkau, 1957, and at least body coloration and the structure of basal lobe of gonocoxite is quite characteristic not seen in the previously recorded species of this genus.

41. *Conchapelopia* sp. B., "seiryuteua" (Fig. 26)

One male was collected on April 26, 1998, by sweeping at Hiyoshi-mura. No. 359:05 (#9-1). BL 4.26mm, WL 2.22mm, WW/WL 0.33. Body entirely pale, even scutal stripes cannot be differentiated by color. ER 0.29, AR 1.86, AHR 0.60, P/H 1.53. SO 20:18, CL 20, PN 12/14, DM 38, DL 43:44, PA 14:16, SC 28, SQ 25:25, RR 0.45, VR 0.89, R/Cu 1.10, fLR 0.82, mLR 0.59, hLR 0.72, fTR 0.13, fBR 3.7, mBR 5.8, hBR 4.1. Hypopygium inadequately mounted, and the entire structure is unable to demonstrate. Basal process of gonocoxite (Fig. 26 a) with 3 apical spine, and 2 subapical rectangularly curved processes. Gonostylus in Fig. 26 b.

Remarks. The measurement data of this specimen are similar to the former species, but body coloration is entirely pale and without dark marks, and the structure of basal lobe of gonocoxite is different, which also cannot be found among the previously known species of this genus. This specimen is considered also as a new species, but the scientific name is reserved until additional materials better for designating as type specimens be collected.

42. *Nilotanypus dubius* (Meigen, 1804) (Fig. 27)

Seven males were collected on April 26, 1998, by sweeping at Hiyoshi-mura. No. 359:16 (#9-12); 360:80-85 (#9-12-2 to 7). BL 1.10-1.19 (1.13 in average of 7) mm, WL 1.10-1.16 (1.13) mm, WW/WL 0.33-0.38 (0.35). Scutum and postnotum almost entirely dark brown, scutellum, legs and abdomen largely brown. Head in Fig. 27 a. Eyes highly pubescent, each with a long and parallel-sided dorsomedial projection, ER 0.43-0.62 (0.51). Antenna with 14 flagellar segments (including the apical very short segment), AR 0.43-0.49 (0.45), AHR

0.17–0.28 (0.21, very short), with a long apical seta. Palp long, P/H 1.10–1.33 (1.21). Supraorbital setae are composed of inner verticals, transversal, and postorbitals, all uniserial, 12–18 (14.1) in total. Clypeal setae 12–16 (13.6). Anteprepronotum (Fig. 27 b) separated in the middle with a V-shaped groove, without dorsal setae and with 3–6 lateral setae. Distribution of setae on scutum and scutellum in Fig. 27 c; DM 22–37 (28.2), DL 21–23 (22.0), PA 8–18 (10.3), SC 20–46 (30.0).

Wing (Fig. 27 d) entirely clothed with macrotrichia, without dark marks, squama with 12–19 fringe hairs. Costa not extending beyond tip of R4+5, which is much proximal to tip of Cul, R/Cu 0.83–0.90 (0.87). R2+3 not discernible. R-M slightly distal to FCu, both located near wing base, Cu2 long and curved. Tip of front tibia (Fig. 27 e) with a long, curved and barbed spur, 40 microns long and 1.5 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 27 f) with one long (52 microns), straight and simple spur (not two short spurs, as in most other species). Tip of hind tibia (Fig. 27 g) also with a long (60 microns), straight and simple spur, and a comb composed of only 6 simple spines, but without the short spur present in most other species. Front tibia longer than front tarsus I, fLR 0.73–0.76 (0.75). Middle tarsus I unusually long, much longer than middle tibia, mLR 1.44–1.47 (1.46). Hind tarsus I slightly longer than hind tibia, hLR 1.02–1.08 (1.05), also an unusual character. fTR 0.16–0.19 (0.18), fBR 4.3–6.2 (5.3), mBR 4.9–5.6 (5.3), hBR 4.9–7.0 (5.9). Pulvilli absent.

Setae on abdominal tergites (Fig. 27 h) are 28 on I, 40 on II to V, 38 on VI, 36 on VII and 28 on VIII. Hypopygium in Fig. 27 i. Anal point and virga absent, posterior margin of ninth tergite slightly concave in the middle. Gonocoxite without inner lobe and bearing 6 or 7 setae on inner margin. Gonostylus simple, inner margin concave and tapering towards sharply pointed apex, megaseta very slender and pointed.

Remarks. From the above morphological characters and the measurement data, the present specimens are considered as belonging to the genus *Nilotanypus* Kieffer, 1923, since body size is very small, eyes are pubescent, wing membrane entirely covered by macrotrichia, R2+3 absent, R-M distal to FCu, tip of R4+5 much proximal to tip of Cul, mLR is unusually large (about 1.4), gonocoxite without inner lobe, and gonostylus is narrow and curved. The above characters of the present specimens are almost coincident with the type species of this genus, *N. dubius* (Meigen, 1804) recorded from a number of localities in Europe (Edwards, 1929, Goetghebuer, 1936, Fittkau, 1962), but is a new record to Japan. The species recorded as a new species by Tokunaga (1937) from Kyoto by the name of *Pentaneura minuta* was placed into this genus by Fittkau (1962), seems to be also closely related to this species, but was distinguished by Tokunaga (1937) from *Pentaneura dubia* Meigen by that AR is smaller (0.39 in *P. minuta* and smaller than 0.7 of *P. dubia*) and front leg ratio being also larger than 1.0 (16:18, or 1.13); it was also stated that eyes are widely separated from each other in *P. minuta*.

43. *Procladius choreus* (Meigen, 1804)

A male was collected on April 24, 1998, by sweeping at Yacho Koen, Nakamura. No. 358:12 (#2–5).

44. *Procladius sagittalis* Kieffer, 1909

A male was collected on April 24, 1998, by sweeping at Yacho Koen, at the same time with the above specimen. No. 358:11 (#2-4). The basoposterior process of gonostylus is more than twice as long as broad in the former specimen, while the ratio is about 1.0 and much smaller, and thus this is recorded by the above scientific name following the classical concept. However, according to Kobayashi (1989), such a difference is a seasonal variation within the same species, *P. choreus*.

45. *Rheopelopia ornata* (Meigen, 1838) (Fig. 28)

A male was collected on April 26, 1998 by sweeping at a downstream site of Hiromi Branch River. No. 358:83 (#7-2). BL 4.26mm, WL 2.32mm, WW/WL 0.30. Ground color of scutum pale, stripes uniformly brown, scutellum pale, postnotum brown; legs largely yellow, femora each with a short apical brown ring; abdominal tergites I to VI largely pale and brownish yellow along oral margin, VII and VIII largely yellow and pale along caudal margin. Head in Fig. 28 a. Eyes bare, each with a long and narrow dorsomedial projection, ER 0.21. Antenna with 14 flagellar segments, AR 1.86, AHR 0.63, last segment very short and with a long apical seta. Palp very long, P/H 1.46, segment I with two setae. SO 16:16, forming an inner vertical, a supraorbital and a postorbital row. CL 24. Anteprepronotum (fig. 28 b) very narrowly united in the middle, with 4:4 lateral setae. Distribution of setae on scutum and scutellum in Fig. 28 c. DM 34, DL 24:25, PA 18:17, SC 22.

Wing venation in Fig. 28 d (macrotrichia omitted). SQ 43, 45, anal lobe nearly rectangular, membrane entirely and thickly clothed by macrotrichia. RR 0.42, VR 0.90, R/Cu 1.11. M-Cu slightly distal to FCu. R2+3 forked and connected with R1. Tip of front tibia (Fig. 28 e) with one terminal spur, which is wide but shorter than the diameter of front tibia, and with 5 side teeth. Tip of hind tibia (Figs 28 g,h) with a long and a short spur, both with 5 side teeth, and a comb composed of only 6 free spines. fLR 0.84, mLR 0.58, hLR 0.76, fTR 0.12, fBR 5.2, mBR 7.7, hBR 8.3. All legs with a large brush like pulvilli (Fig. 28 i, middle tarsus V).

Abdominal tergites with very many setae, some 140 on II, III and IV. Hypopygium in Fig. 28 j. Anal point absent, ninth tergite broad and low, with 14 setae in the middle in a transverse row. Gonocoxite with strong setae on inner part, and with a large ovoid basal lobe (also in Fig. 28 k) which is entirely clothed with microtrichia; the basal lobe bears a finger-like inner process. Gonostylus (Fig. 28 m) long, rectangularly curved and tapering towards apex, with a small apical spine.

Remarks. This specimen is considered as belonging to the genus *Rheopelopia* Fittkau, 1962, since cross vein M-Cu is distal to FCu, postnotum bare, tibiae unicolorous, gonocoxite with a basal lobe, mid tarsus III with a distal group of strong setae, and wings with macrotrichia and darkened cross-vein. It is provisionally identified as *R. ornata* (Meigen, 1838), since it has large and distinct pulvilli, gonostylus is long and curved, and basal lobe of gonocoxite with a narrow inner process, and thus fit to the description and figures given by Fittkau (1962) and Pinder (1978, Fig. 85C) for males of this species.

