Five new chironomid species of five genera from Japan

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Abstract: Five new species of chironomids from Japan, belonging to 5 genera, including a new genus *Amphismittia*, and *Bryophaenocladus*, *Harnischia*, *Polypedilum* and *Tanytarsus*, were described on the basis of morphology of adult males emerging from the bottom samples and collected from the artificial light sources and by sweeping.

INTRODUCTION

Chironomid fauna in Japan was investigated mainly by Dr. M. Tokunaga and his collaborators up to 1965 and about 160 species had been recorded. Thereafter, the fauna was energetically studied mainly by Sasa and his collaborators, and more than 500 species were additionally recorded in a list provided by Sasa and Kikuchi (1995). However, still more work is necessary for complete clarification of the Japanese fauna. In this study, five new species, each belonging to a different genus, were collected and described on the basis of morphology of adult males.

MATERIALS AND METHODS

Male adults were collected by three methods: collection of adults emerging from bottom samples, such as stones, sand, mud or waterweeds, collection of adults attracted to artificial illumination emitted by light traps and vending machines, and collection by sweeping.

Mounting of male specimens was performed according to the method described by Sasa et al. (1980). Identification was carried out using the keys provided by

Pinder (1978), Wiederholm (1989) and Sasa and Kikuchi (1995).

Type materials are temporally deposited in the Laboratory of Ecology, Faculty of Applied Biological Science, Hiroshima University, Japan.

The abbreviations in the descriptions of species mean the following measurements and ratios cited from Sasa and Kikuchi (1995), with some modifications.

BL: body length, or the combined length in mm of thorax and abdomen in slide-mounted specimens.

WL: wing length, or the distance between tip of wing and arculus.

AR: antennal ratio, obtained by dividing the length of the last antennal segment with the combined length of the remaining flagellar segments (not including pedicel).

ER: eye ratio, obtained by dividing the distance between dorsomedian corners of two eyes with the height of an eye.

SO: number of supraorbital setae on one side.

CL: number of clypeal setae.

PN: number of setae on anteprepronotum on each side.

DM: number of dorsomedian setae on scutum.

Fig. 1. *Amphismittia yoshiwaensis* sp. nov. Male. A, wing. Scale: 0.5 mm; B, hypopygium. Scale: 0.1 mm.

DL: number of dorsolateral setae on each side of scutum.
 SA: number of supraalar setae on each side of scutum.
 PA: number of prealar setae on each side of scutum.
 SC: number of setae on scutellum.
 SQ: number of fringe setae on squama.

LR₁: front leg ratio, obtained by dividing the length of front tarsal segment I with the length of front tibia.
 LR₂: ratio obtained by dividing the length of middle tarsal segment I with the length of middle tibia.
 LR₃: ratio obtained by dividing the length of hind tarsal segment

- I with the length of hind tibia.
 TR₁: ratio obtained by dividing the length of front tarsal segment V with the length of front tibia.
 BR₁: front beard ratio, obtained by dividing the length of the longest hair on front tarsal segment I with the diameter of the segment at the base of the hair.
 BR₂, BR₃: same, referring to the beard ratio of middle and hind tarsal segment I.

DESCRIPTION OF ADULT MALES

1. Subfamily Orthocladiinae

Amphismittia gen. nov.

Type species: *Amphismittia yoshiwaensis* sp. nov.

Diagnostic characters: Separable from other genera of Orthocladiinae in having completely bare eyes, strong straight subapical seta on antenna, antennal ratio less than 1.0, bare squama, bare wing membrane, strongly extended costa, no anal point and tergite IX not divided into two lobes.

Amphismittia yoshiwaensis sp. nov.

Male (n=3)

Coloration (in specimen mounted in gum-chloral): Head reddish-brown. Antennal flagella and plume brown. Palps pale brown. Antepnotum dark brown. Scutum yellowish-brown; scutal stripes indistinguishable. Scutellum and postnotum brown. Halteres transparent. Legs uniformly light brown. Abdomen light brown; each tergite with a dark brown band on oral half. Hypopygium light brown.

