Additional records of the chironomid midges from the Ryukyu Islands, southern Japan (Diptera, Chironomidae)

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Abstract: In addition to the total of 26 chironomid species of the tribe Chironomini recorded by Sasa and Hasegawa (1983) and Hasegawa and Sasa (1987), 16 more species belonging to the other tribes of the family Chironomidae from the Ryukyu Islands are recorded in the present paper, namely 4 species of Tanytarsini, 10 species of Orthocladiinae, and 2 species of Tanypodinae. Among them, 10 are described as new species. A new genus, *Okinawayusurika*, is established with *O. otsurui*, sp. nov. as the genotype. In addition, *Smittia pratorum* is described as a new record from Japan, and new scientific names are given for 3 species of the genus *Polypedilum* which were listed in our previous paper without designating scientific names.

INTRODUCTION

Collections of adult as well as larval chironomid midges were carried out during the period from December 1981 to February 1982 on the three main islands of the Ryukyu Archipelago, Okinawa, Miyako and Ishigaki. The adults were collected from their resting places or while swarming in the air with insect net. The larvae breeding in the bottom of sewage ditches, eutrophicated ponds, or some clean mountain streams were collected together with the bottom sediments, and were reared in the laboratory to obtain the adult midges for the taxonomic studies. Among the chironomids collected and identi-

fied, 26 species belonging to the tribe Chironomini of the subfamily Chironominae were recorded and described in the first paper by Sasa and Hasegawa (1983). In the second paper by Hasegawa and Sasa (1987), the pupae of 17 species and the larvae of 8 species among them were described, and new scientific names were given for 4 species recorded in the first report without giving scientific names. The present paper deals mainly with the records and descriptions of the species belonging to the other tribes or subfamilies of the family Chironomidae collected or reared at the same time as the specimens recorded in our previous papers. In addition, new scientific names are given for 3 species of the genus *Polypedilum*, which were already listed in our previous paper without designating scientific names.

The methods of collection, preservation and mounting the chironomid specimens are the same as described in our first report. In

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addition to the standard measurement items used in the previous papers, the following measurements are added in the present paper. AHR (antennal hair ratio), the length of longest antennal hairs on the last short antennal segment divided by the combined length of the flagellar segment of antenna; RR (radius ratio), the distance between ends of R1 and R2+3 divided by the distance between ends of R1 and R4+5; VR (the venarum ratio), the distance between wing base (tip of arculus) and fCu divided by the distance between wing base and r-m; R/Cu, the distance between wing base and end of R4+5 divided by the distance between wing base and end of Cu1.

Most of the specimens (those with the mark "No. A") used in the present study, including all holotypes and some paratypes, are provisionally preserved in the Toyama Medical and Pharmaceutical University. Some paratypes and other specimens (those with the mark "ChT") are deposited in the Department of Parasitology, School of Medicine, University of the Ryukyus.

1. *Polypedilum tananense* Sasa et Hasegawa, sp. nov.

#21. *Polypedilum* sp. (Tanane-yusurika) of Sasa and Hasegawa, 1983, Jpn. J. Sanit. Zool. 34: 326, Fig. 4-Q.

Holotype: male, No. A 64:41. Paratypes: 2 males, No. A 64:42, 43. All emerged from a bottom mud collected from a clean stream at Tanane, Miyako Island, on February 2, 1982. The morphology of male and female as well as the distinguishing characters from the related species were given in the previous paper. It belongs to the subgenus *Tripodura* Townes, 1945, and can be differentiated from the previously known Japanese species of this group by the following key.

1. Wing without dark marks; ninth tergite with narrow and apically pointed lateral tubercles; AR 1.46–1.57, fLR 1.46–1.52, fBR 3.0–3.2 *scalaenum* (Schrank, 1803) of Sasa (1985a, p. 7)
- Wing with dark marks 2
2. Wing with one dark patch in cell R-M (between veins R4+5 and M), and another dark patch in cell Cu (between Cu1 and Cu2) 3

- Wing with two or more dark patches in cell R-M and also in cell Cu 7
3. Ninth tergite without lateral processes flanking anal point; anal point wide and short; dorsal appendage with a beak-like inner process and with 2 long setae on posterior margin *japonicum* (Tokunaga, 1938)
- Ninth tergite with a pair of lateral tubercles flanking anal point 4
4. Anal point narrow, slender and parallel-sided; AR usually 0.6–0.8; body largely yellow 5
- Anal point short and stout; AR usually larger than 1.0 6
5. Dorsal appendage with only one long posterior seta; lateral processes flanking anal point long, narrow and sharply pointed; AR 0.58–0.66 *unifascium* (Tokunaga, 1938) of Sasa (1980, p. 32)
- Dorsal appendage with 4 long posterior setae; lateral processes flanking anal point low and roughly rectangular; AR 0.81–0.83 *miyakoense* Hasegawa et Sasa, 1987
6. Body largely pale yellow, dark marks on wing rather faint; anal point stout and parallel-sided; lateral processes flanking anal point low and very wide; dorsal appendage much longer than wide, with only one long posterior seta; WL 1.46–1.62 mm, AR 1.13–1.15, fLR 1.92–2.06, fBR 2.9–3.3 *tananense* sp. nov.
- Body largely dark brown, dark marks on wing much darker; anal point narrow at base and apically expanded, sometimes like figure T; lateral processes flanking anal point long, narrow and apically pointed; dorsal appendage nearly as wide as long, with 3–6 long posterior setae; WL 1.57–1.70 mm, AR 1.14–1.38, fLR 1.87–2.00, fBR 3.0–3.3 *tamahinoense* Sasa et Ichimori, 1983
7. Wing with 2 dark patches in cell R-M; dorsal appendage long and finger-like, not expanded apically and with only one long seta; lateral processes flanking anal point low and obtuse; AR about 1.8, fLR about 2.0 (after Tokunaga, 1938) .. *sagittiferum* (Tokunaga, 1938)
- Wing with 3 dark patches in cell R-M; dorsal appendage shorter, wider and apically expanded, with 3–5 long setae

- 8
8. Anal point constricted at base and apically expanded; lateral processes flanking anal point acutely produced; dorsal appendage with a long lateral seta, and 4 shorter inner setae; AR about 2.0, fLR about 1.8 (after Tokunaga, 1938, p. 337)
 .. *decematoguttatum* (Tokunaga, 1938)
- Anal point long, narrow, widest at base and apically pointed; ninth tergite without lateral processes flanking anal point; dorsal appendage short, apically expanded and with a beak-like inner process, with 4 long setae on posterior margin and 3 shorter setae on inner margin; AR about 1.5, fLR about 1.8
 masudai (Tokunaga, 1938)

2. *Polypedilum kunigamiense* Sasa et Hasegawa. sp. nov.

#23. *Polypedilum* sp. (Kunigami-yusurika) of Sasa and Hasegawa, 1983, Jpn. J. Sanit. Zool. 34:328, Fig. 5-R.

This species belongs to the *nubeculosum* group of genus *Polypedilum*, and has the dorsal appendage composed of a low and broad base bearing long inner setae, and a horn-like distal blade bearing a long lateral seta. Among the previously known species of this group, it is most closely related to *P. albicorne* (Meigen, 1838) recorded from Europe and redescribed by Pinder (1978, p. 138, Fig. 170A), but both differ from each other in the shape and structure of anal point and dorsal appendage, as pointed out in our previous paper.

Type specimens. Holotype: male, No. A 64:71. Paratypes: 2 males and 3 females, Nos. A 64:72–76. All emerged from fallen leaves in the bottom of a clean mountain stream at Benoki, Kunigami-son, northern Okinawa, on December 10, 1981.

3. *Polypedilum benokiense* Sasa et Hasegawa. sp. nov.

#24. *Polypedilum* sp. (Benoki-yusurika) of Sasa and Hasegawa, 1983, Jpn. J. Sanit. Zool. 34: 328, Fig. 5-S.

This is also a member of the *nubeculosum* group of genus *Polypedilum* and is most

closely related to *P. arundineti* (Goetghebuer, 1921), which was originally described from Europe and was also recorded by Sasa (1985a, p. 6) from Hokkaido, northern Japan, but in the present species gonostylus is much longer and narrower, AR is smaller (0.70 in the present species, 1.55 in *arundineti*), while fLR is 1.84 and larger than 1.6 of *arundineti*.

Type specimen. Holotype: male, No. A 64:47, emerged from the same bottom sample as the last species, collected in the bottom of a mountain stream at Benoki, northern Okinawa, on December 10, 1981.

4. *Tanytarsus kitaokinawanus* Sasa et Hasegawa, sp. nov.

(Fig. 1-a–n)

A male and a female emerged from fallen leaves collected in the bottom of a mountain stream at Benoki, northern Okinawa, on December 10, 1981.

Male. BL 1.94 mm, WL 1.18 mm. Body almost entirely pale yellow, Scutal stripes and postnotum slightly brownish. Eyes bare, ER 0.90. Frontal tubercles absent. Antenna with 13 flagellar segments, AR 0.67, AHR 0.48. so 8:8, cl 12, pn 0:0, dm 8, dl 6:6, pa 1:1, sc 4. Wing (Fig. 1-d) cneiform, macrotrichiae are distributed rather sparsely on distal half of wing membrane and on veins R1, R4+5, M, Cu1, Cu2 and An. RR 0.49, VR 1.33, R/Cu 1.08. fLR 2.67, mLR 0.57, hLR 0.67, fTR 0.39, fBR 2.8, mBR 3.5, hBR 3.6. Tips of tibiae in Fig. 1-e, f, g. Pulvilli absent.

Hypopygium in Fig. 1-h. Bands of ninth tergite united, and not produced caudally towards the middle. Anal point (Fig. 1-i) wide and short, with lateral ridges, and 5 spine clusters distributed roughly in double rows, and with 4 short setae at base and 2 lateral setae on both sides. Dorsal appendage (Fig. 1-j, k, l) roughly triangular, widest at base and rather pointed apically, with 4 lateral, one subapical, 2 inner setae, and one basal seta arising on a small tubercle. Digitus blade-like, slightly curved inwards, almost parallel-sided and with rounded apex, longer than dorsal appendage and largely extending beyond its inner margin. Ventral appendage short and stout, bearing 7 recurved setae on

Fig. 1

dorsal side and 3 caudally directed setae on the ventral side of the apical portion. Median appendage (appendage 2-a) long, apical setae extending beyond tip of ventral appendage, bearing numerous narrow and simple setae (Fig. 1-m, n). Gonostylus widest at about middle and smoothly tapering towards apex, with relatively long inner setae in the apical portion.