46. *Rheopelopia seiryuuvea* sp. nov. (Fig. 29)

A male was collected on April 26, 1998, with a light trap in the town of Nakamura. Holotype: No. 358:51 (#4-11). BL 4.22mm, WL 2.12mm, WW/WL 0.31. Scutum (Fig. 29 c) largely pale but median stripes each with an oral and a middle dark brown spot, lateral stripeps each with an oral and caudal dark brown spots, scutellum entirely pale, postnotum largely pale and with a dark brown area in the middle and posterior portion. Legs largely yellow but all femora with a short but conspicuous dark brown ring apically; tibiae with a conspicuous short dark brown ring basally. Abdominal tergites largely pale, I and II entirely pale, III to IV with a narrow dark brown band along oral margin, oral 2/3 of VII brown, VIII entirely pale, hypopygium brown.

Head in Fig. 29 a. Eyes bare, each with long medial extention, ER 0.15. Antenna with 14 flagellar segments including the short apical segment bearing a long apical seta, AR 1.93, AHR 0.62. Palp long, P/H 1.27. SO 16:16, CL 20. Anteprepronotum (Fig. 29 b) united in the middle, with 4:4 lateral setae. Distribution of setae on scutum and scutellum in Fig. 29 c; DM 40, DL 24:24, PA 12:12, SC 28.

Wing venation in Fig. 29 d (macrotrichia omitted). Membrane entirely and thickly clothed with macrotrichia. SQ 30:30, RR 0.49, VR 0.89, R/Cu 1.14. Tip of front tibia (Fig. 29 e) with a short and broad terminal spur bearing 9 side teeth. Tip of middle tibia (Fig. 29 f) with two wide spurs, bearing also 9 side teeth. Tip of hind tibia (Fig. 29 g) with two spurs bearing side teeth, and a comb composed of 8 spines. fLR 0.85, mLR 0.59, hLR 0.77, fTR 0.11, fBR 5.8, mBR 4.9, hBR 7.5. All legs with a brush like pulvilli, which are smaller than in the former species (Fig. 29 h, middle tarsus V).

Abdominal tergites with very many setae, each with more than 100. Hypopygium in Fig. 29 i. Anal point absent, ninth tergite small and low, bearing 14 setae in the middle portion. Gonostylus very broad and roughly oval, with numerous setae on distal half of inner side, and with a basal process (Fig. 29 j) roughly quadrangular but with concave margin, lateral process such as seen in the former species are absent. Gonostylus (Fig. 29 k) only slightly curved.

Remarks. This specimen also belongs to the genus *Rheopelopia* Fittkau, but differs from the above species and also from the previously known species of this genus in the peculiar coloration of scutum, postnotum, abdomen and legs, by having small pulvilli, and also by the shape of basal lobe of gonocoxite and gonostylus.

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REFERENCES

- 1) Edwards, F. W. (1929): British non-biting midges. Trans. Entom. Soc. London, 77:279–7429.
- 2) Fittkau, E. J. (1962): Die Tanypodinae. Abh. Larvensyst. Insekten. 6:1–453.
- 3) Goetghebuer, M. (1940): Orthoclaadiinae. A. Imagines. Fliegen palaeark. Reg. 3 (13g): 1–208.
- 4) Hirvenoja, M. & Hirvenoja, E. (1988): *Corynoneura brundini* sp. nov. Ein Beitrag zur Systematik der Gattung *Corynoneura*. Spixiana Suppl. 14:213–238.
- 5) Kawai, K. (1991): Seven new chironomid species from Japan. Jpn. J. Limn. 52:161–171.
- 6) Kobayashi, T. (1998): Seasonal changes in body size and male genital structures of *Procladius choreus*. Aquatic Insects. 20:165–172.
- 7) Niitsuma, H. (1991): *Nanocladius* from Japan, with description of a new species. Jpn. J. Entomol. 59 (2): 343–355.
- 8) Pinder, C. V. (1978): A key to adult males of British Chironomidae. Freshwater Biol. Assoc. Sci. Publ. No. 37, 168 pp., Figs 189.
- 9) Saether, O. A. (1990): A review of the genus *Limnophyes* Eaton from the Holarctic and Afrotropical regions. Entom. Scand. Suppl. No. 35:5–135.
- 10) Sasa, M. (1988): Studies on the chironomid midges of lakes in southern Hokkaido. Res. Rep. Nation. Inst. Envir. Stud. R-121-'88. 90pp.
- 11) Sasa, M. (1990): Studies on the chironomid midges of the Nansei Islands, southern Japan. Jpn. J. Exp. Med. 60: 111–165.
- 12) Sasa, M. (1998): Chironomidae of Japan, 1998. Res. Rep. Inst. Envir. & Welfare Studies. 156 pp.
- 13) Sasa, M. & Hasegawa, H. (1988): Additional records of the Chironomid midges from the Ryukyu Islands, southern Japan. Jpn. J. Sanitary Zool. 39: 229–256.
- 14) Sasa, M. & Kikuchi, M. (1995): Chironomidae of Japan. 333pp. Univ. Tokyo Press
- 15) Sasa, M. & Okazawa, T. (1992): Studies on the chironomid midges (Yusurika) of Kurobe River. TPEP 1992, pp. 40–91.
- 16) Sasa, M., Suzuki, H. & Sakai, T. (1998): Studies on the Chironomid Midges Collected on the Shore of Shimanto River in April, 1998. Part I, Description of species of the Subfamily Chironominae. Trop. Med., 40 (2): 47–89.
- 17) Schlee, D. (1968): Vergleichende Merkmalsanalyse zur Morphologie und Phylogenese der *Corynoneura*-Gruppe. Stuttg. Beitr. Naturkunde Nr. 180. 1–150.
- 18) Tokunaga, M. (1937): Chironomidae from Japan, K. Tanypodinae and Diamesinae. Phil. J. Sci. 62: 21–61.
- 19) Tokunaga, M. (1964): Supplementary notes on Japanese Orthoclaadiinae midges. Akitu 12:17–20.
- 20) Wiedelholm, T. (ED) (1989): The adult males of Chironomidae of the Holarctic Region—Keys and diagnoses. Entom. Scand. Suppl. 34:1–532.

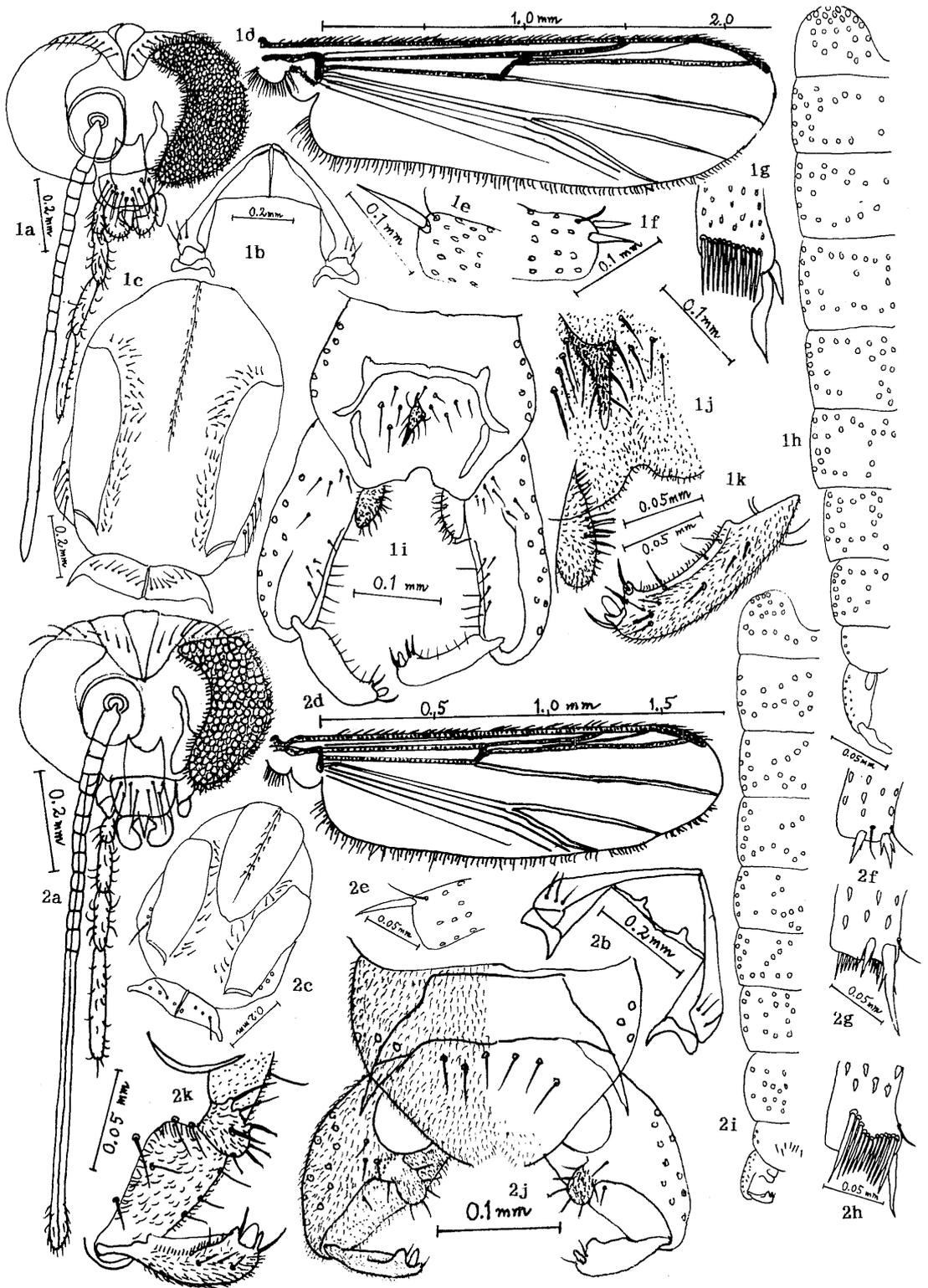


Fig. 1. *Cricotopus seiryubeus* sp. nov.