Structure: AR 0.64–0.68. SO 7–8. Eyes completely bare with weak dorsomedial projections, ER 0.52. CL 8. PN 2. DM 7–8, starting close to antepnotum. DL 11–12. SA 2–4. SC 5. SQ 0. Wing as in Fig. 1A. Wing membrane granular at 100× magnification. Anal lobe slightly developed, with rounded margin. Costa strongly

ly extended beyond the end of R₄₊₅. R₂₊₃ running separately from both R₁ and R₄₊₅ and ending almost midway between the tips of both veins. R₄₊₅ ending slightly distal to the tip of M. FCu well beyond RM. Cu₂ slightly curved at the tip. LR₁ 0.68–0.72. LR₂ 0.40–0.46. LR₃ 0.48–0.53. TR₁ 0.10–0.11. BR₁ 1.6–2.3. BR₂ 1.4–2.3. BR₃ 1.4–3.1. Front tibia with a long terminal spur. Middle tibia with two terminal spurs; one short and the other longish. Hind tibia with a terminal comb and a long terminal spur. Tarsi without pseudospurs. Pulvilli absent. Hypopygium as in Fig. 1B. Anal point absent. Ninth tergite not divided into two lobes, with about 10 strong bristles along caudo-medial margin. Virga absent. Gonocoxite distally tapered with straight inner margin and without any inner lobes. Gonostylus robust, straight and distally swollen and with a well-developed megaseta.

Size: BL 2.21–2.38 mm WL 1.25–1.37 mm.

Type material: Holotype ♂ attracted to a light trap set at the shore of the Ohta River, Yoshiwa-Mura, Saeki-Gun, Hiroshima Pref., Japan, on Aug. 21, 1996. Paratypes 2♂ from the same sample as holotype.

Discussion: This new genus *Amphismittia* seems closely related to *Tsudayusurika* Sasa in that eyes and squama are bare, wing membrane is granular, vein Cu₂ is curved at the tip, costa is extended beyond the tip of R₄₊₅ and anal point is absent. However, it is easily distinguishable from the latter in having a strong straight subapical seta on antenna and AR less than 0.7 (see Sasa, 1985). It is also related to *Semiocladus* Sublette et Wirth and *Smittia* Holmgren. However, it clearly differs from *Semiocladus* in having a strong subapical seta on antenna and tergite IX not divided into two lobes, and from *Smittia* in that eyes are bare, AR is less than 0.7 and anal point is absent (see Wiederholm, 1989). It is somewhat related to *Chaetocladus* Kieffer, but is quite different from the latter in hav-

Fig. 2. *Bryophaenocladus simplicicoxus* sp. nov. Male. A, wing. Scale: 0.5 mm; B, hypopygium. Scale: 0.1 mm.

ing completely bare eyes and strongly extended costa (see Pinder, 1978).

***Bryophaenocladus simplicicoxus* sp. nov.**
Male (n=1)
Coloration (in specimen mounted in

gum-chloral); Head, antennal shaft and plume dark brown. Palps pale brown. Scutal ground yellow; scutal stripes brown and distinguishable. Prescutellar area darkened. Scutellum pale brown. Postnotum brown. Halteres pale brown. Legs uniformly brown. Abdomen and hypopygium brown.

Structure: AR 1.26. SO 8. Eyes bare with moderate dorsomedial projections, ER 0.87. PN 5. DM 11, distributed from close to the antepnotum. DL 8–9. SA 5. SC 5. SQ 4. Wing as in Fig. 2A. Wing membrane granular. Anal lobe moderately developed. Costa much produced beyond the tip of R_{4+5} . R_{2+3} running separately from both R_1 and R_{4+5} and ending almost midway between the tips of R_1 and R_{4+5} . R_{4+5} ending above the tip of Cu_1 . FCu well beyond RM. Cu_2 strongly curved distally. Front tibia with a long terminal spur. Middle tibia with two long terminal spurs. Hind tibia with 2 terminal spurs; one long and the other shorter, and with a terminal comb. Middle and hind tarsi without pseudosours. Pulvilli vestigial. Hypopygium as in Fig. 2B. Ninth tergite with many strong setae on the caudal margin. Virga absent. Anal point transparent, broad and with rounded apex. Gonocoxite large and distally tapered, and without any inner lobes. Gonostylus stout, distally expanded and strongly curved apically and with a well-developed megaseta.