Female. Body length 1.66 mm, wing length 1.21 mm. Body largely pale yellow, scutal stripes reddish yellow. Head in Fig. 1-a. Eyes reniform, inner margin concave but without dorsomedial projection, ER 0.91. Antenna composed of a pedicel and 4 flagellar segments (70, 43, 50, 120 μm). AR 0.74, AHR 0.61, last segment with 3 fine sensory setae near apex but without long apical seta. Palp 4 segmented. so 6:6, cl 15, pn 0, dm 12, dl 12:12, pa 1:1, sc 4. Wing with macrotrichiae more numerous and widespread than in male, venation as in male. RR 0.53, VR 1.35, fLR 2.74, mLR 0.58, hLR 0.64, fTR 0.42, fBR 2.8, mBR 3.3, hBR 3.9. Pulvilli absent. Spermathecae (Fig. 1-b) small, both roughly globular, 37×38 and $34 \times 36 \mu\text{m}$. Cercus (Fig. 1-c) also small, 38 μm long and 60 μm wide.

Type specimens. Holotype: male, No. A 64:70a. Paratype: female, No. A 64:73b. Both emerged from a sample collected at Benoki, Kunigami-son, northern Okinawa.

Remarks. This species is somewhat related to *Tanytarsus lestagei* Goetghebuer described by various authors from Europe in that anal point is wide, short and bearing several spine clusters, and median appendage is very long and extending beyond tip of ventral appendage, but differs from the latter in that anal tergite bands are united in the middle (separated in *lestagei*), and that dorsal appendage is triangular (elongate oval in *lestagei*). Among members of this genus recorded from Japan, the present species is

closest to the one noted by Sasa (1985a, p. 9, Fig. 5) as *Tanytarsus* sp. "utonai" from Lake Utonai (Hokkaido) in the structure of hypopygium, especially in the shape of dorsal appendage and digitus, but they differ from each other in body coloration (dark brown in "utonai"), in the number of spine clusters on anal point (11 in "utonai", only 5 in the present species), and in the relative length of median appendage (long but not extending beyond tip of ventral appendage in "utonai"), and also in the structure of anal tergite bands (separated in "utonai"). Frontal tubercles are absent both in the present species and in "utonai," while they are present and rather conspicuous in all of the three following species of *Tanytarsus* being recorded from Okinawa.

5. *Tanytarsus miyakoflavus* Sasa et Hasegawa, sp. nov.

(Fig. 1-A-L)

Many males and females emerged from bottom sediments collected in a small unpolluted stream in a plantation on Miyako Island, on February 2, 1982; 13 males and 10 females among them were mounted on slides for morphological study.

Male. BL 2.35–2.75 (2.51 in average of 12) mm, WL 1.47–1.75 (1.62) mm. Ground color of scutum yellow, scutal stripes brownish yellow, scutellum pale yellow, postnotum brownish yellow, abdominal tergites yellow, halteres white, legs brownish yellow. Head in Fig. 1-A. Eyes bare, each with a long dorsomedial projection, ER 0.54–0.77 (0.65) (smaller than in the preceding species). Frontal tubercles (Fig. 1-B) 20–33 (27) μm high, 10–18 (14) μm wide, and 52–73 (61) μm apart from each other. Antenna with 13 flagellar segments, AR 0.86–1.11 (0.96), AHR 0.42–0.49 (0.47), so 6–9 (7.3), cl 12–16 (14.3), pn absent, dm 11–16 (13.3), dl

Fig. 1 *Tanytarsus kitaokinawanus*, sp. nov. and *Tanytarsus miyakoflavus*, sp. nov.

Tanytarsus kitaokinawanus, sp. nov. Female: a, head; b, spermathecae; c, cercus; Male: d, wing; e, tip of front tibia; f, tip of middle tibia; g, tip of hind tibia; h, hypopygium; i, anal point; j, dorsal appendage and digitus, ventral view; k, l, do, dorsal view; m, ventral and median appendages, dorsal view; n, do, ventral view. *Tanytarsus miyakoflavus*, sp. nov. Male: A, head; B, frontal tubercles; C, wing; D, tip of front tibia; E, tip of hind tibia; F, tip of middle tibia; G, hypopygium; H, dorsal appendage, dorsal view; I, ventral and median appendages, dorsal view. Female: J, head; K, spermathecae; L, cercus.

6–9 (7.3), pa 1 (rarely 2 or 3), sc 4 (rarely 5). Wing in Fig. 1-C. Anal lobe cneiform, wing with macrotrichiae more extensively distributed than in the preceding species, RR 0.36–0.51 (0.44), VR 1.09–1.20 (1.16), R/Cu 1.02–1.07 (1.05). Tip of front tibia with a long terminal scale and a subterminal seta (Fig. 1-D), tip of middle and hind tibiae with two separated terminal scales, both bearing a long spur (Fig. 1-E, F). fLR 2.56–2.92 (2.76), mLR 0.57–0.66 (0.61), hLR 0.68–0.74 (0.72), fTR 0.35–0.40 (0.37), fBR 2.6–4.0 (3.0), mBR 3.9–6.2 (5.0), hBR 3.3–6.0 (4.4). Tarsi IV longer than tarsi V in all legs. Pulvilli absent.

Hypopygium in Fig. 1-G. Anal tergite bands separated in the middle and connected caudally with bases of lateral ridges of anal point. Ninth tergite with 2–6 (3.6) setae at base of anal point. Anal point relatively wide, parallel-sided and apically rounded, with lateral ridges and 3–5 (2.8) spine clusters situated on a longitudinal line. Dorsal appendage (Fig. 1-H) roughly oval, without distal constriction, and bearing 2–4 (2.8) inner, 2–3 (2.4) dorsal and 2–4 (3.2) lateral setae. Digitus very small and completely hidden behind dorsal appendage. Ventral appendage (Fig. 1-I) thumb-like, slightly expanded distally, bearing 8–10 (9.2) recurved setae on dorsal side and 3 caudally directed setae on ventral side of apical portion. Median appendage (Fig. 1-I) medium in length, with 3 broad lamellar setae and numerous simple setae. Gonostylus rather slender, inner margin almost straight, and widest at about middle.

Female. BL 1.65–2.33 (2.11 in average of 10) mm, WL 1.48–1.70 (1.54) mm. Body almost entirely pale yellow; scutal stripes, postnotum and legs brownish yellow; halteres white. Head in Fig. 1-J. Frontal tubercles large, conical, 18–25 (21) μ m high, 20–38 μ m wide at base and 57–78 (74) μ m apart

from each other. ER 0.53–0.70 (0.60). Antenna composed of a pedicel and 4 flagellar segments (91, 62, 73, 145 μ m in average), last segment narrowed in the middle and with a terminal seta 79–101 (92) μ m long, AR 0.56–0.71 (0.64), AHR 0.53–0.70 (0.59). so 4–8 (6.5), cl 15–20 (17.1), pn 0, dm 8–16 (12.3), dl 7–13 (9.6), pa 1 (rarely 2), sc 4 in all. Wing wider and with more macrotrichiae than in male, RR 0.36–0.43 (0.42), VR 1.13–1.27 (1.18), R/Cu 1.05–1.08 (1.06), fLR 2.66–3.03 (2.82), mLR 0.54–0.60 (0.57), hLR 0.65–0.69 (0.68), fTR 0.34–0.39 (0.37), fBR 2.3–3.9 (2.8), mBR 2.8–4.7 (3.7), hBR 3.1–4.2 (3.6). Spermathecae (Fig. 1-K) two, both oval, 45–60 (52) $\times$ 38–55 (43) μ m. Cercus (Fig. 1-L) small, 53–78 (68) $\times$ 48–55 (49) μ m.

Type specimens. Holotype: male, No. A 64:63A. Paratypes: 11 males, A 64:64a, 66a, ChTA1–9; 10 females, A 63b, 64b, ChTB1–8.

Remarks. This species is somewhat related to *T. gregarius* Kieffer, 1909, described by various authors from Europe (Edwards, 1929, p. 410; Brundin, 1956, p. 66; Reiss and Fittkau, 1971, p. 114; Pinder, 1978, p. 156), in that body is largely yellow, anal point has lateral ridges and rather small numbers of spine clusters (6–9, mean 7.1, after Reiss and Fittkau, 1971), dorsal appendage is oval and nearly parallel to body axis, digitus is minute, and median appendage is relatively short and with both simple setae and broad lamellar setae. However, in the present species, pulvilli is completely absent (Pulvillen vorhanden in *gregarius*, according to Reiss and Fittkau, 1971), wing length is much smaller (2.2–2.8 mm in *gregarius*, AR is smaller (1.26–1.46 in *gregarius*), and fLR is much larger (1.89–2.03 in *gregarius*).

Fig. 2 *Tanytarsus miyakobrevi*, sp. nov. and *Tanytarsus sakishimanus*, sp. nov.

Tanytarsus miyakobrevi, sp. nov. Female: a, head; b, spermathecae; c, cercus. Male: d, frontal tubercles; e, hypopygium; f, median and ventral appendages, dorsal view; g, dorsal appendage, dorsal view; h, do, ventral view. *Tanytarsus sakishimanus*, sp. nov. Female: A, head; B, spermathecae; C, cercus. Male: D, frontal tubercles; E, wing; F, tip of front tibia; G, tip of middle tibia; H, tip of hind tibia; I, abdominal segments III to VI, lateral view; J, hypopygium; K, anal point; L, median and ventral appendages; M, dorsal appendage, dorsal view; N, do, ventral view.

Fig. 2

**6. *Tanytarsus miyakobrevis* Sasa
et Hasegawa, sp. nov.
(Fig. 2-a-h)**

Many males and females emerged from a bottom sample collected on February 2, 1982, from an unpolluted stream in a plantation on Miyako Island; 10 males and 10 females among them were mounted on slides for morphological study.

Male. BL 3.05–3.73 (3.39 in average of 10)mm, WL 1.80–2.10 (1.96)mm. Body largely yellow, with brown marks. Ground color of scutum yellow, median stripes yellowish brown and dark brown along the midline, lateral stripes brownish yellow along inner and posterior margin. Scutellum yellow, postnotum dark brown, abdominal tergites yellow, hypopygium brown, anal point and median appendages dark brown, legs brownish yellow. Frontal tubercles (Fig. 2-d) roughly conical, 21–43 (28) μ m high, 18–28 (21) μ m wide at base, and 42–95 (71) μ m apart from each other. Eyes with a narrow dorsomedial projection, ER 0.47–0.56 (0.52). Antenna with 13 flagellar segments, AR 1.25–1.38 (1.33), AHR 0.46–0.53 (0.50). so 8–14 (10.6), cl 16–21 (18.0), pn 0, dm 12–18 (14.9), dl 7–13 (10.1), pa 1, sc 6–8 (7.0). Wing bluish, coarsely granular, with macrotrichiae on almost entire wing membrane and veins (except R2+3 and subcosta, which are bare). Squama bare, anal lobe cneiform, anal vein ending before fCu. RR 0.36–0.50 (0.44), VR 1.15–1.22 (1.19), R/Cu 1.03–1.11 (1.06). fLR 2.47–3.13 (2.89), mLR 0.62–0.68 (0.65), hLR 0.68–0.73 (0.71), fTR 0.38–0.41 (0.39), fBR 3.1–3.7 (3.3), mBR 4.0–5.9 (4.7), hBR 4.1–7.5 (4.9). Terminal scale of front tibia with a narrow and sharply pointed process, terminal combs of middle and hind tibiae separated, both with a long spur. Pulvilli absent.