Fig. 2. *Cricotopus seiryubeceus* sp. nov.

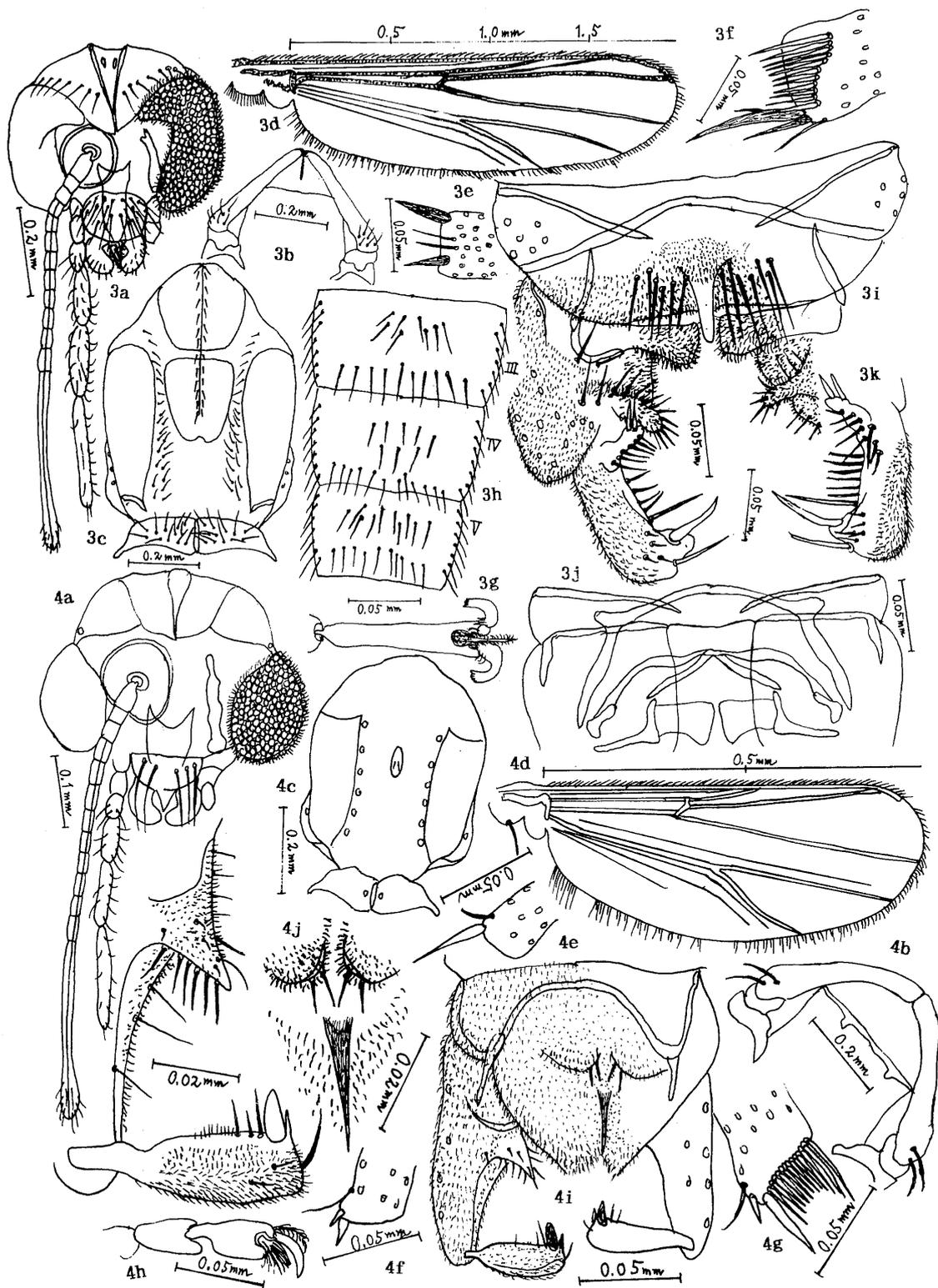


Fig. 3. *Cricotopus seiryucedeus* sp. nov.

Fig. 4. *Nanocladius quadrivittatus* Niitsuma, 1991

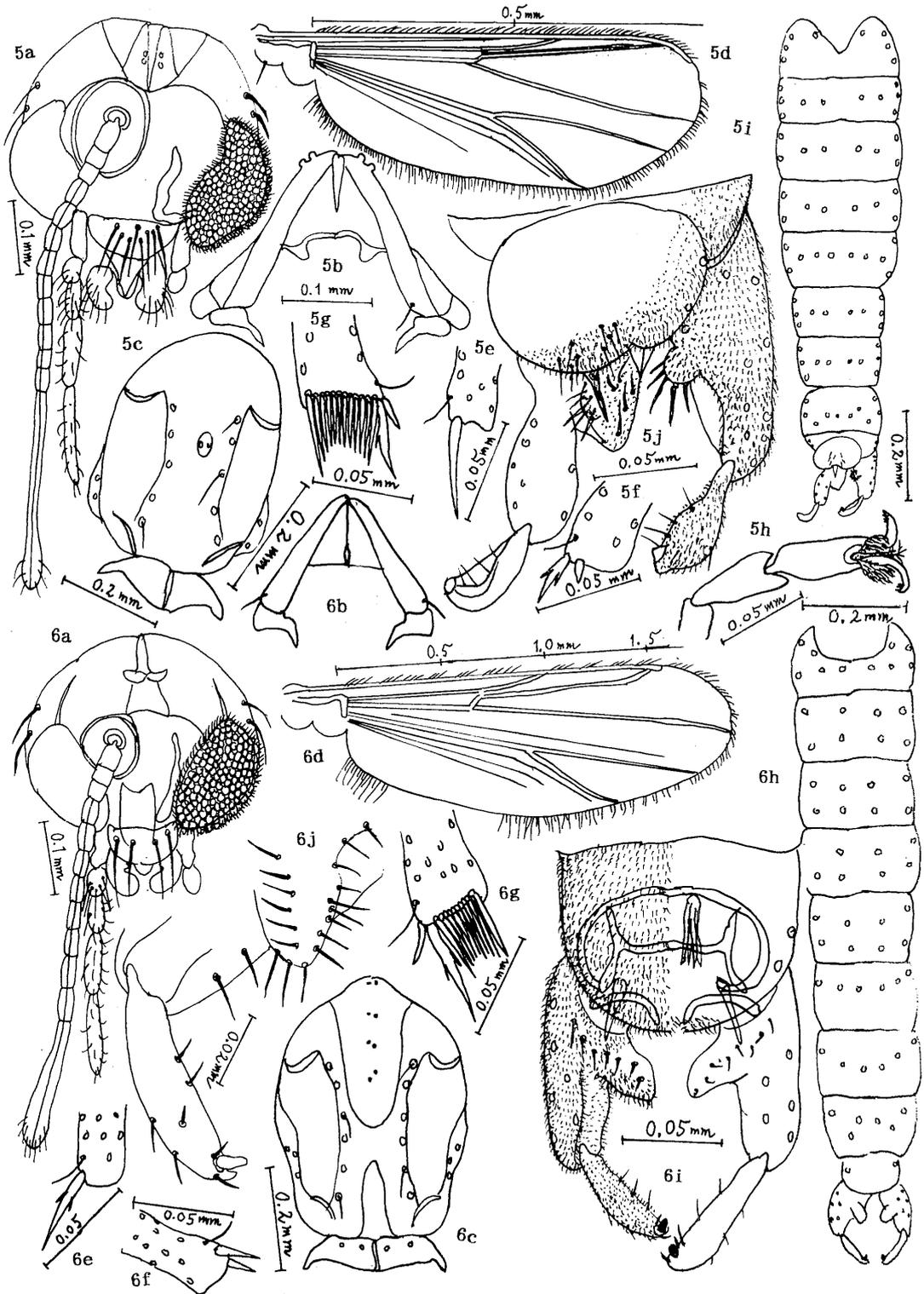


Fig. 5. *Nanocladus seiryudeeus* sp. nov.
 Fig. 6. *Eukiefferiella seiryuefea* sp. nov.