Size: BL 2.16 mm WL 1.23 mm.

Type material: Holotype ♂ attracted to a light trap set at the shore of the Ohta River, Yoshiwa-Mura, Saeki-Gun, Hiroshima Pref., Japan, on Aug. 21, 1996.

Discussion: This species should be affiliated to the genus *Bryophaenocladus* Thienemann because wing membrane is granular, costa extended beyond the tip of R_{4+5} , squama is fringed, Cu_2 is curved, dorsomedian setae are distributed from close to the antepnotum, anal point is hyaline and apically rounded, although virga is absent. This is clearly different from all the species described so far

in having gonocoxite without any inner lobes (See Pinder, 1978; Sasa and Okazawa, 1992).

2. Subfamily Chironominae

Harnischia biwacurtus sp. nov.

Male (n=3)

Coloration (in specimen mounted in gum-chloral): Head pale yellow. Pedicel yellowish-brown. Antennal shaft and plume brown. Palps pale brown. Scutal background hyaline. Scutal stripes yellowish-brown, conspicuous. Scutellum pale brown. Postnotum brown; anteriorly pale brownish, posteriorly lighter. Halteres pale yellow. Femora yellowish. Tibiae and tarsi light brownish. Front leg segments darker. Abdomen yellowish-pale brown. Hypopygium brown.

Structure: AR 1.63–2.25. SO 13–17. Eyes with strong dorsomedial projections, ER 0.20–0.33. CL 12–15. PN 2–4. DM 10–11. DL 9–13. SA 3. SC 6–7. SQ 5–10. Wing as in Fig. 3A. Wing membrane purplish by transmittent light. Anal lobe well developed, rectangular. Costa not produced beyond the tip of R_{4+5} . R_{2+3} running separately from both R_1 and R_{4+5} and ending closer to the tip of R_1 . R_{4+5} ending slightly distal to the tip of Cu_1 . FCu slightly beyond RM. LR_1 2.22–2.36. LR_2 0.67–0.74. LR_3 0.80–0.84. TR_1 0.27–0.31. BR_2 2.0–2.6. BR_3 2.8–3.4. Front tibia without terminal spur and with rounded terminal scale. Middle and hind tibia with two terminal combs; each with a spur, one long and the other shorter. Large pulvilli present. Hypopygium as in Fig. 3B. Caudal margin of ninth tergite rounded medially. Anal point long, stout, widest at base and distally tapered with pointed apex. Gonocoxite large, fused with gonostylus. Gonostylus short, straight, distally truncate and slightly expanded and with a hook-like projection at distal end on inner margin. Dorsal appendage vestigial, conical and with 3 strong setae. Ventral appendage absent.

Size: BL 3.19–4.29 mm WL 1.49–1.96

Fig. 3. *Harnischia biwacurtus* sp. nov. Male. A, wing. Scale: 0.5 mm; B, hypopygium. Scale: 0.1 mm.

mm.

Type material: Holotype ♂ attracted to a light source emitted by a vending machine set at the shore of Lake Biwa, Kitakomatsu, Shiga-Cho, Shiga-Gun, Shiga Pref., Japan, on Oct. 26, 1995. Paratype ♂

attracted to a light source emitted by a vending machine set at the shore of Lake Biwa, Uchiidehama, Ohtsu-Shi, Shiga Pref., Japan, on Oct. 25, 1995. Paratype ♂ collected by sweeping at the shore of Lake Biwa, Kitafunaki, Adogawa-Cho,

Takashima-Gun, Shiga Pref., Japan, on May 18, 1995.