Hypopygium in Fig. 2-e. Bands on ninth tergite widely separated in the middle. Ninth tergite with 2–4 (3.6) setae at base of anal point. Anal point slightly tapering towards rounded apex, with lateral ridges and 4–10 (7.4) lateral setae, and 3–8 (6.3) spine clusters in a single row. Dorsal appendage roughly elongate oval but slightly constricted near apex, with 3–4 (3.1) inner and 7–10

(8.4) dorsal setae, the long axis directed slightly inwards against the body axis, with microtrichiae on inner side (Fig. 2-g, h). Digitus small and completely hidden behind dorsal appendage (Fig. 2-h). Ventral appendage finger-like, slightly expanded apically, with 13–20 (18.0) recurved setae on apical half of dorsal side, and 3 straight setae on ventral side near apex. Median appendage (2-f) short, directed inwards, with numerous short setae arranged in a thick tuft (Fig. 2-f).

Female. BL 2.58–3.23 (2.83 in average of 10)mm, WL 1.95–2.21 (2.04)mm. Body largely yellow, both median and lateral scutal stripes brown along inner margin as in male, abdomen yellow, legs brownish yellow. Head in Fig. 2-a ER 0.35–0.48 (0.41), frontal tubercles conical, 13–20 (15) μ m high, 10–23 (17) μ m wide at base, and 47–81 (70) μ m apart from each other. Antenna composed of a pedicel and 4 flagellar segments (113, 79, 93, 184 μ m in average), last segment with a subterminal seta of 115–148 (132) μ m long, AR 0.60–0.72 (0.65), AHR 0.54–0.68 (0.60). so 7–12 (9.3), cl 18–23 (20.1), pn 0, dm 14–22 (17.6), dl 13–23 (18.1), pa 1:1 in all, sc 6–10 (8.1). Wing bluish and granular, with numerous macrotrichiae, as in male. RR 0.32–0.45 (0.39), VR 1.13–1.26 (1.18), fLR 2.69–2.95 (2.81), mLR 0.62–0.69 (0.64), hLR 0.68–0.72 (0.70), fTR 0.36–0.40 (0.39), fBR 2.5–3.5 (2.9), mBR 2.9–5.5 (3.9), hBR 2.8–5.2 (3.7). Spermathecae (Fig. 2-b) 44–68 (55) $\times$ 61–95 (74) μ m, cercus 80–105 (90) $\times$ 65–78 (71) μ m wide, both larger and relatively longer than in female of the preceding species.

Type specimens. Holotype: a male, No. A 64:65a. Paratypes: 9 males, ChTC1–9, and 10 females, A 64:65b, ChTD1–9. All collected on Miyako Island on February 2, 1982.

Remarks. This species again related to *T. gregarius* Kieffer, 1909, known from Europe, in that anal tergite bands are separated, anal point has lateral ridges and small numbers of spine clusters, dorsal appendage is roughly oval and digitus is very small, and median appendage is rather short and directed inwards. However, it differs from *gregarius* in that anal tergite bands are ex-

tending to bases of lateral ridges of anal point, long axis of dorsal appendage is conspicuously oblique to body axis, dorsal appendage is slightly constricted near apex and with microtrichiae on both inner and lateral margins, median appendage bears more numerous setae, and pulvilli are absent. It is also related to the former species collected on the same island, *T. miyakoflavus*, but differs from it in the structure of median appendage (with numerous simple setae in the present species, with broad lamellae setae in the former), in the shape and presence or absence of microtrichiae on dorsal appendage, and in the distribution of recurved setae on ventral appendage (arising over the distal half in the present species, restricted to only the apical portion in the former).

**7. *Tanytarsus sakishimanus* Sasa
et Hasegawa, sp. nov.**

(Fig. 2-A-N)

Five males and 2 females emerged from bottom sand of a water filtration pond of Ishigaki City, Ishigaki Island, collected on February 1, 1982 (Nos. A 64:68a, b, 69a, b, ChTE1-3). A male and a female emerged also from bottom sand of a pond on Miyako Island, collected on February 2, 1982 (Nos. A 64:67a, b). Four males emerged from a bottom sample of a taro paddy in Ohyama, Ginowan-shi, Okinawa Island, on April 10, 1983 (ChTE4-7). A male was collected at Itoman-shi, Okinawa Island, on August 11, 1982 (ChTE8).

Male. BL 2.88–3.65 (3.24 in average of 11) mm, WL 1.55–1.95 (1.77) mm. Ground color of scutum nearly white, scutal stripes dark brown, scutellum white, postnotum dark brown; halteres white; femora largely yellow, brown apically; tibiae and tarsi yellowish brown. Abdominal tergites II to VI each with a pair of large pale areas surrounded in the middle by longitudinal dark brown band, and dark brown areas along caudal as well as oral margin of each segment (Fig. 2-I); tergites VII and VIII brown, hypopygium largely brown but anal point, dorsal appendage and bands of ninth tergite dark brown. Frontal tubercles (Fig. 2-D) well developed, 38–65 (49) μ m high, 23–30 (28) μ m wide, and about 65–73 (67)

μ m apart from each other. Eyes bare, ER 0.46–0.73 (0.66). Antenna with 13 flagellar segments, AR 1.09–1.31 (1.18), AHR 0.47–0.55 (0.50). so 8–14 (10.6), cl 16–22 (18.6), pn 0, dm 12–16 (13.6), dl 7–11 (8.4), pa 1 (rarely 2), sc 4–7 (5.2). Wing membrane bluish, finely granular. Wing venation in Fig. 2-E. Squama bare, anal lobe obtuse, with macrotrichiae rather sparsely and restricted mainly to distal half, on veins R, R₁, R₄+5, M, Cu₁, Cu₂ and An, as well as in the cells between R₄+5 and M, M and Cu₁, Cu₁ and Cu₂, and behind An. Costa ending at tip of R₄+5. RR 0.33–0.43 (0.39), VR 1.07–1.16 (1.12), R/Cu 1.02–1.11 (1.06). Anal vein ending proximal to fCu. fLR 2.29–2.53 (2.40), mLR 0.62–0.67 (0.64), hLR 0.67–0.75 (0.72), fTR 0.32–0.39 (0.36), fBR 3.1–4.3 (3.4), mBR 3.8–7.2 (5.2), hBR 3.7–6.9 (5.3). Terminal scale of front tibia with a long and narrow process (Fig. 2-F). Terminal combs of middle and hind tibiae separated, one wide and the other narrow, both with a long spur (Fig. 2-G, H). Pulvilli absent. Both abdominal tergites and sternites with reduced numbers of setae (Fig. 2-I).

Hypopygium in Fig. 2-J. Bands of ninth tergite widely separated in the middle. Ninth tergite with 1–3 (2.1) setae at about the tips of bands or anterior to the base of anal point. Anal point (Fig. 2-K) with darkly pigmented lateral ridges, several short lateral setae, and 3–10 (7.9) spine clusters in irregular rows. Dorsal appendage (Fig. 2-M, N) with nearly straight inner margin and strongly convex lateral margin, abruptly narrowed near apex, and a triangular apical process, bearing 3–4 (3.1) inner, 2–4 (2.8) dorsal, and 2–6 (4.9) lateral setae. Digitus (Fig. 2-N) very small, situated at the base of ventral side of dorsal appendage, and almost completely hidden behind it. Ventral appendage finger-like, slightly expanded apically, with 11–17 (14.0) recurved setae on dorsal side and 1–4 (2.8, usually 3) caudally directed straight setae on the ventral side of apical portion (Fig. 2-L). Median appendage composed of a short stem, and numerous stout and simple setae directed inwards or caudally (Fig. 2-L). Gonostylus with almost straight inner margin and smoothly convex lateral margin, bearing two rows of short setae along inner margin, bear-

ing two rows of short setae along inner margin.

Female. BL 2.34, 2.42, 2.58 mm, WL 1.58, 1.66, 1.78 mm. Body coloration as in male but generally paler; ground color of scutum yellow, stripes brown, scutellum yellow, postnotum brown, abdominal tergites largely yellow and with brown patches, hypopygium brown, leg segments yellowish brown. Head in Fig. 2-A. Frontal tubercles prominent, roughly conical. Antenna with 5 flagellar segments, AR 0.52, 0.59, 0.63, AHR 0.43, 0.43, 0.47, cl 18, 24, 32, so 7:7, 8:8, 9:9, pn 0, dm 14, 15, 18, dl 8:8, 9:11, 12:12, pa 1:1 in all, sc 7, 8, 10. Macrotrichiae on wing membrane more numerous than in male. RR 0.34, 0.37, 0.39, VR 1.17, 1.21, 1.26, R/Cu 1.10, 1.12, 1.12, sq 0, fLR 2.20, 2.30, 2.50, mLR 0.59, 0.65, 0.65, hLR 0.67, 0.76, fTR 0.31, 0.36, 0.41, fBR 2.5, 2.6, 2.9, mBR 2.7, 3.0, hBR 3.0, 3.3. Pulvilli absent. Spermathecae in Fig. 2-B, cercus in Fig. 2-C.

Type specimens. Holotype: male, No. A 65:12a, collected on Ishigaki. Paratypes: 10 males and 3 females, collected on Ishigaki, Miyako and Okinawa Islands.

Remarks. This species is somewhat related to *Tanytarsus oyamai* Sasa, 1979, which is one of the most common species breeding in rice paddies and ponds in the mainland of Japan, especially in the structure of wing and hypopygium. However, the present species can be distinguished from it by the following points.

1) Abdominal tergites II to VI have a pair of large pale areas in the middle, as shown in Fig. 2-I, while they are almost uniformly dark brown in *T. oyamai*. 2) Anal point has 8–10 spine clusters distributed irregularly in multiple rows, while they are only 3–6 and distributed in a single longitudinal line in *T. oyamai*. 3) Dorsal appendage is roughly oval and with an apical hook, while that of *T. oyamai* is abruptly constricted at about 1/3, and without apical hook. 4) Digitus is much smaller than that of *T. oyamai*. 5) Median appendage has more numerous branches than in *T. oyamai*. 6) In *T. oyamai*, AR is 0.86–1.12, fLR is 1.60–1.79, and both smaller than 1.09–1.31 or 2.29–2.53 of the present species. The measurement data and morphological char-

acteristics of *T. oyamai* were shown in the original description by Sasa (1979, p. 3, Fig. 5).