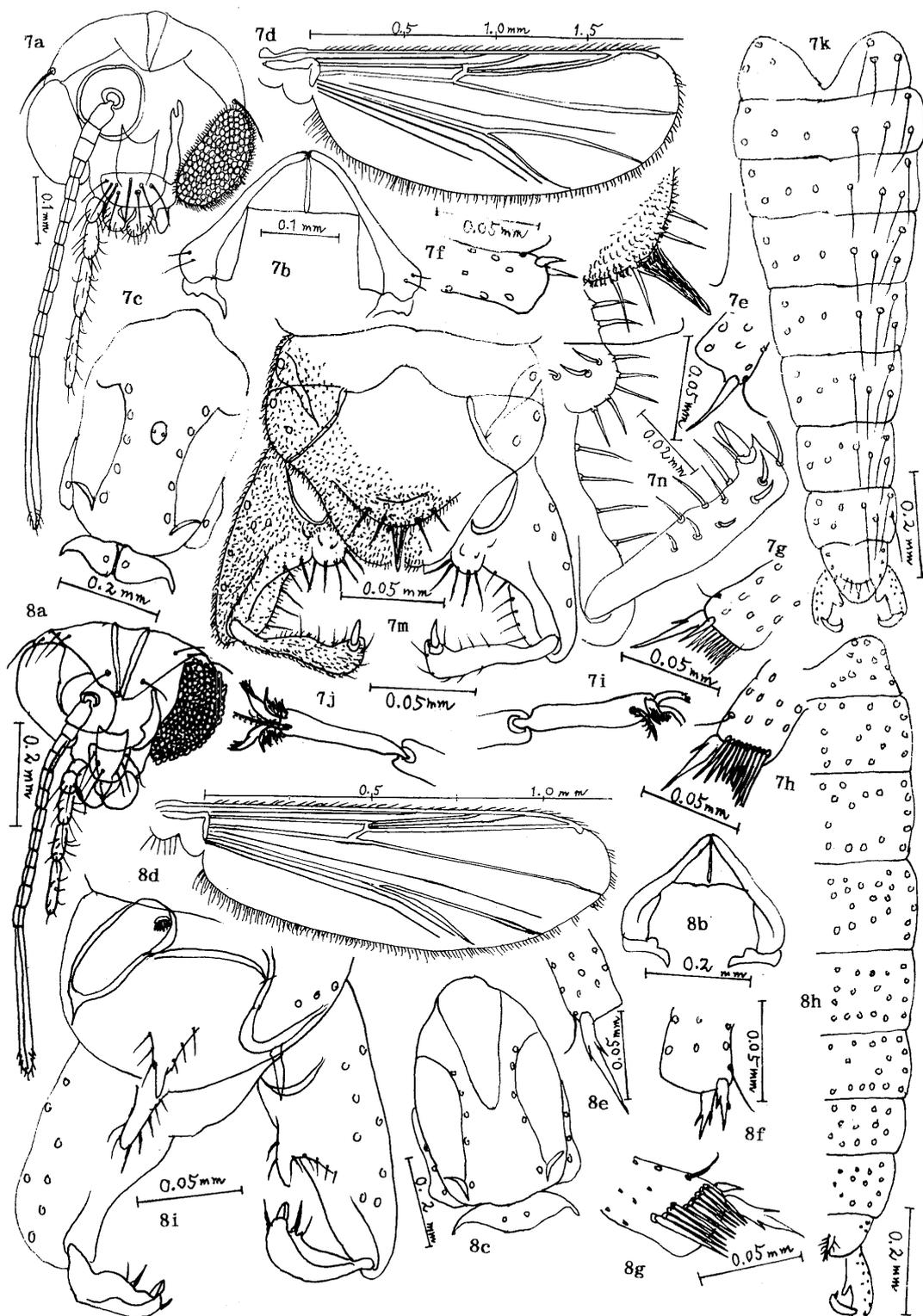


Fig. 7. *Eukiefferiella seiryufegea* sp. nov.
 Fig. 8. *Orthocladius seiryugeus* sp. nov.

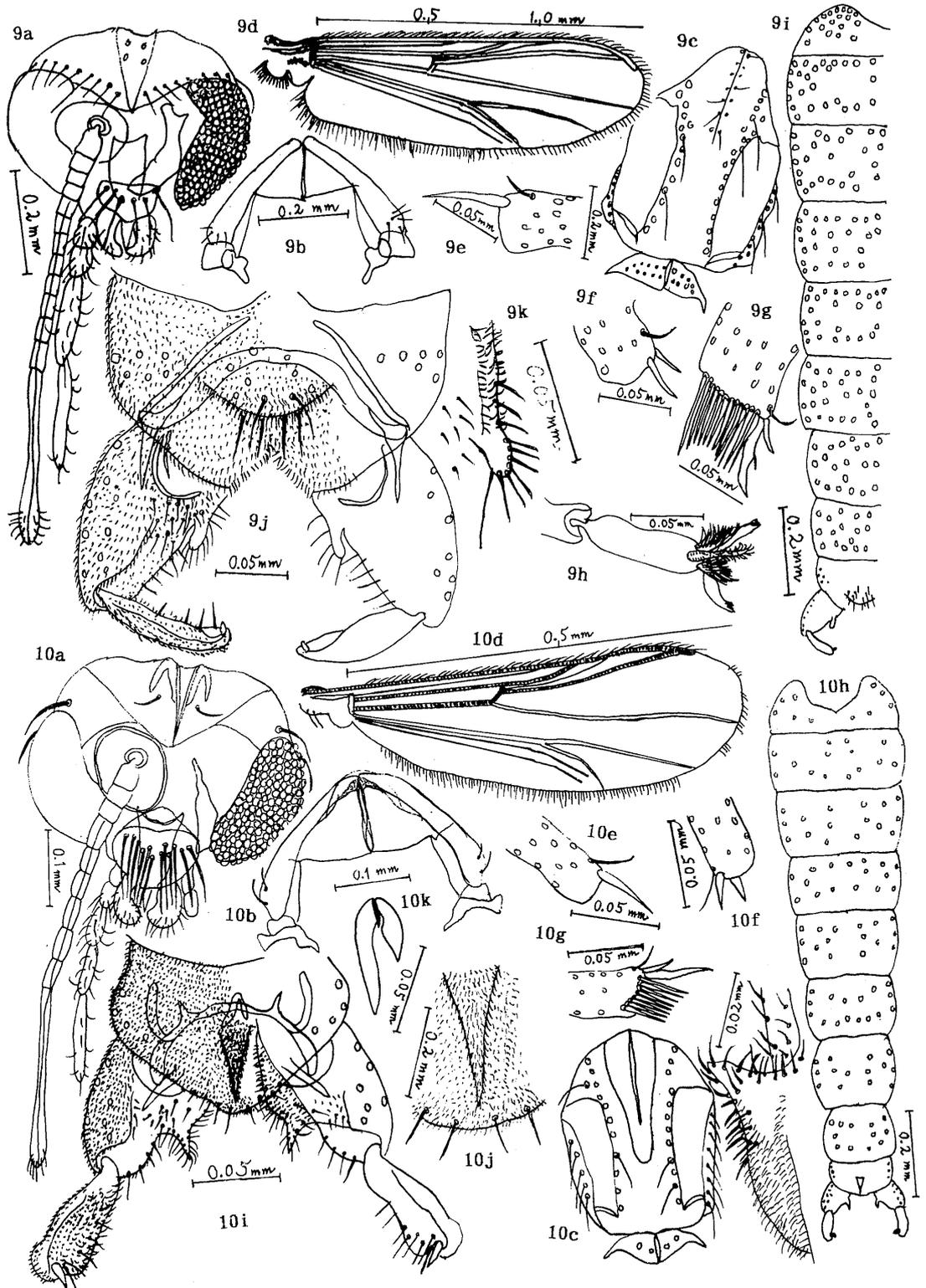


Fig. 9. *Psectrocladius seiryuensis* sp. nov.

Fig. 10. *Limnophyes seiryuensis* sp. nov.