Discussion: This species belongs to the genus *Harnischia* Kieffer because both dorsal and ventral appendages are highly reduced and gonostylus is almost parallel-sided and without keel. It is somewhat related to *H. japonica* Hashimoto in general structure of hypopygium, but it clearly differs from the latter in that the anal point is much longer and stouter and the gonostylus is shorter and almost straight (See Hashimoto, 1984). It is also related to *H. inaeus* Sasa in general structure of hypopygium, but it clearly differs from the latter in that the gonostylus is almost parallel-sided and the anal point is slender (See Sasa, Kitami and Suzuki, 2001).

***Polypedilum akapulcher* sp. nov.**

Male (n=1)

Coloration (in specimen mounted in gum-chloral): Head yellowish. Pedicel pale brown. Antennal shaft and plume brown. Palps pale yellow. Scutal background hyaline. Scutal stripes yellowish, indistinguishable. Scutellum yellowish. Postnotum brownish-yellow. Halteres pale yellow. All legs pale yellow. Abdomen yellowish, distally slightly darkened. Hypopygium brownish-yellow.

Structure: AR 1.03. SO 11. Eyes with strong dorsomedial projections, ER 0.34. CL 14. DM 10. DL 12–13. SA 4. SC 14. SQ 6–9. Wing as in Fig. 4A. Wing membrane without any cloudy marks. Anal lobe slightly developed. Costa not produced beyond the tip of R_{4+5} . R_{2+3} running separately from both R_1 and R_{4+5} and ending close to the tip of R_1 . R_{4+5} ending above the tip of M. FCu well beyond RM. LR_2 0.53. LR_3 0.67. BR_2 4.6. BR_3 6.3. Front tibia with a rounded terminal scale. Middle and hind tibiae with two terminal combs; one with a spur, the other unarmed. Pulvilli well developed. Hypopygium as in Fig. 4B. Anal point long, lobust, distally tapered and apically pointed. Dorsal appendage sickle-

shaped, almost straight and apically abruptly curved and with two basal setae, and with a lateral seta, inserted at apical 1/5. Ventral appendage short and robust, with strong bristles on apical 1/3. Gonostylus short, gradually tapering to apex, with its inner margin straight and with long setae along inner margin.

Size: BL 2.65 mm WL 1.42 mm.

Type material: Holotype ♂ attracted to a light trap set at the shore of the Ohta River, Yoshiwa-Mura, Saeki-Gun, Hiroshima Pref., Japan, on Aug. 21, 1996.

Discussion: This species is somewhat related to *P. okipallidum* Sasa in coloration and general structure of hypopygium, but it clearly differs from the latter in that the gonostylus is by far shorter, the ventral appendage is also shorter and the lateral seta of dorsal appendage is inserted at apical 1/5 (See Sasa, 1990).

***Tanytarsus hajifissus* sp. nov.**

Male (n=1)

Coloration (in specimen mounted in gum-chloral): Head brown. Pedicel dark brown. Antennal shaft and plume brown. Palps pale brown. Scutal background yellowish-brown. Scutal stripes dark brown, conspicuous. Scutellum yellowish-brown. Postnotum dark brown. Halteres pale. Legs almost uniformly yellowish-brown; front tarsi brownish. Abdominal tergites yellowish-brown. Hypopygium brown. Tergites II–IV each medially with a longitudinal broad dark spot.

Structure: AR 1.02. SO 11. Eyes with moderate dorsomedial projections, ER 0.7. CL 15. DM 13. DL 6–7. SA 2. SC 5. SQ 0. Wing as in Fig. 5A. Wing membrane with macrotrichia on distal half; dense only on a distal portion. Anal lobe only weakly developed, almost obtuse. Costa not produced beyond the tip of R_{4+5} . R_{2+3} running separately from both R_1 and R_{4+5} and ending close to the tip of R_1 . R_{4+5} ending distal to the tip of Cu_1 . FCu well beyond RM. LR_1 2.00. LR_2 0.55. LR_3 0.71. TR_1 0.28. BR_1 3.6. BR_2 3.9. BR_3 4.1. Front tibia with a terminal spine. Middle and