8. *Eukiefferiella yaraensis* Sasa et Hasegawa, sp. nov.

(Fig. 3-a–h)

Two males were collected on December 11, 1981, with insect net on the shore of the Hija River under Yara Bridge, Kadena-cho, Okinawa, where the water was highly eutrophicated.

Male. BL 2.04, 2.10 mm, WL 1.27, 1.34 mm. Ground color of scutum yellow, stripes dark brown, scutellum yellowish brown, postnotum dark brown, abdominal tergites yellowish brown; halteres yellow; leg segments yellowish brown. Head in Fig. 3-a. Eyes bare, inner margin slightly concave, without dorsomedial projection, ER 1.37, 1.55. Antenna with 13 flagellar segments, AR 0.78, 0.88, AHR 0.46, 0.51. Supraorbital setae absent in the median portion, 3 or 4 in the lateral portions. cl 6, 8.

Anteprenotum (Fig. 3-b) narrowly separated in the middle, with 2 lateral setae on each side. Scutum and scutellum in Fig. 3-c, dm 0, dl 8:9, 8:8, pa 3:3, 4:3, scutellar setae 6 in both specimens. Wing in Fig. 3-d. R2+3 almost fused with R4+5, RR 0.87, 0.90. Costa extending beyond end of R4+5, which is much proximal to end of Cu1, R/Cu 0.84, 0.90. fCu much beyond r-m, VR 1.32, 1.35. Cu2 almost straight. Anal vein extending much beyond fCu.

Front tibia with a long terminal spur (45 μ m, Fig. 3-e). Middle tibia with two short terminal spurs (12, 20 μ m, Fig. 3-f). Hind tibia with a long terminal spur (45 μ m), a short terminal spur (17 μ m), and a terminal comb composed of 13 free spurs (20–41 μ m, Fig. 3-g). All tarsi without terminal spurs. In the front legs, tarsus IV (58 μ m) is longer than tarsus V, while in the middle and hind legs, tarsi IV (58, 79 μ m) are shorter than tarsi V (68, 76 μ m). Pulvilli absent.

Hypopygium in Fig. 3-h. Ninth tergite with neither anal point nor long setae, posterior margin rounded. Inner lobe of gonocoxite nearly as long as wide, with rounded margin. Gonostylus simple, almost parallel-sided, with a terminal spur but without sub-

terminal tooth.

Type specimens. Holotype: male, No. A 65:77a. Paratype: male No. A 65:78a. Type loc. Kadena-cho, Okinawa.

Remarks. This species is classified as a member of the genus *Eukiefferiella*, because the structure of hypopygium, wing veins and other body parts are similar to those of certain species of this complicated genus. Among the species of this genus known from Europe, it is most closely related to *E. claripennis* (Lundbeck) redescribed and illustrated by Pinder (1978) in that anal point is absent, eyes are bare, gonostylus is not expanded basally, and costa is ending much proximal to tip of Cu1, but the shape and structure of inner lobe of gonocoxite and gonostylus are quite different from each other. Among the species of this genus recorded from Japan, it is most closely related to *E. yasunoi* Sasa, 1979, in the above stated morphological characters, but it again differs from *E. yasunoi* in AR (0.44–0.52 in *yasunoi*), absence of dm (dm present in *yasunoi*), and in the shape of inner lobe of gonocoxite (rounded in the present species, elongate and quadrangulate in *yasunoi*). *E. yasunoi* was collected from clean mountain streams on Mount Tsukuba (Ibaraki), while *E. yaraensis* was found at the side of a highly polluted stream on Okinawa Island.

9. *Rheocricotopus chalybeatus* (Edwards, 1929) (Fig. 3-A–Q)

Altogether 13 males and 14 females were collected with insect net on the bank of eutrophic ponds and streams on the three large islands surveyed, *i.e.* 2 males and 2 females on Ishigaki (No. A 65:91–93), 3 males and 3 females on Miyako (A 65:34, 99, 100), and 8 males and 9 females on Okinawa (A 65:79, 85–89, 91, 95–98).

Male. BL 2.32–2.82 (2.56 ± 0.16) mm in measurements of 10, WL 1.18–1.38 (1.48 ± 0.11) mm. Body largely black; ground color of scutum dark brown; scutal stripes, scutellum, postnotum and abdominal tergites black, sternites brown; halteres dark brown; legs dark brown. Eyes highly pubescent, without dorsomedial projection and widely apart from each other, ER 1.28–1.73 (1.54). An-

tenna with 13 flagellar segments. AR 1.18–1.38 (1.28), AHR 0.46–0.62 (0.52), supra-orbital setae composed of an inner pair, and 3–5 lateral pairs, cl 14–19 (15.2). Antepnotum with double lobes in the middle, and with 2–6 (4.2) lateral setae (Fig. 3-F). Scutum with a pair of large humeral pits (hm), dm 0, dl 10–16 (12.9), pa 3 or 4 (3.4), sc 10 or 12 (Fig. 3-K). Wing bare, slightly brownish, venation in Fig. 3-E. Costa not extending beyond end of R4+5. R2+3 ending about midway between ends of R1 and R4+5, RR 0.48–0.55 (0.51). fCu slightly beyond r-m, VR 1.06–1.16 (1.10). R4+5 ending slightly beyond end of Cu1, R/Cu 1.02–1.08 (1.05). Cu2 slightly curved near the tip. Anal vein extending much beyond fCu. Squama with 6–10 (8.2) fringe hairs. Anal lobe rather conspicuously produced. Front tibia with a long terminal spur (50 μ m; Fig. 3-G). Middle tibia with two short terminal spurs (16, 17 μ m; Fig. 3-H). Hind tibia with a long terminal spur (45 μ m), a short terminal spur (18 μ m), and a terminal comb composed of 12 or 13 free spurs (30–58 μ m; Fig. 3-I, J). fLR 0.64–0.67 (0.66), mLR 0.54–0.58 (0.56), hLR 0.57–0.61 (0.59), fTR 0.14–0.15 (0.142), fBR 1.8–3.5 (2.2), mBR 2.0–3.7 (3.0), hBR 2.4–4.1 (3.4). All legs with a pair of large pulvilli, claws and empodium.

Abdominal tergites with rather reduced numbers of setae, arranged roughly into the lateral and the middle groups. Hypopygium in Fig. 3-L. Anal point the *Orthocladius* type, *i.e.* widest at base and tapering towards sharply pointed apex, with lateral setae, and with microtrichiae on basal 2/3, distal 1/3 bare. Inner lobes of gonocoxite double-layered, the dorsal lobe roughly rectangular, without microtrichiae and with several short setae on inner margin, the ventral lobe wider and obtuse, thickly covered with microtrichiae (Fig. 3-M, N). Gonostylus apically expanded and sharply curved inwards, with a strong apical spur, and a conspicuous sub-apical swelling (Fig. 3-P, Q).

Female. BL 1.94–2.22 (2.07 in average of 8) mm, WL 1.22–1.57 (1.45) mm. Body largely black as in male; ground color of scutum dark brown, stripes, scutellum and postnotum black, abdominal tergites dark brown, sternites brown, halteres dark brown,

Fig. 3

leg segments dark brown. Head in Fig. 3-A. Eyes oval and without dorsomedial projection, ER 1.29–1.53 (1.39), highly pubescent. Antenna composed of a pedicel and 5 flagellar segments, AR 0.52–0.60 (0.55), AHR 0.31–0.42 (0.38). Supraorbital setae composed of an inner pair, and 3, 4 or 5 lateral pairs, cl 16–20 (17.6). Anteprenotum showing peculiar structure, as in male, with 2–5 (3.4) lateral setae. Scutum with a pair of large humeral pits as in male. dm 0, dl 12–22 (17.1), pa 3–6 (usually 3 or 4, mean 3.4), sc 10–16 (12.6). Wing membrane bare, brownish (darker than in male wing), smooth, veins thicker than in male. Wing venation in Fig. 3-D. Costa slightly extending beyond end of R4+5. R2+3 ending about midway between end of R1 and R4+5, RR 0.46–0.53 (0.50). VR 1.04–1.21 (1.11). R4+5 ending slightly beyond end of Cu1, R/Cu 1.03–1.08 (1.05). Anal vein extending much beyond fCu. Squama with 8–10 (8.5) fringe hairs. Anal lobe obtuse. Spermathecae (Fig. 3-B) two, both oval and colorless. Cercus (Fig. 3-C) with a conspicuous ventral projection.

Remarks. This species is a typical member of genus *Rheocricotopus* Thienemann et Harnisch, 1932, since eyes are pubescent and without dorsomedial projection, hypopygium has a large anal point bearing lateral setae, scutum has a pair of large humeral pits, wings are bare, squama are fringed, and gonostylus is simple. The present species is identified as *R. chalybeatus* (Edwards), because gonostylus is abruptly curved upwards at tip (a characteristic of this species). The structure of hypopygium, the presence of large humeral pits and measurement data fit to the description of this species by various authors from Europe. *R. chalybeatus* was recorded also by Tokunaga (1938, p. 319) from Kyoto and Osaka, and by Sasa and Kawai (1987a, p. 43) from Lake Biwa (Shiga).

10. *Metriocnemus ryutanus* Sasa et Hasegawa, sp. nov.

(Fig. 4-a–h)

A male (holotype) was collected with insect net on the shore of Lake Ryutan, Shuri, Okinawa Island, on December 7, 1981 (No. A 65:31).

Male. BL 2.26 mm, WL 1.44 mm. Ground color of scutum yellow, scutal stripes reddish brown, scutellum yellowish brown, postnotum dark brown, abdominal tergites brown; leg segments brownish yellow; halteres yellow. Head in Fig. 4-a. Eyes bare, each with a long dorsomedial projection, ER 0.58 (very small as a member of Orthocladiinae). Antenna with 13 flagellar segments, AR 0.94, AHR 0.49, last segment not expanded apically, without apical seta. Palp 4 segmented as usual. Scutum and scutellum in Fig. 4-b; so 13:13, cl 12, dm 20, dl 27:27, pa 8:11, sc 10, all relatively large in the numbers. Wing (Fig. 4-c) with numerous macrotrichiae both on veins and membrane. R4+5 ending much proximal to end of Cu1 and to the tip of wing, R/Cu ratio 0.84. Costa extending much beyond end of R4+5. R2+3 ending about midway between ends of R1 and R4+5, RR 0.56. fCu beyond r-m, VR 1.17. Cu2 slightly curved. Anal vein ending under fCu. Squama with 6 fringe hairs, anal lobe obtuse. Leg ratios relatively high, fLR 0.80, mLR 0.56, hLR 0.70, fTR 0.13. Tarsi with long beards, fBR 3.9, mBR 5.8, hBR 6.0. All tarsi cylindrical, pulvilli absent. Front tibia with a long terminal spur (62 μ m; Fig. 4-d). Middle tibia with two short terminal spurs (20, 22 μ m; Fig. 4-e). Hind tibia with a long terminal spur (53 μ m), a short terminal spur (25 μ m), and a terminal comb composed of 8 free spurs 30–48 μ m long (Fig. 4-f). Ninth tergite without long setae.