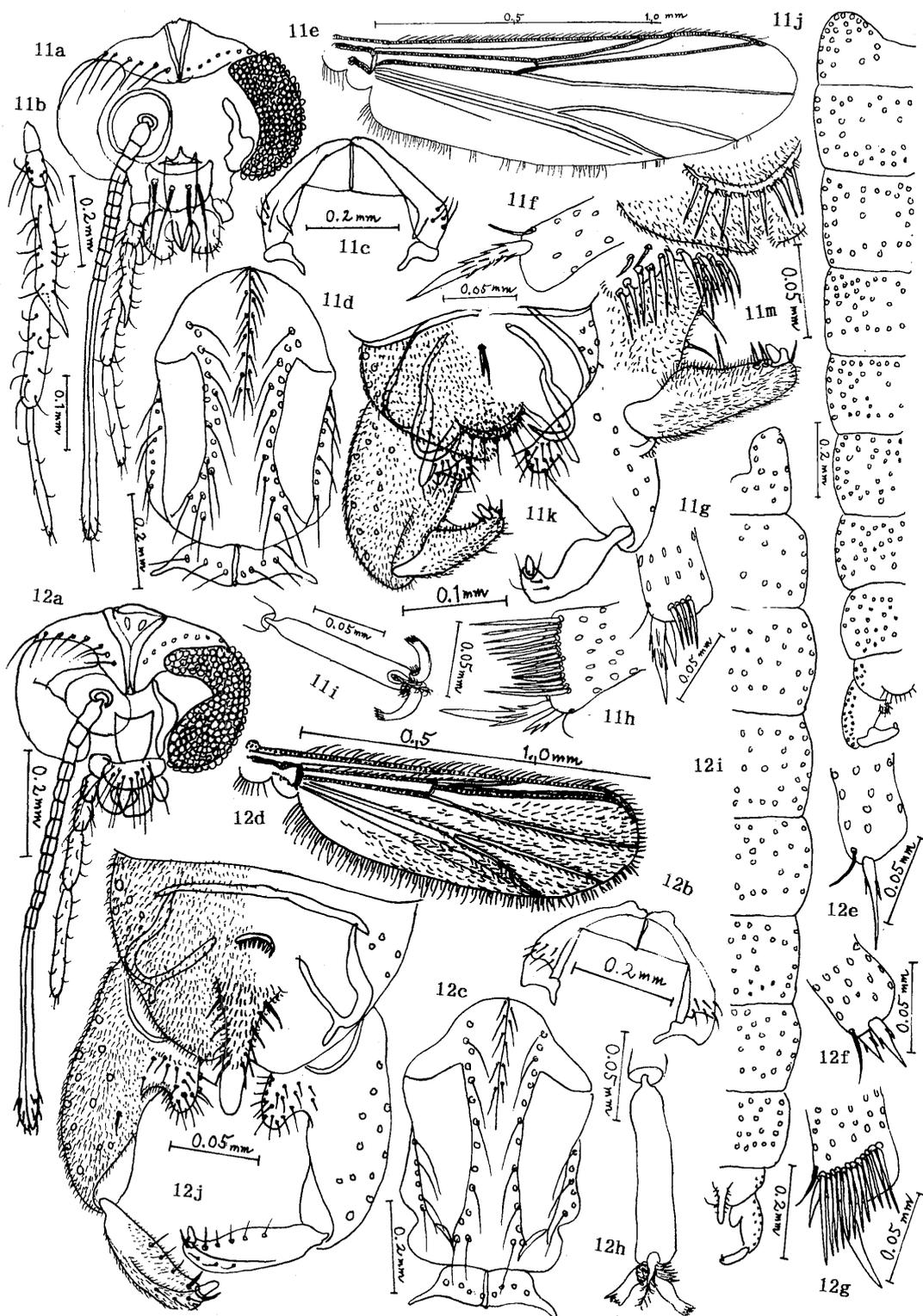


Fig. 11. *Okinawayusurika seiryujekea* sp. nov.

Fig. 12. *Metriocnemus seiryukeleus* sp. nov.

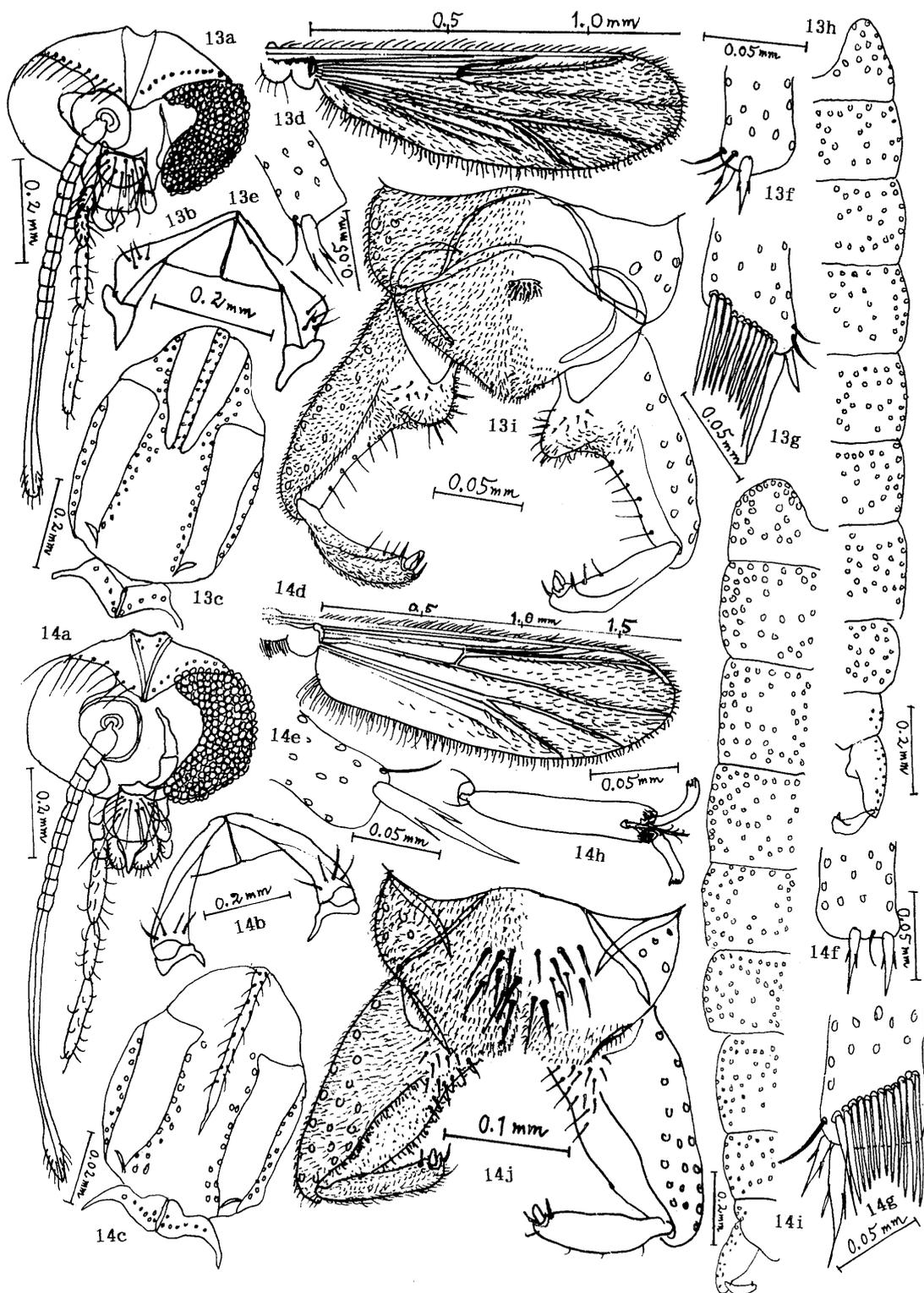


Fig. 13. *Metriocnemus seiryulemeus* sp. nov.

Fig. 14. *Metriocnemus seiryumeneus* sp. nov.

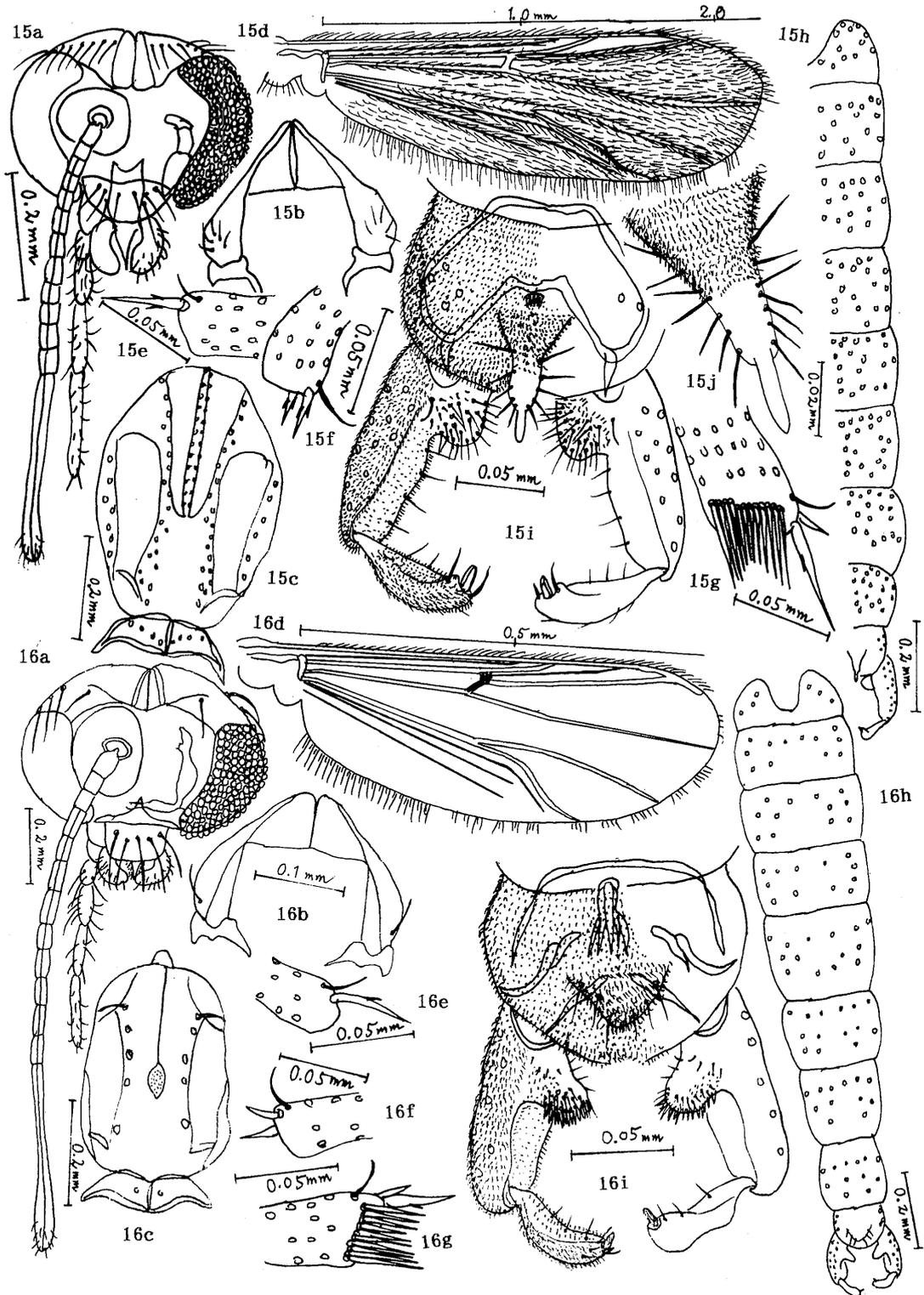


Fig. 15. *Paraphaenocladus impensus* (Walker, 1856)
 Fig. 16. *Epicocladus seiryuopeus* sp. nov.

