

## Two New and Three Newly Recorded Species of Chironomidae (Diptera) from Korea

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### ABSTRACT

Chironomid adults were collected by light traps at night, sweeping on grasses, during daytime hours, sweeping of swarming males with an insect net, and aspiration of light-attracted adults using a sucking tube. The collected specimens were slide-mounted and examined. I identified two species new to science, namely *Orthocladius manhaei* n. sp. and *Ablabesmyia jeongi* n. sp., and three species for the first time in Korea: *Paratrichocladius tamaator* Sasa, 1981, *Rheocricotopus chalybeatus* (Edwards, 1929) and *Hayesomyia tripunctata* (Goetghebuer, 1922). This is the first report of the genera *Rheocricotopus* and *Hayesomyia* in Korea. The genus *Hayesomyia* in the tribe Pentaneurini of Tanyptodinae has a Holarctic distribution with only one species recorded from each of the Palaearctic and Nearctic regions.

**Keywords:** Chironomidae, taxonomy, new record, new species, Korea

### INTRODUCTION

It has been estimated that there are as many as 15,000 species of chironomids worldwide, many of which remain undescribed or undiscovered. Such estimates need to be treated with caution, but there is good evidence to support an estimate in excess of 10,000 species (Cranston, 1995). Sasa and Kikuchi (1995) reported a total of 810 species of chironomids in Japan during the period 1936–1995, and 176 species were added 3 years thereafter to the fauna of chironomids in Japan (Sasa, 1998). In Korea, 32 species of chironomidae including four new species were reported for the first time (Ree and Kim, 1981). Since then, 14 new and 27 unreported species were reported in 11 scientific papers during the period of 1982–2009. In the past three years (2010–2012), 32 new and 47 unreported species were reported (Na, 2004; Ree and Jeong, 2010; Ree et al., 2010, 2011, 2012; Kang, 2012; Ree, 2012). In this report, the fauna of Korean Chironomidae is extended 157 species (including 50 new species), 57 genera, and five subfamilies.

### MATERIALS AND METHODS

Chironomid adults were collected by sweeping grasses around breeding sites with an insect net during the daytime. Swarming males were collected by sweeping with an insect net in the evenings. At night, a light trap was operated, and light-attracted adults resting on the walls and windows of stores, restaurants and official buildings were aspirated using a sucking tube. The collected specimens were preserved in 75% ethanol. The antennae, head, wings, abdomen, and hypopygium of each specimen were dissected using two fine dissecting needles under a stereomicroscope, and mounted using either phenol balsam or Hoyer's solution. When Hoyer's mounting media was used, the cover glasses were ringed with lacquer. Terminology follows Saether (1980).