Hypopygium in Fig. 4-g, h. Anal point

Fig. 3 *Eukiefferiella yaraensis*, sp. nov. and *Rheocricotopus chalybeatus* (Edwards).

Eukiefferiella yaraensis, sp. nov. Male: a, head; b, anteprenotum; c, scutum and scutellum; d, wing; e, tip of front tibia; f, tip of middle tibia; g, tip of hind tibia; h, hypopygium. *Rheocricotopus chalybeatus* (Edwards) Female: A, head; B, spermathecae; C, cercus; D, wing. Male: E, wing; F, anteprenotum; G, tip of front tibia; H, tip of middle tibia; I, J, tip of hind tibia; K, scutum and scutellum; L, hypopygium; M, inner lobes of gonocoxite, dorsal view; N, do, ventral view; P, Q, gonostylus.

robust, widest at base, thickly covered with microtrichiae and with lateral setae on basal 3/4, distal 1/4 bare and rounded apically. Inner lobe of gonocoxite single, low, broad and obtuse. Gonostylus simple, widest at about distal 1/3, lateral margin convex and inner margin almost straight, with a strong apical spur, and a small subapical swelling.

Remarks. This species belongs to the genus *Metriocnemus* van der Wulp, 1874, since it has wings with macrotrichiae on almost entire surface, simple gonostylus, bare eyes, almost straight Cu2, a large anal point, and costa extending much beyond end of R4+5. This genus is relatively rich in species. Goetghebuer (1940) recorded 12 species from Europe, and Pinder (1978) gave 10 species in his key to British Chironomidae. Among them, the present species seems to be most closely related to *M. cavicola* Kieffer, 1921, since wing is almost entirely covered with macrotrichiae, gonocoxite has a large basal lobe, and AR is about 1.0. However, the structure of male hypopygium is essentially different between these species, i.e. in *M. cavicola* anal point has no lateral setae, inner lobe of gonocoxite is much larger, and gonostylus has no subapical tooth.

Three species of genus *Metriocnemus* have been recorded from Japan, including the present new species. Their males can be differentiated from each other by the following key.

1. AR 2.5–3.0; gonocoxite without inner lobe; thorax black *picipes* (Meigen, 1818) of Tokunaga, 1940
- AR about 1.0; gonocoxite with a conspicuous inner lobe 2
2. Scutellum with 32–38 setae distributed in multiple rows, prealar setae 20–36 on each side; anal point without lateral setae, and covered entirely with microtrichiae; ninth tergite with 22–35 long setae; tarsi I and II of middle legs and tarsi I of hind legs with two terminal

spurs; body almost entirely black
..... *tamaokui* Sasa 1983

- Scutellum with about 10 setae in a transverse row; prealar setae 8–12; anal point with lateral setae, and with microtrichiae restricted to basal 2/3; ninth tergite without long setae; tarsi without apical spurs; body largely yellow, with brown marks *ryutanus* sp. nov.

***Okinawayusurika* Sasa and Hasegawa, gen. nov.**

Chironomidae: Orthoclaadiinae: *Metriocnemini*. Male: Eyes bare, inner margin concave. Antenna with 13 flagellar segments, last segment slightly swollen apically, without terminal seta. Palp 4 segmented. Anteprepronotum completely united in the middle, with lateral setae but without dorsal setae. dm minute and restricted to the anterior half of scutum. dl arising from large pale pits. Wing membrane bare and coarsely granular; squama with a few fringe hairs; costa not extending beyond end of R4+5; fCu beyond r-m; Cu1 ending proximal to end of R4+5; Cu2 almost straight; anal vein faint, extending beyond fCu. Leg segments long and slender; front tibia with a long and slender terminal spur; middle and hind tibiae each with a long terminal spur, a short terminal spur, and a terminal comb composed of free spinules; tarsus IV longer than tarsus V in all legs; pulvilli absent. Hypopygium without anal point; inner lobe of gonocoxite broad and low, and bearing short and strong setae; gonostylus simple, widest at about middle, with a strong terminal spur.

Type species. *Okinawayusurika otsurui* Sasa et Hasegawa, sp. nov., monotypic.

This generic name is originated from “Okinawa” (name of the prefecture), and “Yusurika” (Japanese common name for chironomid midges). The gender of this

Fig. 4 *Metriocnemus ryutanus*, sp. nov. and *Okinawayusurika otsurui*, gen. nov., sp. nov. *Metriocnemus ryutanus*, sp. nov. Male: a, head; b, scutum and scutellum, showing distribution of setae; c, wing; d, tip of front tibia; e, tip of middle tibia; f, tip of hind tibia; g, hypopygium, dorsal view; h, do, ventral view. *Okinawayusurika otsurui*, gen. nov., sp. nov. Male: A, head; B, anteprepronotum; C, wing; D, scutum and scutellum; E, tip of front tibia; F, G, tip of middle tibia; H, I, tip of hind tibia; J, abdominal tergites II and III, showing distribution of setae; K, hypopygium; L, gonostylus.

generic name is feminine.

**11. *Okinawayusurika otsurui* Sasa
et Hasegawa, gen. et sp. nov.
(Fig. 4-A-L)**

A male (holotype) was collected on February 3, 1982, on the shore of a small eutrophicated pool of the primary school on Ikema Island, Miyako (No. A 65:16).

Male. BL 2.36 mm, WL 1.52 mm. Ground color of scutum yellow, stripes dark brown, scutellum yellowish brown, postnotum dark brown, abdominal tergites brown, sternites yellowish brown, halteres yellow, leg segments brown. Head in Fig. 4-A. Eyes bare, inner margin strongly concave, ER 0.80. Antenna with 13 flagellar segments, AR 1.31, AHR 0.59, last segment only slightly swollen apically, with several short sensory setae in the apical portion but without terminal seta such as seen in some *Smittia* species. Palp 4 segmented. Supraorbital setae 8 on both sides. Anteprepronotum (Fig. 4-B) narrow but completely united in the middle, with 5 lateral setae. Scutum and scutellum in Fig. 4-D. dm 22 in two rows, all minute and starting from near anterior margin. dl 18:18, all arising from large pale pits, prealar setae 6:7, scutellar setae 7.

Wing in Fig. 4-C. Wing membrane bare, coarsely granular such as in *Limnophyes* species, slightly bluish under transmitted light. Squama with 3:3 fringe hairs. Costa not extending beyond end of R4+5. R2+3 ending closer to end of R1, RR 0.36. fCu beyond r-m, VR 1.22. Cu1 ending proximal to end of R4+5. Cu2 almost straight. Anal vein rather faint, extending beyond fCu. Leg segments relatively long and slender, fLR 0.61, mLR 0.52, hLR 0.60, fTR 0.13. Tip of front tibia with a very long and slender terminal spur (83 μ m, Fig. 4-E). Middle tibia with a long terminal spur (52 μ m), a short terminal spur (30 μ m), and a terminal comb composed of 6 free spurs (24–30 μ m, Fig. 4-F, G). Hind tibia with a long terminal spur (62 μ m), a short terminal spur (30 μ m), and a terminal comb composed of 15 free spurs (28–46 μ m, Fig. 4-H, I). All tarsi without terminal spurs. Tarsus I with a relatively long beard, fBR 4.0. Tarsus IV much longer than tarsus V

in all legs. Claws well developed, empodium rather small, pulvilli absent.

Abdominal tergites with relatively large numbers of setae, which are almost evenly distributed (Fig. 4-J). Hypopygium in Fig. 4-K. Anal point absent, but ninth tergite with a broad and rounded lobe with darkly pigmented posterior margin and with a wedge-shaped pale area in the middle and 10 strong setae on posterior margin. Inner lobe of gonocoxite broad and low, bearing 10 spine-like setae with strong bases. In addition, gonocoxite has 10 long and slender setae in the area lateral to the inner lobe. Gonostylus (Fig. 4-L) widest at about middle, with a strong terminal spur 18 μ m long and 6 μ m wide.

Remarks. *Okinawayusurika* is somewhat related to certain species of the genus *Limnophyes* Eaton in that wing membrane is coarsely granular, squama has very small numbers of fringe hairs, Cu2 is almost straight, and anal point is absent. However, the present new genus is essentially different from *Limnophyes* and all the other genera of the subfamily Orthocladiinae in that the middle tibia has a terminal comb, such as seen in the tip of hind tibia of the most other species of this subfamily. It is also characteristic in having a rudimentary inner lobe on gonocoxite.

This species name is dedicated to Professor Masamitsu Otsuru, former Dean of the School of Medicine and also Chairman of the Department of Parasitology, University of the Ryukyus.

**12. *Pseudosmittia ikemaensis* Sasa
et Hasegawa, sp. nov.
(Fig. 5-a-p)**

Adults of this species were found swarming on the bank of a small eutrophicated pool in the primary school of Ikema Island, Miyako, on February 3, 1982; 18 males and 3 females were studied as slide specimens.

Male. BL 2.10–2.18 (2.14 in average of 10) mm, WL 1.08–1.22 (1.14) mm. Scutum almost uniformly black, scutellum dark brown, postnotum black, abdominal tergites dark brown, anal point black, legs dark brown, halteres brown. Head in Fig. 5-e. Eyes bare, reniform, without dorsomedial

Fig. 5 *Pseudosmittia ikemaensis*, sp. nov.