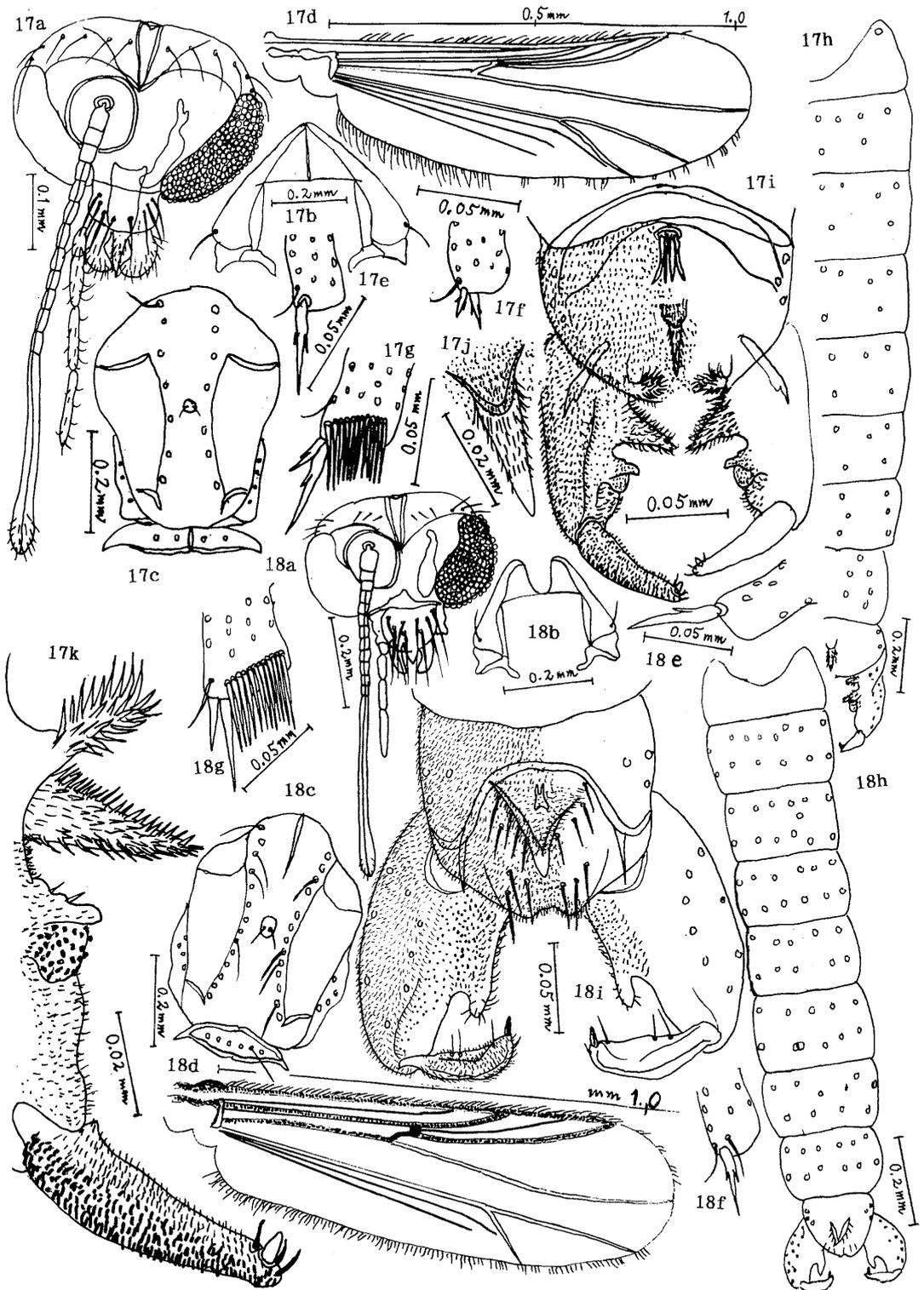


Fig. 17. *Pseudosmittia forcipata* (Goetghebuer, 1921)

Fig. 18. *Pseudosmittia nishiharaensis* Sasa et Hasegawa, 1988

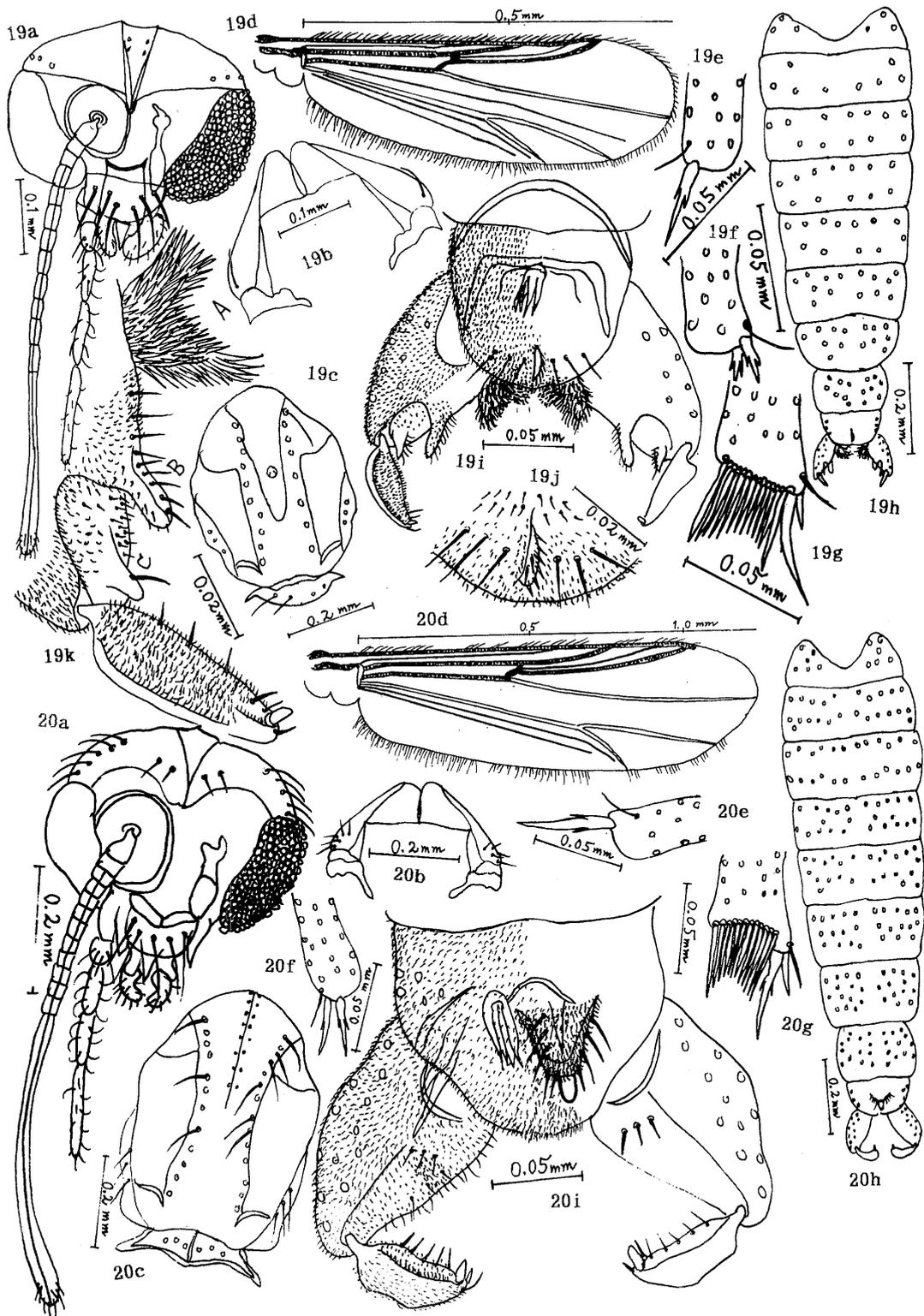


Fig. 19. *Pseudosmittia seiryupequea* sp. nov.

Fig. 20. *Pseudosmittia seiryuquerea* sp. nov.