Fig. 4. *Polypedilum akipulcher* sp. nov. Male. A, wing. Scale: 0.5 mm; B, hypopygium. Scale: 0.1 mm.

hind tibiae with two terminal combs; each with a longish spur. Pulvilli vestigial. Hypopygium as in Fig. 5B. Ninth tergite bands widely separated in the middle. Anal point wide, triangular and distally

tapered, and with lateral ridges on both sides and a row of spine clusters. Dorsal appendage oval, with rounded inner margin, but having a distal finger-like process and with a fissure between them. It with 2

Fig. 5. *Tanytarsus hajifissus* sp. nov. Male. A, wing. Scale: 1 mm; B, hypopygium. Scale: 0.2 mm.

strong setae on inner margin and 4 dorsal setae, and ventrally with a strong seta, arising from a conspicuous basal tubercle. Digitus long and far beyond the inner

margin of dorsal appendage. Ventral appendage robust, with rounded apex and with about 15 setae distributed on distal $1/3$. Median appendage short, not reach-

ing the apex of ventral appendage, with a few leaf-like processes and several simple setae. Gonostylus long, widest at about distal 1/3 and with curved inner margin.

Size: BL 3.80 mm WL 2.30 mm.

Type material: Holotype ♂ emerged from a bottom sample collected from the Gono River, Yachiyo-Cho, Takada-Gun, Hiroshima Pref., Japan, on Mar. 10, 1998.

Discussion: This species is somewhat related to *T. tamagotoi* SASA and *T. holochloris* EDWARDS in general structure of hypopygium, but it clearly differs from the latter two species in that the inner margin of dorsal appendage is rounded and without any processes and the body coloration is brownish (See Sasa, 1983; Pinder, 1978).

REFERENCES

- Hashimoto, H. 1984. A new species of *Harnischia* (Diptera, Chironomidae) from Japan. *Konchu*, 52: 262–265.
- Pinder, L. C. V. 1978. A key to adult males of British Chironomidae. *Freshwater Biol. Assoc. Sci. Pull.*, No. 37: 1–169, Figs. 189.
- Sasa, M. 1983. Studies on chironomid midges of the Tama River. Part 5. An observation on the distribution of Chironominae along the main stream in June, with description of 15 new species. *Res. Rep. Natl. Inst. Environ. Stud.*, 43: 1–67.
- Sasa, M. 1985. Studies on the chironomids collected from lakes in southern Kyushu (Diptera, Chironomidae). *Res. Rep. Natl. Inst. Environ. Stud.*, 83: 25–99.
- Sasa, M. 1990. Studies on the chironomid midges (Diptera, Chironomidae) of the Nansei Island, southern Japan. *Jpn. J. Exp. Med.*, 60: 111–165.
- Sasa, M. and Kikuchi, M. 1995. Chironomidae of Japan. 333pp., Univ. Tokyo Press, Tokyo.
- Sasa, M., Kitami, K. and Suzuki, H. 2001. Additional studies on the chironomid midges collected on the shore of Lake Inawashiro. 37 pp., *Noguchi Hideyo Kinenkan* 2, Fukushima.
- Sasa, M. and Okazawa, T. 1992. Some characteristics of nature conservation within the chief rivers in Toyama Prefecture (The upper reach of Kurobe River). Studies on the chironomid midges of Togamura, Toyama. Pt. 2. The subfamily Orthocla-diinae. *Res. Rep. Toyama Pref. Environ. Poll. Res. Center*, 1992: 92–204.
- Sasa, M., Yasuno, M., Ito, M. and Kikuchi, T. 1980. Studies on chironomid midges of the Tama River. Part 1. The distribution of chironomid species in a tributary in relation to the degree of pollution with sewage water. *Res. Rep. Natl. Inst. Environ. Stud.*, 13: 1–8.
- Wiederholm, T. E. 1989. Chironomidae of the Holarctic region. Keys and diagnoses. Part 3—Adult males. *Entomol. Scand. Suppl.*, 34: 1–532.