Female: a, head; b, wing; c, spermathecae; d, cercus. Male: e, head; f, wing; g, antepnotum; h, scutum and scutellum; i, tip of front tibia; j, tip of middle tibia; k, tip of hind tibia; l, abdominal tergites; m, anal point; n, hypopygium; p, gonostylus.

projection, ER 1.21–1.59 (1.40). Antenna with 13 flagellar segments, AR 1.19–1.37 (1.27 ± 0.06), AHR 0.49–0.56 (0.52), last segment slightly swollen apically, with numerous short sensory setae in the apical portion but without apical spine. Palp 4 segmented as usual. Supraorbital setae 1–3 in the inner portion and 3–5 in the outer

portion, 4–7 in total. Clypeal setae 7–13 (10.1). Antepnotum (Fig. 5-g) deeply separated in the middle, with 2 or 3 lateral setae. Scutum (Fig. 5-h) without dorso-median setae but with a median tubercle bearing two minute setae. Dorsolateral setae 12–16 (13.9), all arising from a large pale pit. Prealar setae 3–5 (most frequently 4,

mean 4.0). Scutellum with 8 setae in a transverse row in all the specimen examined. Wing in Fig. 5-f. Wing membrane bare, veins without macrotrichiae except on costa, slightly brownish. Squama bare, anal lobe obtuse. Costa extending beyond end of R4+5, which ends much proximal to the tip of wing and also to the end of Cu1. R2+3 ending closer to end of R4+5 than to end of R1, RR 0.56–0.75 (0.64). fCu is much distal to r-m, VR 1.66–1.83 (1.71), Cu2 is very short. R4+5 ending proximal to end of Cu1, R/Cu 0.90–0.94 (0.92). Anal vein ending much proximal to fCu. fLR 0.54–0.58 (0.56), mLR 0.51–0.55 (0.53), hLR 0.65–0.68 (0.66), fTR 0.13–0.15 (0.14), fBR 4.0–5.1 (4.7), mBR 4.4–6.0 (5.2), hBR 4.4–6.1 (5.3). Front tibia with a long terminal spur (155 μ m, Fig. 5-i). Middle tibia with a short (22 μ m) and a long (42 μ m) terminal spur (Fig. 5-j). Hind tibia with a long terminal spur (48 μ m), a short terminal spur (27 μ m), and a terminal comb composed of some 11 spurs 22–38 μ m long (Fig. 5-k). In addition, tarsi I to IV of all legs with one short terminal spur. Pulvilli absent.

Abdominal tergites (Fig. 5-l) with reduced numbers of setae. Hypopygium in Fig. 5-n. Ninth tergite thickly covered with strong microtrichiae. Anal point long, slender, parallel-sided and apically rounded, darkly pigmented and also thickly covered with strong spines together with the V-shaped base (Fig. 5-m). Inner lobe of gonocoxite single, roughly rectangular, with short setae on the dorsal side and with numerous microtrichiae on the ventral side. Gonostylus (Fig. 5-p) simple, almost straight but slightly expanded in the middle, with a large terminal spur.

Female (No. A 25A, 26A, B). BL 1.62, 1.80, 1.90 mm, WL 0.99, 1.00, 1.06 mm. Ground color of scutum brown; stripes, scutellum and postnotum dark brown, abdominal tergites black, sternites yellowish brown; legs brown; halteres yellowish brown. Head in Fig. 5-a. Eyes bare, without dorso-medial projection and widely apart from each other, ER 1.26, 1.31, 1.37. Antenna composed of a pedicel and 5 flagellar segments (65, 47, 48, 40, 84 μ m), AR 0.42, 0.43, AHR 0.30, 0.32. Supraorbital setae

composed of 2 or 3 inner and 4 or 5 outer groups, clypeal setae 9, 11, 14. Anteppronotum with 3 or 4 lateral setae. Scutum without dorsomedian setae but with a small round median tubercle bearing two minute setae. dl 12:12, 12:13, 16:16, pa 4:4, 4:4, 3:5, sc 8, 8, 10. Wing in Fig. 5-b, generally similar in structure to that of male, but relatively wider: costa much more extending beyond end of R4+5, R2+3 almost fused with R4+5, RR 0.76, 0.82, 0.86. fCu much beyond r-m, VR extremely large, 1.49, 1.64, 1.66. R4+5 ending much proximal to end of Cu1. Cu2 very short. Squama bare, anal lobe obtuse. fLR 0.52, 0.53, mLR 0.51, 0.51, 0.53, hLR 0.64, 0.65, 0.67, fTR 0.14, 0.15, fBR 2.4, 2.6, 2.8, mBR 2.7, 2.9, 3.2, hBR 3.2, 3.4, 3.7. Tarsi I to IV of all legs with a short terminal spur, as in male. Pulvilli absent. Spermathecae (Fig. 5-c) two, both ovoid and darkly pigmented. Cercus in Fig. 5-d.

Type specimens. Holotype: male, No. A 65:12a. Paratypes: 17 males and 3 females, No. A 65:09–14, 27, 29. All collected on February 3, 1982, on Ikema Island, Miyako, Okinawa.

Remarks. This species is also placed into the genus *Pseudosmittia* Goetghebuer, since eyes, wings and squama are all bare, scutum has a median tubercle, antenna without apical seta, and R4+5 is ending proximal to end of Cu1. Among the known species of this genus, it is somewhat related to *P. curtica* (Edwards, 1929) in that gonocoxite has only one inner lobe, AR is about 1.0, and hypopygium has well developed anal point. However, the present species differs from it essentially in the shape of gonostylus (widest at apex and produced inwards in *curtica*), inner lobe of gonocoxite (much smaller in *curtica*), and anal point (bearing stronger microtrichiae, with a large U-shaped base in the present species). The present species is also quite unusual as a member of this genus in that costa is extending much beyond end of R4+5, and fCu is situated far distal to r-m.

13. *Pseudosmittia nishiharaensis***Sasa et Hasegawa, sp. nov.**

(Fig. 6-a-n)

A total of 16 males and a female were collected from 4 islands of the Ryukyus, all with insect net from bushes at the side of

more or less polluted streams; 3 males and a female at Nishihara, Miyako Island (No. A 65:21, 22), 4 males on Ikema Island, Miyako (No. A 65:13, 24), a male on Ishigaki (A 65:92), 4 males at Kochinda (A 65:19, 20), and 4 males at Yara Bridge (A 65:83, 84), Kadena-cho, Okinawa Island, all in February 1982.

Fig. 6 *Pseudosmittia nishiharaensis*, sp. nov.

Male: a, head; b, antepnotum; c, wing; d, tip of front tibia; e, tip of middle tibia; f, g, tip of hind tibia; h, scutum and scutellum; i, abdominal tergites; j, hypopygium. Female: k, head; l, wing; m, spermathecae; n, cercus.

Male. BL 1.80–2.10 (1.95 ± 0.11 in measurements of 10) mm, WL 0.94–1.14 (1.07 ± 0.07) mm. Ground color of scutum brownish yellow, stripes dark brown, scutellum, postnotum and abdominal tergites dark brown; halteres brown; femora dark brown, tibiae and tarsi brown. Head in Fig. 6-a. Median frontal process (Stirnfortsatz of Brundin, 1956, p. 165) strongly extending between bases of antennae. Eyes bare, reniform and without dorsomedial projection, ER 1.37–1.67 (1.49). Antenna with 13 flagellar segments, AR 0.82–0.94 (0.89 ± 0.04), AHR 0.47–0.56 (0.52), last segment slightly expanded apically, without apical spur but with numerous short sensory setae in the apical portion. so 3–6 (most frequently 4, mean 4.4), cl 6–9 (most frequently 6, mean 6.7).

Anteprenotum (Fig. 6-b) deeply divided in the middle, usually with only one (2 in one, 0 in another) lateral seta on each side. Scutum and scutellum in Fig. 6-h. Scutum with a small pale area (Mesonotalhöcker of Brundin, 1956) in the middle, which bears two short setae, otherwise dorsomedian setae absent. dl 8–14 (most frequently 10, mean 10.4), pa 2–3 (mean 2.7), sc usually 4 (6 in one specimen). Wing in Fig. 6-c. Squama bare. Wing membrane without macrotrichiae, slightly brownish and very finely granular. R4+5 ending much proximal to tip of wing. Costa not extending beyond end of R4+5. R2+3 running very close to R4+5, often almost fused with it, RR 0.65–0.84 (0.75). Tip of R4+5 much proximal to tip of Cu1, R/Cu 0.83–0.92 (0.88). fCu situated far distal to r-m, VR unusually large, 1.50–1.71 (1.63). Cu2 very short, almost straight. Anal vein ending much proximal to fCu. Anal lobe obtuse.

Tip of front tibia with a long and basally barbed terminal spur ($43 \mu\text{m}$; Fig. 6-d). Tip of middle tibia with only one, relatively long terminal spur ($35 \mu\text{m}$, Fig. 6-e). Tip of hind tibia with a long terminal spur ($42 \mu\text{m}$), a shorter terminal spur ($28 \mu\text{m}$), and a terminal comb composed of some 12 free spurs $23\text{--}32 \mu\text{m}$ long (Fig. 6-f, g). fLR 0.48–0.51 (0.49, unusually small), mLR 0.48–0.52 (0.51), hLR 0.57–0.59 (0.58), fTR 0.12–0.13 (0.12). Tarsi with long beards, fBR 3.0–5.0 (4.0), mBR 3.7–5.9 (4.2), hBR 4.7–5.4 (5.1). Pulvilli absent, tarsi IV cylin-

dric, almost as long as tarsi V of the same legs.

Setae on abdominal tergites are reduced in the numbers, as in Fig. 6-i. Hypopygium in Fig. 6-j. Ninth tergite produced caudally in the middle forming a V-shaped anal point, whose lateral ridges are darkly pigmented, leaving the middle portion clear. Inner lobe of gonocoxite longer than wide, with rather pointed apex. Gonostylus long and narrow, inner margin concave and with two long setae, with a large apical spur but without subapical swelling.

Female. BL 1.70 mm, WL 1.00 mm. Ground color of scutum yellow, scutal stripes, scutellum and postnotum dark brown, halteres yellowish brown, leg segments yellowish brown, abdominal tergites dark brown, sternites yellow. Head in Fig. 6-k. Eyes bare, inner margin slightly concave, ER 1.41. Antenna with 5 flagellar segments (65, 40, 42, 40, $66 \mu\text{m}$), AR 0.35, so 5, 5, cl 9. Scutum without dorsomedian setae, with a median tubercle bearing two minute setae, dorsolateral setae 11:12, prealar setae 3:3, scutellar setae 6. Wing in Fig. 6-l. Squama bare, anal lobe obtuse. Costa not extending beyond end of R4+5, R2+3 close to R4+5, RR 0.68. fCu much beyond r-m, VR 1.73 (unusually high, as in male). R4+5 ending proximal to end of Cu1 (R/Cu ratio 0.93). Spermathecae two, both almost colorless, 66×50 , $72 \times 40 \mu\text{m}$ (Fig. 6-m). Cercus with a ventral projection, $62 \mu\text{m}$ high and $46 \mu\text{m}$ wide (Fig. 6-n).

Type specimens. Holotype: male, No. A 65:22a, collected at Nishihara, Miyako Island. Paratypes: 15 males and a female, collected on 4 islands of the Ryukyus, as stated before.