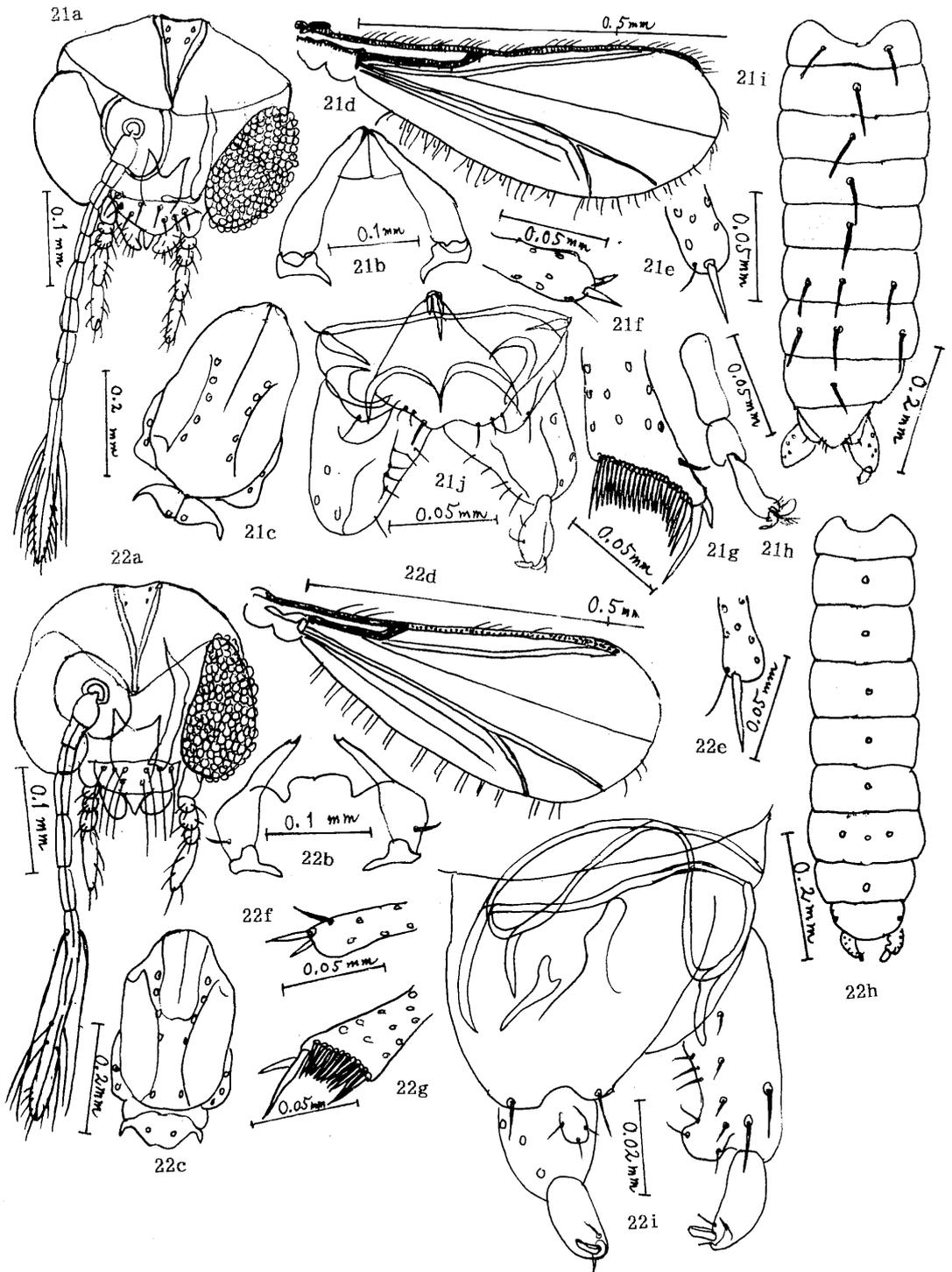


Fig. 21. *Corynoneura scutellata* Winnertz, 1846
 Fig. 22. *Corynoneura seiryuresea* sp. nov.

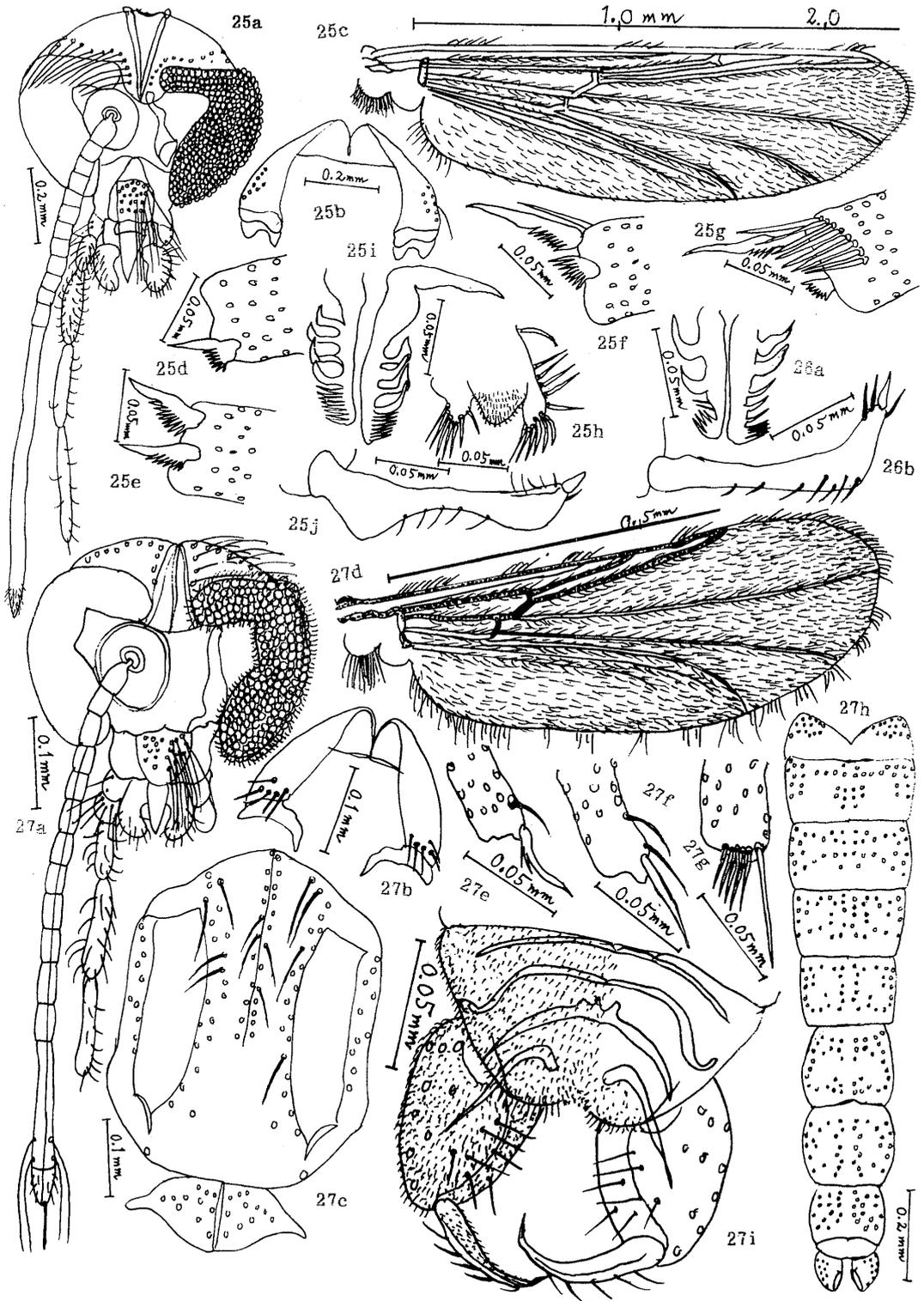


Fig. 25. *Conchapelopia seiryusetea* sp. nov.

Fig. 26. *Conchapelopia* sp. B, *seiryuteua*

Fig. 27. *Nilotanypus dubius* (Meigen, 1804)

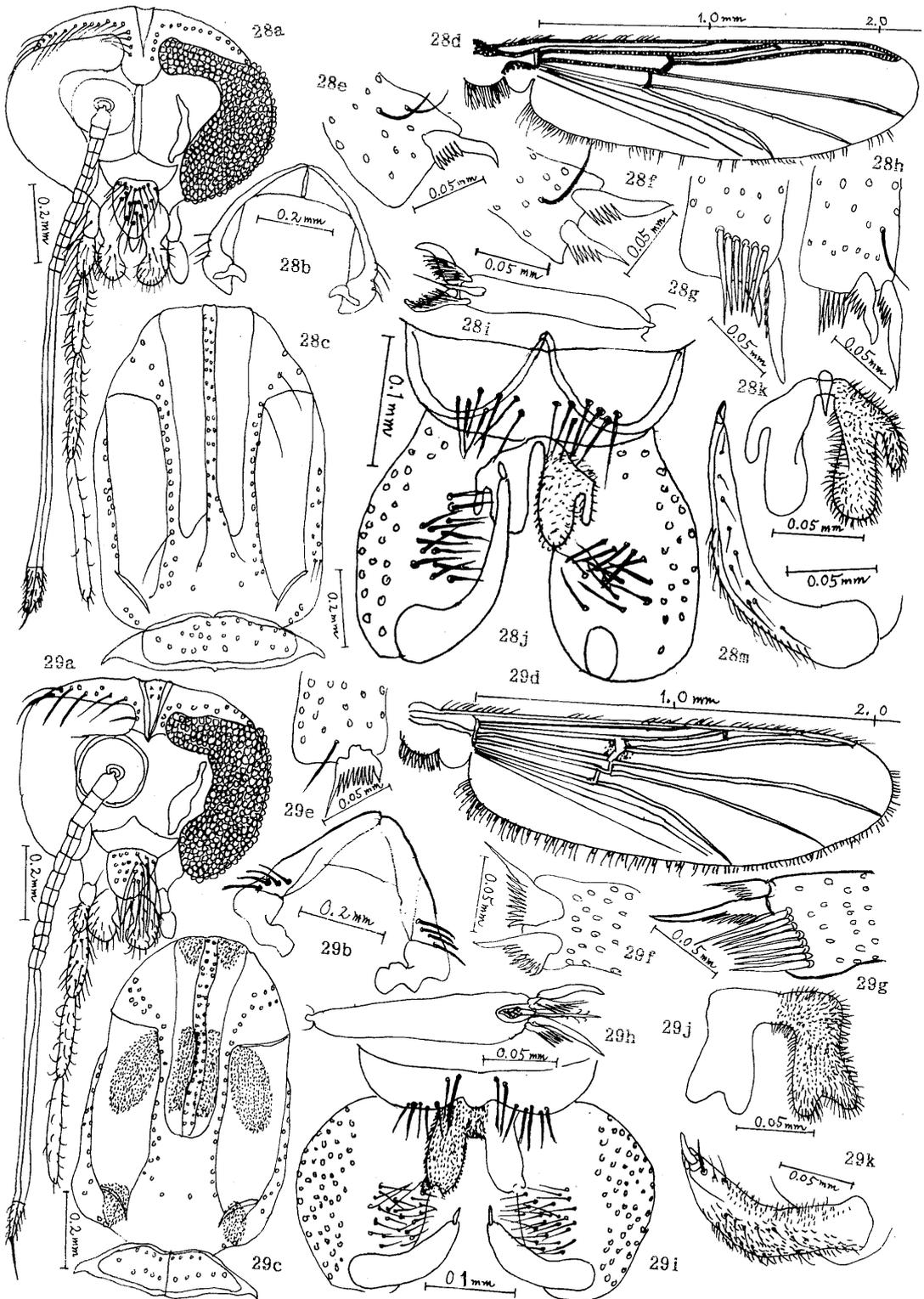


Fig. 28. *Rheopelopia ornata* (Meigen, 1838)

Fig. 29. *Rheopelopia seiryuuvea* sp. nov.