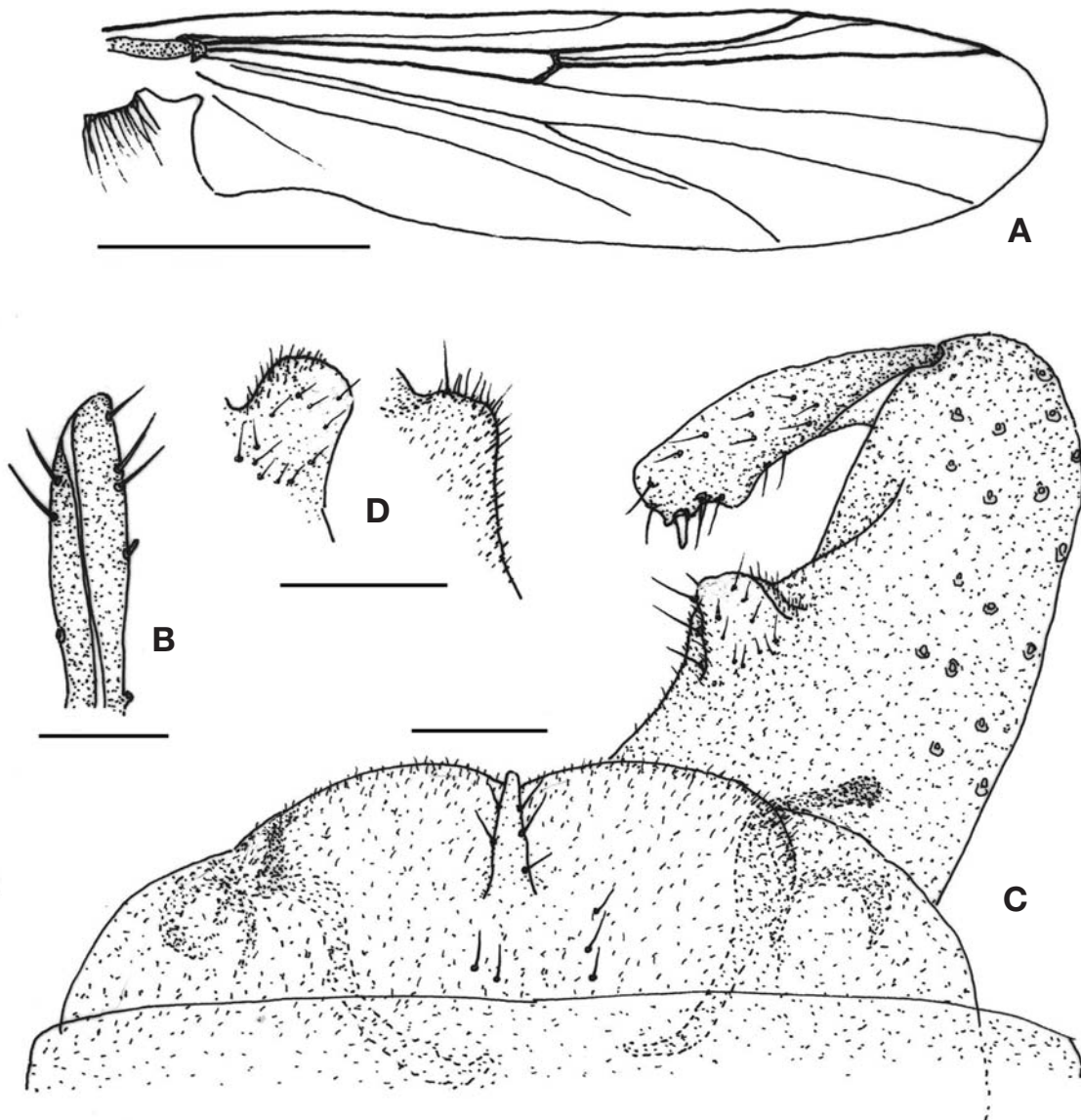
Measurements of the slide-mounted specimens were obtained from observing the specimens under a compound microscope equipped with a micrometer. Values were transformed to mm or  $\mu\text{m}$  using the scale of the micrometer. Abbreviations used are as follows: wing length (WL), antennal ratio (AR), fore leg ratio (LR), radius-medial cross vein (RM), medius-cubital cross-vein (MC), and forked Cu (fCu).

Type specimens were deposited in the collection of Arthro-

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**Fig. 1.** *Orthocladius manhaei* n. sp. (male). A, Wing; B, Tip of antenna; C, Hypopygium; D, Gonocoxal inner lobe (left dorsal, right ventral). Scale bars: A=1.0 mm, B–D=0.05 mm.

pods of Medical Importance Resource Bank, Department of Environmental Medical Biology, Yonsei University.

**SYSTEMATIC ACCOUNTS**

Order Diptera  
 Family Chironomidae Holiday  
 Subfamily Orthoclaadiinae Edwards  
 Genus *Orthocladius* v.d. Wulp

**<sup>1</sup>\**Orthocladius manhaei* n. sp. (Fig. 1)**

**Material examined.** Holotype: ♂ (RCH-3460), Korea, Gangwon-do, Inje-gun, Manhae village, 11 Nov 2005, Ree HI. Paratypes: 10 ♂♂, same as holotype.

**Diagnosis.** Dark brown, medium to large species (WL 3.0 mm). Eye bare. Wing membrane bare. All veins bare, except R. Costa slightly extended. Squama densely fringed. Anal point relatively short (48 μm long), slightly tapered distally, with 4–5 lateral setae. Gonocoxal inner lobe double. AR

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1.72. LR 0.85.