Remarks. This species is also placed into the genus *Pseudosmittia* Goetghebuer, 1932, in the sense of Brundin (1956) and Pinder (1978), since eyes, wings and squama are all bare, antenna has no apical seta, R4+5 is ending proximal to end of Cu1, costa is not extending beyond end of R4+5, scutum has no dorsomedian setae but has a median tubercle (Mesonotalhöcker of Brundin, 1956). However, it is quite unusual as a member of this genus in that fCu is situated much distal to r-m with very high VR values of 1.50–1.71, and Cu2 is very short and

not sinuate. The genus *Pseudosmittia* includes fairly large number of species. Brundin (1956) recorded 7 species from North Europe, and Pinder (1978) 6 species from British Isles. Among them, the present species is related to *P. restricta* Brundin, 1956, in that pronotum is widely separated in the middle, wing veins without macrotrichiae, gonocoxite with only one inner lobe, and $R2+3$ is almost fused with $R4+5$, but is essentially different from it in that the present species has a large conical anal point on ninth tergite (it is absent in *restricta*), AR being larger (only 0.25 in *restricta*), and gonostylus is swollen apically in *restricta*. The present species is also quite unusual as a member of subfamily Orthoclaadiinae in that middle tibia has only one apical spur (most other species have two short apical spurs on middle tibia). In Japan, Sasa (1985c, p. 124) recorded *Pseudosmittia triappendiculata* (Goetghebuer, 1931) from Lake Motosu and Yamanaka (Yamanashi), but in this species gonocoxite has three inner lobes and thus belongs to an entirely different group within this genus.

14. *Smittia aterrima* (Meigen, 1818)

A male was collected at Kochinda, Okinawa Island, on January 28, 1982, with insect net from bush near a sewage stream (No. A 65:94A). Body largely dark brown, scutal stripes black. BL 2.96 mm, WL 1.79 mm (both larger than in *S. nudipennis*). AR 1.85, AHR 0.61, ER 1.11, so 9:10, cl 6, pn 4:4, dm 14, dl 10:13, pa 4:5, sc 6, sq 0:0. RR 0.31, VR 1.34, R/Cu 1.05, fLR 0.55, mLR 0.48, hLR 0.60, fTR 0.11, fBR 3.2, mBR 3.2, hBR 7.9. Pulvilli absent. Hypopygium as illustrated by Sasa (1985c, p. 144).

Remarks. This species is widely distributed in Europe, and its morphology was described by Edwards (1929, p. 360), Goetghebuer (1940, p. 86), and Pinder (1978, p. 96). In Japan, it was also recorded by Tokunaga (1940, p. 289) from Hokkaido, by Sasa (1985c, p. 121) from Lakes Motosu and Yamanaka (Yamanashi), by Sasa and Kamimura (1987) from Lake Akan (Hokkaido), and by Sasa and Kawai (1987a) from Lake Biwa (Shiga). Morphologically, it is characterized by having relatively large

body size, pubescent eyes, short anal point with microtrichiae towards the tip, small but acutely produced inner lobe of gonocoxite, and simple gonostylus with a large swelling in the middle.

15. *Smittia nudipennis* Goetghebuer, 1931

A male was collected with insect net on the bank of the Hija River under Yara Bridge, Okinawa Island, on December 11, 1981 (No. A 65:82A). Body largely black except abdominal sternites which are brown. BL 2.94 mm, WL 1.28 mm. Both antennae are missing. Eyes pubescent, ER 1.38. so 5:5 (none in the middle portion, all situated laterally), cl 8, pn 1:1, dm 6 (all small, arising from near anterior margin of scutum), dl 16:19 (more numerous than in the related species), pa 8:8, sc 10, sq 0:0. RR 0.44, VR 1.28, R/Cu 0.94 (characteristic to this species), fLR 0.48 (smaller than in the related species), mLR 0.44, hLR 0.57, fTR 0.13, fBR 3.1, mBR 4.0, hBR 5.0. pulvilli absent. Hypopygium as illustrated by Sasa (1985c, p. 144).

Remarks. This is a species widely distributed in Europe, and its morphology was described by Goetghebuer (1940, p. 97) and Pinder (1978, p. 96). In Japan, it was recorded by Sasa (1985c, p. 122) from Lakes Motosu, Shoji and Yamanaka (Yamanashi), by Sasa and Kamimura (1987, p. 41) from Lake Panke (Hokkaido), and by Sasa and Kawai (1987a, p. 53) from Lake Biwa (Shiga). Morphologically, this species is characterized by having relatively small body size, pubescent eyes, flat anal lobe of wing, $R4+5$ ending proximal to end of $Cu1$ (R/Cu smaller than 1.0), long, nude and apically pointed anal point, and gonostylus being strongly swollen in the middle.

16. *Smittia pratorum* (Goetghebuer, 1926)

(Fig. 7-a-m)

Eight males and 2 females were collected at Tamagusuku, 3 males and a female at Ryutan, 2 males at Hentona, all on Okinawa Island; a male at Ishigaki, Ishigaki Island, in January and February, 1982 (No. A

Fig. 7

65:01-07, 32, 33, 74, 91).

Male. BL 2.02-2.30 (2.12 in average of 10)mm, WL 1.25-1.58 (1.44)mm. Body largely black or dark brown. Ground color of scutum dark brown, scutal stripes black; scutellum, postnotum and abdominal tergites black; leg segments dark brown; halteres brown. Head in Fig. 7-a. Eyes bare (a very important characteristic of this species), reniform, ER 1.24-1.45 (1.49). Antenna composed of a pedicel and 13 flagellar segments, AR 1.40-1.54 (1.49), AHR 0.49-0.56 (0.54), last segment slightly expanded in the apical portion, with a strong apical seta, and some 10 short and curved sensory setae in the apical portion (Fig. 7-b). Supraorbital setae composed of one or two middle pairs, and 3-6 lateral pairs, cl 7-14 (9.8). Anteprenotum (Fig. 7-c) united in the middle, with 1 or 2 lateral setae. dm 6-10, all minute. dl 8-14 (most frequently 12, mean 12.0), pa 3-5 (most frequently 3, mean 3.8), scutellar setae 6 (in 7 specimens) or 8 (in 3 specimens, mean 7.2), in a transverse row.

Wing in Fig. 7-d. Squama bare, anal lobe obtuse. R2+3 ending closer to end of R1 than to end of R4+5, RR 0.27-0.36 (0.31). Costa extending much beyond end of R4+5. fCu much beyond r-m, VR 1.28-1.40 (1.30). Tip of Cu1 slightly proximal to tip of R4+5, R/Cu 1.02-1.11 (1.05). Cu2 strongly curved in the middle. Anal vein extends beyond fCu. Front tibia with a long terminal spur (50 μ m, 1.8 times the diameter of the end of front tibia, Fig. 7-e). Middle tibia with two short terminal spurs (23, 24 μ m, Fig. 7-f). Hind tibia expanded at tip, with a long terminal spur (50 μ m), a short terminal spur (23 μ m), and a terminal comb composed of 12 free spurs (23-33 μ m, Fig. 7-g). fLR 0.53-0.55 (0.54), mLR 0.43-0.47 (0.45), hLR 0.54-0.58 (0.56), fTR 0.12-0.13 (0.12), fBR 2.8-4.4 (3.5), mBR 3.5-7.0 (5.4), hBR 4.0-7.7 (6.5). Pulvilli absent, claws and empodium well developed. All tarsi without terminal spurs.

Hypopygium in Fig. 7-h, i. Anal point long, nearly parallel-sided and with rounded apex, without microtrichiae, and with a conspicuous U-shaped base. Inner lobes of gonocoxite double, the dorsal lobe triangular and without microtrichiae, the ventral lobe broad and obtuse, bearing both macro- and microtrichiae. Gonostylus strongly expanded in the middle and with a large terminal spur. Small virga present.

Female (measurements of 3 specimens). BL 1.48, 1.60, 1.84 mm, WL 1.12, 1.14, 1.24 mm. Body largely dark brown, generally paler than in male. Head in Fig. 7-j. Eyes reniform, ER 1.07, 1.07, 1.17. Antenna with 5 flagellar segments, last segment 0.35, 0.38 times as long as the 4 preceding segments combined. Supraorbital setae composed of 1 or 2 inner group and 4 or 5 lateral group. cl 8, 8, 12. Anteprenotum united in the middle, with 1 or 2 lateral setae on each side. Scutum and scutellum in Fig. 7-k. dm 6, 6, 6, dl 10:10, 12:14, 16:16, pa 4:4, 4:4, 5:6, sc 6, 6, 7. Squama bare. Costa extending much beyond end of R4+5, to almost tip of the wing. RR 0.36, 0.40, 0.42, VR 1.21, 1.42, R/Cu 1.02, 1.08. Cu2 strongly sinuate. fLR 0.52, 0.54, 0.55, mLR 0.44, 0.45, hLR 0.57, 0.58, 0.60, fTR 0.14, 0.14, 0.14, fBR 2.7, 2.8, 3.5, mBR 2.6, 3.0, hBR 2.7, 4.3, 4.5. Pulvilli absent. Spermathecae in Fig. 7-l. Cercus (Fig. 7-m) small and nearly circular.

Remarks. This species was collected on the shore of eutrophicated ditches and lakes on Okinawa and Ishigaki Islands. These specimens are morphologically almost coincident with that of *S. pratorum* described by Edwards (1929, p. 361), Goetghebuer (1940, p. 97) and Pinder (1978, p. 96), especially in that eyes are nude and male hypopygium has a long and nude anal point. This species is morphologically related to *S. itachipennis* Sasa et Kawai, 1987, recorded from Toyama, Japan, but the eyes are pubescent in the latter.

Fig. 7 *Smittia pratorum* (Goetghebuer) and *Smittia gusukuensis*, sp. nov.

Smittia pratorum (Goetghebuer). Male: a, head; b, tip of antenna; c, anteprenotum; d, wing; e, tip of front tibia; f, tip of middle tibia; g, tip of hind tibia; h, hypopygium, dorsal view; i, do, right half, ventral view. Female: j, head; k, scutum and scutellum; l, spermathecae; m, cercus. *Smittia gusukuensis*, sp. nov. Male: A, head; B, tip of antenna; C, wing; D, tip of front tibia; E, tip of middle tibia; F, tip of hind tibia; G, hypopygium.

**17. *Smittia gusukuensis* Sasa
et Hasegawa, sp. nov.**

(Fig. 7-A-G)

A male (holotype) was collected on January 28, 1982, at Tamagusuku, Okinawa Island. Holotype: No. A 65:04a.