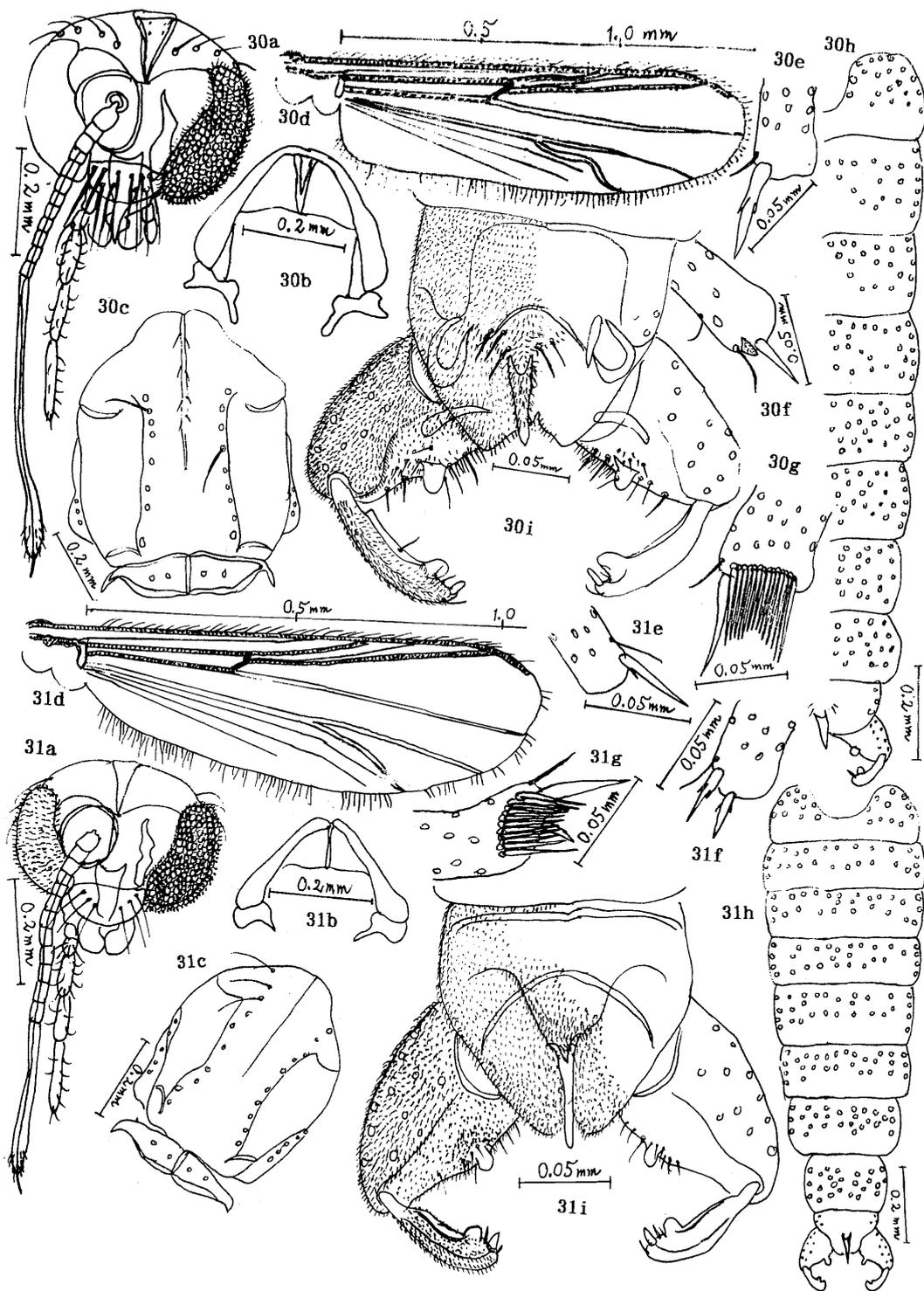


Fig. 30. *Smittia leucopogon* (Meigen, 1818)

Fig. 31. *Smittia seiryuwewea* sp. nov.

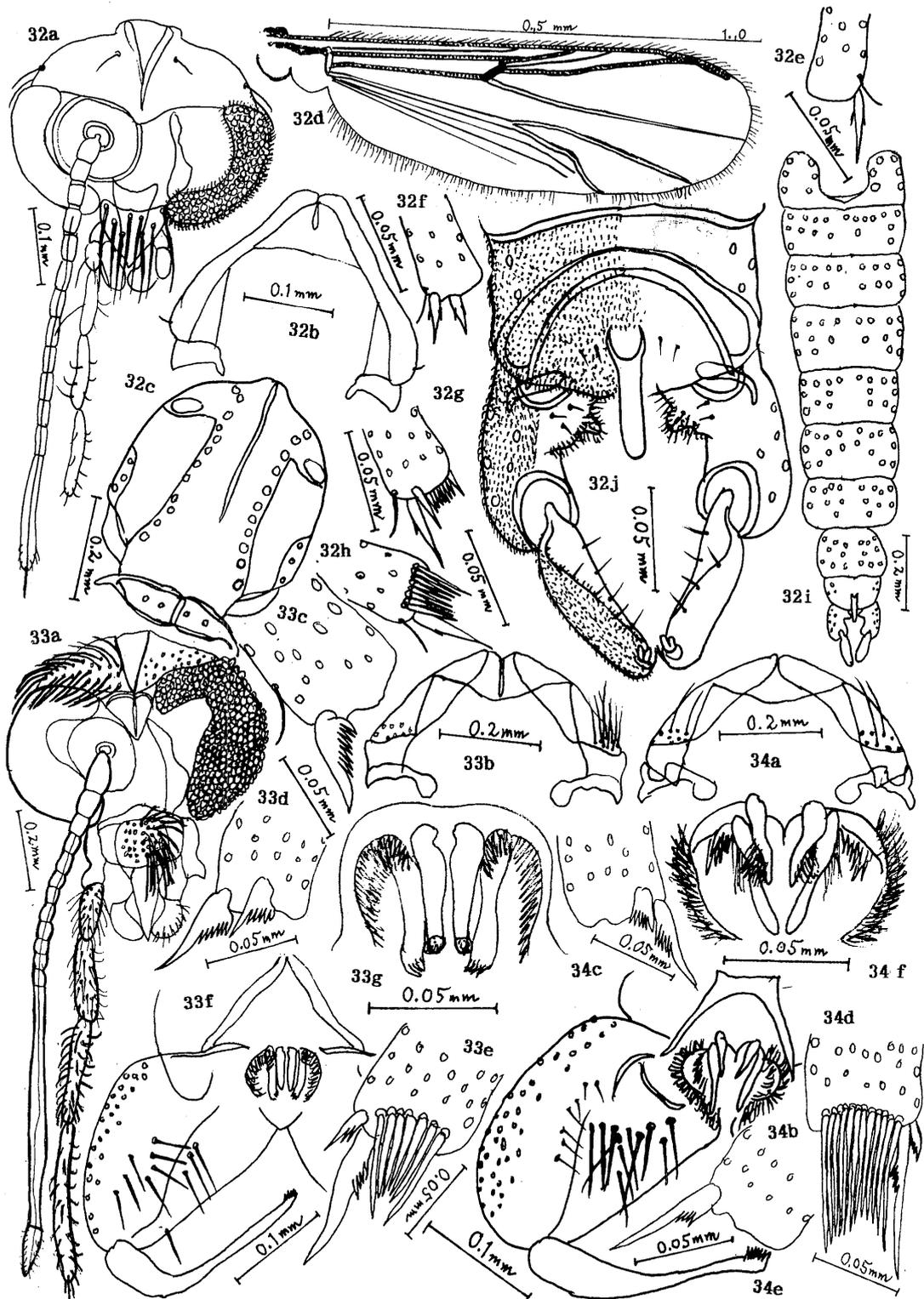


Fig. 32. *Smittia seiryuwexea* sp. nov.

Fig. 33. *Ablabesmyia longistyla* Fittkau, 1962

Fig. 34. *Ablabesmyia monilis* (Linnaeus, 1763)