Male. BL 3.05 mm, WL 1.79 mm. Body largely black and dark brown; scutum entirely black, scutellum dark brown, postnotum black, abdominal tergites dark brown, halteres and leg segments dark brown. Head in Fig. 7-A. Eyes pubescent, inner margin conspicuously concave, ER 1.08. Antenna with 13 flagellar segments, AR 1.86, AHR 0.55. Tip of antenna slightly expanded, and with a strong terminal seta and numerous short and curved setae (Fig. 7-B). so 10:10, cl 10. Antepronotum well developed and thickly united in the middle, with 6:6 lateral setae. dm 12 in two rows, all minute and arising from near anterior margin of scutum. dl 8:9, pa 3:3, sc 8. Wing in Fig. 7-C. Squama bare, anal lobe nearly rectangularly produced. Costa produced much beyond end of R4+5. RR 0.36, VR 1.34 (unusually high). R4+5 ending above tip of Cu1, R/Cu 1.00. Cu2 strongly curved. Anal vein extending beyond fCu. Front tibia with a long terminal spur (52 μ m). Middle tibia with two terminal spurs (17, 32 μ m). Hind tibia with a long terminal spur (58 μ m), a short terminal spur (22 μ m), and a terminal comb composed of 15 free spurs (26–46 μ m). fLR 0.54, mLR 0.45, hLR 0.60, fTR 0.12, fBR 3.3, mBR 3.8, hBR 5.2. Pulvilli absent.

Hypopygium in Fig. 7-G. Anal point rather small and covered with microtrichiae to near tip, such as in that of *S. aterrima*, and with a darkly pigmented, U-shaped base. Inner lobe of gonocoxite single and very small, roughly semicircular. Gonocoxite bearing some 10 short setae on inner side around inner lobe. Gonostylus simple, long, slender and tapering towards pointed apex, with a small terminal spur, a small subterminal tooth, but without swelling in the middle such as seen in *S. aterrima*.

Remarks. This species is somewhat related to *S. aterrima* (Meigen) in that eyes are pubescent, and anal point is rather short and almost entirely covered by microtrichiae,

but both differ from each other in the shape of gonostylus (inner margin strongly expanded in *aterrima*, inner margin is concave and not expanded in the present species), and of inner lobe of gonocoxite (narrow triangular and apically pointed in *aterrima*, wide and rounded in the present species).

18. *Paramerina divisa* (Walker, 1856)

(Fig. 8-a-m)

Altogether 5 males and a female emerged from bottom sediments of Lake Ryutan, collected on December 7, 1981 (No. A 65:35a, b, 36a, b, 42, 43). Two pupal exuviae associated with males were also collected and studied (No. A 65:37a, b).

Male. BL 2.96–3.22 (3.07 in average of 5) mm, WL 1.66–1.84 (1.58) mm. Body largely yellow, with brown marks; scutum with yellow ground color, median and lateral stripes yellowish brown, and with a pair of yellow marks posterior to the lateral stripes; scutellum yellow, postnotum yellowish brown, halteres pale yellow, wing unmarked, leg segments entirely yellow; abdominal tergite I brown, II and V entirely yellow, III, IV, VI and VIII brown for oral half and yellow for distal half, VII and hypopygium yellowish brown. Head in Fig. 8-a. Eyes each with a long dorsomedial projection, ER 0.19–0.34 (0.28), without microtrichiae. Antenna composed of a pedicel, 12 short proximal segments, a long 13th segment, and a short apical segment bearing a stout terminal seta and several short sensory setae, AR (combined length of last and penultimate segments divided by the combined length of flagellar segments I–XII) 1.71–1.90 (1.79), AHR 0.49–0.56 (0.53). so 14–18 (15.2) on one side, cl 13–16 (15.0). Base of antenna with 4–6 (mean 4.8) long setae on each side.

Antepronotum well developed, united in the middle, without dorsal setae and with 2–3 (usually 3, mean 2.9) lateral setae. Distribution of setae on scutum and scutellum in Fig. 8-b. dm 40–52 (46.0), dl 30–34 (31.9), pa 9–13 (10.6), all composed of the long and the short setae. Scutellum with 10–12 (11.0) long setae in a caudal transverse row, and 16–22 (18.8) short setae in oral area. Wing in Fig. 8-c. Squama with 18–26 (21.2) fringe hairs. Wing membrane

Fig. 8 *Paramerina divisa* (Walker).

Male: a, head; b, scutum and scutellum, showing distribution of setae; c, wing; d, tip of front tibia; e, tip of middle tibia; f, tip of hind tibia; g, hind tarsus V; h, hypopygium. Female: i, head. Pupa: j, k, thoracic horn; l, abdominal tergites; m, tergites VII, VIII and anal tergite.

thickly covered with macrotrichiae. Costa not produced beyond end of R4+5, ending proximal to end of M and distal to end of Cu1, R/Cu 1.03–1.08 (1.05). R1 and R4+5 running closely, R2+3 absent. Cross vein m-cu situated distal to fCu and united with

Cu1. fCu proximal to r-m, VR 0.74–0.84 (0.80). Anal vein extending much beyond fCu.

Front tibia with a rather short, barbed terminal spine (Fig. 8-d). Middle tibia with a long and a short terminal spines, both

barbed (Fig. 8-e). Hind tibia with a very long and narrow terminal spur, a short terminal spur, and a terminal comb composed of 6 simple and free spurs (Fig. 8-f). fLR 0.69–0.91 (0.78), mLR 0.98–1.03 (1.00), hLR 0.79–0.85 (0.82), fTR 0.14–0.15 (0.14), fBR 5.2–7.9 (6.5), mBR 6.0–7.8 (6.6), hBR 6.8–7.8 (7.4). Tarsi V with a pair of well developed claws, a rather small empodium, and without pulvilli (Fig. 8-g).

Hypopygium in Fig. 8-h. Ninth tergite small and almost quadrangulate. Anal point (AP) broad, transparent and roughly triangular, with rounded apex. Phallapodeme (PHA) very long and extending into gonocoxite (a characteristic of this genus). Gonocoxite with a setigerous area at the base but without basal lobe. Gonostylus long, slender, widest at base and tapering towards apex, with a long apical spur.

Female. WL 1.58 mm. Body coloration as in male, largely yellow, with yellowish brown marks on scutum. Head in Fig. 8-i. Antenna composed of a pedicel and 11 flagellar segments, with 5 setae on each of the base and the pedicel. Palp 4 segmented, so 14:16, cl 15. Antepnotum complete, with 2:2 lateral setae. dm 62, dl 56:59, pa 12:12, sc 30, sq 18:21. Wing membrane thickly covered with macrotrichiae, R2+3 absent. r-m distal to fCu, VR 0.88. m-cu distal to fCu. Costa not extending beyond end of R4+5, which is slightly distal to end of Cu1, R/Cu 1.04. fLR 0.74, mLR 0.88, hLR 0.79, fTR 0.15, fBR 4.4, mBR 4.7, hBR 5.2. Abdomen missing from this specimen.

Pupa. Length of abdomen 2.82, 3.12 mm. Thoracic respiratory horns (Fig. 8-j, k) nearly cylindrical, 272–288 μ m long and 48–50 μ m wide, composed of a long dark tube with a small fan-like organ enclosed in a transparent sheath. Distribution of setae and spines on abdominal tergites in Fig. 8-l. Tergites I to IV without lateral swimming hairs, VII with 4 pairs, VIII with 5 pairs of long, flat swimming hairs. Anal lobe very narrow and slender, with two pairs of lateral swimming hairs, and small spines along lateral margin (Fig. 8-m).

Remarks. This species belongs to the genus *Pentaneura* Philippi, 1865 in the sense of Edwards (1929) and Tokunaga (1937a,

b), and to *Paramerina* Fittkau, 1962 in the more modern sense, since wing vein R2+3 is absent, m-cu is distal to fCu, costa is not extending beyond end of R4+5 and ending proximal to tip of M, gonocoxite has no basal lobe, and hypopygium has very long phallapodemes. Among the previously recorded species of this group, the present specimens are identified here as *P. divisa* (Walker) described by various workers in Europe, by Edwards, 1929, as *Pentaneura*, by Goetghebuer (1937), as *Ablabesmyia*, by Fittkau (1962) and Pinder (1978), as *Paramerina divisa* (Walker). In Japan, Tokunaga (1937a, b) recorded this species from Gotenba (Shizuoka) by a name of *Pentaneura divisa*, and Fittkau (1962, p. 327) quoted it as "(?) *Paramerina divisa* Tokunaga, 1937."

19. *Clinotanypus sugiyamai* Tokunaga, 1937

A male emerged from a bottom sample collected in an eel-pond at Hentona, Okinawa Island, on December 10, 1981 (No. A 65:38). The standard measurement data are as follows.

BL 5.28 mm, WL 2.44 mm, AR 2.86, AHR 0.54, ER 0.42, so 16:16, cl 8, dm 82, dl 44:46, pa 31:33, sc 44, sq 32:32, RR 0.49, VR 1.04, R/Cu 1.18, fLR 0.65, mLR 0.72, hLR 0.70, fTR 0.11, fBR 2.0, mBR 2.4, hBR 3.7.

Remarks. This species was described by Tokunaga (1937a) based on males collected in Kyoto. Redescription of the male and the new record of female was made by Sasa and Kawai (1987a) with specimens collected on the shore of Lake Biwa.

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摘 要

琉球列島に生息するユスリカ類の知見追加

琉球列島に産するユスリカ科の昆虫については、すでに Sasa and Hasegawa (1983) が Chironominae 亜科の Chironomini 族の26種の成虫の記録を行い、さらに Hasegawa and Sasa (1987) はその中の11種のサナギと8種の幼虫の形態を記載し、かつ4種に新

たに学名を与えた。これらの記載に用いた標本は、主として1981年の12月から1982年の3月にかけて沖縄本島、宮古島、池間島、石垣島の各地で下水溝、養魚池、溜池、および山間の清流などで採集したものであるが、今回はそれらのうち、これまで記載しなかった *Tanytarsus* 属の4種、Orthoclaadiinae 亜科の10種、および Tanypodinae 亜科の2種、計16種について主として雄成虫の形態にもとづいて種名を同定し、琉球列島産のユスリカ科として追加した。さらに前回の Sasa and Hasegawa (1983) の報告において学名をつけなかった *Polypedilum* 属の3種に新たに学名を与えた。

今回記録した19種のうち12種は、従来記録された種類に該当するものがなく、新種として学名を与えた。そのうちの Orthoclaadiinae の1種は、雄の中脚の tibia の末端に後脚の tibia の末端と同じような櫛列 terminal comb をもち、それは従来知られている同亜科のユスリカにはみられない特徴であるため、これを新属・新種として *Okinawayusurika otsurui* オウツル・オキナワユスリカと命名した。また、わが国には未記録の *Smittia pratorum* と同定される種類の成虫が多数採集された。