**Description (male).** **Head:** Eye bare, not produced dorso-medially. Antenna dark brown, 13 segmented, with 5 sub-apical sensory setae (Fig. 1B). AR 1.72. Palp dark brown, with 5 segments: 25, 79, 139, 137, 203  $\mu\text{m}$  (1 : 3.2 : 5.6 : 5.5 : 8.1). Clypeus with 23 setae. **Thorax:** Yellowish brown in ground color. Anteprepronotum brown, well developed, with 9 setae ventrally. Scutum dark brown, vittae inconspicuous, 7–10 dorsocentrals arising from large pale pit, 6 prealars. Scutellum dark brown, with 18 setae. Postnotum dark brown. **Wing (Fig. 1A):** WL 3.0 mm. Membrane bare. All veins bare, except R.  $R_{2+3}$  ending at 2/5 between  $R_1$  and  $R_{4+5}$ . Costa slightly extended from  $R_{4+5}$ . FCu slightly distal to RM.  $M_{3+4}$  ending under end of  $R_{4+5}$ .  $Cu_1$  almost straight. An far distal to FCu. Anal lobe well developed. Squama fringed. Arculus and brachiolum dark brown, bare. **Legs:** All segments uniformly dark brown. Fore tibia with a long narrow spur apically; mid tibia, mid tarsus I, mid tarsus II with 2 short apical spurs, respectively. Pulvillus absent. LR 0.85. **Abdomen:** All segments dark brown, with irregularly arranged numerous setae. **Hypopygium (Fig. 1C):** Anal tergite bilobed distally, with 5 short median setae, anal tergal band absent. Anal point relatively short (48  $\mu\text{m}$  long, 20  $\mu\text{m}$  wide at base), slightly tapered distally, with 4–5 lateral setae and round tip. Gonocoxite rather long; gonocoxal inner lobe double: dorsal lobe (Fig. 1D) semi-square with 1 apical, 2 inner lateral, and 4–5 ventral setae, ventral lobe slightly larger, triangular, covered with microtrichia. Gonostylus roughly parallel-sided, with developed crista dorsalis and megaseta. **Female.** Unknown.

**Etymology.** This species is named after late Manhae, who is a famous poet in Korea. The specimens were collected at Manhae village.

**Distribution.** Korea.

**Remarks.** This species is somewhat similar to *Orthocladius suspensus* (Tokunaga, 1939) in general. However, this new species has an anal point with the round tip, which is one of the diagnostic characters of the subgenus *Euorthocladius*. *Or. suspensus* has an anal point with a pointed tip, which is one of the characters of the subgenus *Orthocladius*.

Genus *Paratrichocladius* Santos Abreu

<sup>1</sup>\**Paratrichocladius tamaator* Sasa, 1981 (Fig. 2)

*Paratrichocladius tamaator* Sasa, 1981: 20 (type locality: Japan, Toyama-ken, Tama river); Sasa, 1983: 70; 1988: 35; Sasa and Okazawa, 1991: 57.

**Material examined.** 2 ♂♂: Korea, Gyeonggi-do, Munsan,

20 May 2003, Ree HI; 6 ♂♂: Jeju-do, Seoguipo-si, 2 Sep 1988, Ree HI.

**Diagnosis.** Brownish, small to medium species (WL 1.4 mm). Eye hairy. Costa extended from  $R_{4+5}$ .  $Cu_1$  almost straight. Squama with setae. Anal point absent. Anal tergite band absent. Gonocoxal inner lobe triangular, notched dorsally on middle, with rounded tip. AR 1.13. LR 0.59.

**Description (Male).** **Head:** Eye hairy, shortly extended dorso-medially. Antenna pale dark brown, 13 segmented, with 7–9 subapical sensory setae. AR 1.13. Palp pale dark brown, with 5 segments: 36, 43, 89, 102, 189  $\mu\text{m}$  (1 : 1.2 : 2.5 : 2.8 : 5.3). Clypeus brown, with 10 setae. **Thorax:** Brown in ground color. Anteprepronotum brown, sharply narrowed dorsally, bare. Scutum brown, vittae inconspicuous; 7 small, decumbent acrosticals; 13–14 dorsocentrals, arising from pale pit; 4–5 prealars. Scutellum dark brown, with 8–10 setae. Postnotum brown. **Wing (Fig. 2A):** WL 1.4 mm. Membrane bare. Costa slightly produced from  $R_{4+5}$ .  $R_{2+3}$  ending middle of  $R_1$  and  $R_{4+5}$ .  $R_{4+5}$  distal to  $M_{3+4}$ . FCu slightly distal to RM.  $Cu_1$  almost straight. Anal lobe moderately developed. Squama with setae. **Legs:** Femur brown, lighter basally. Tibia and tarsi I–V light brown. Fore tibia with a narrow, long spur; mid tibia with a very short spur; hind tibia with a long spur and 12–14 comb spurs. Pulvillus absent. LR 0.59. **Abdomen:** All segments brown; 3–5 lateral setae on tergites III–IV (Fig. 2B). **Hypopygium (Fig. 2C):** Anal tergite roundly produced distally, with 8 median setae, anal tergal band absent. Gonocoxal inner lobe triangular, notched dorsally on middle, with round tip, with 7–9 inner-lateral setae and 2 small dorsal setae. Gonostylus expanded distally with pale megaseta.

**Distribution.** Japan, Korea.

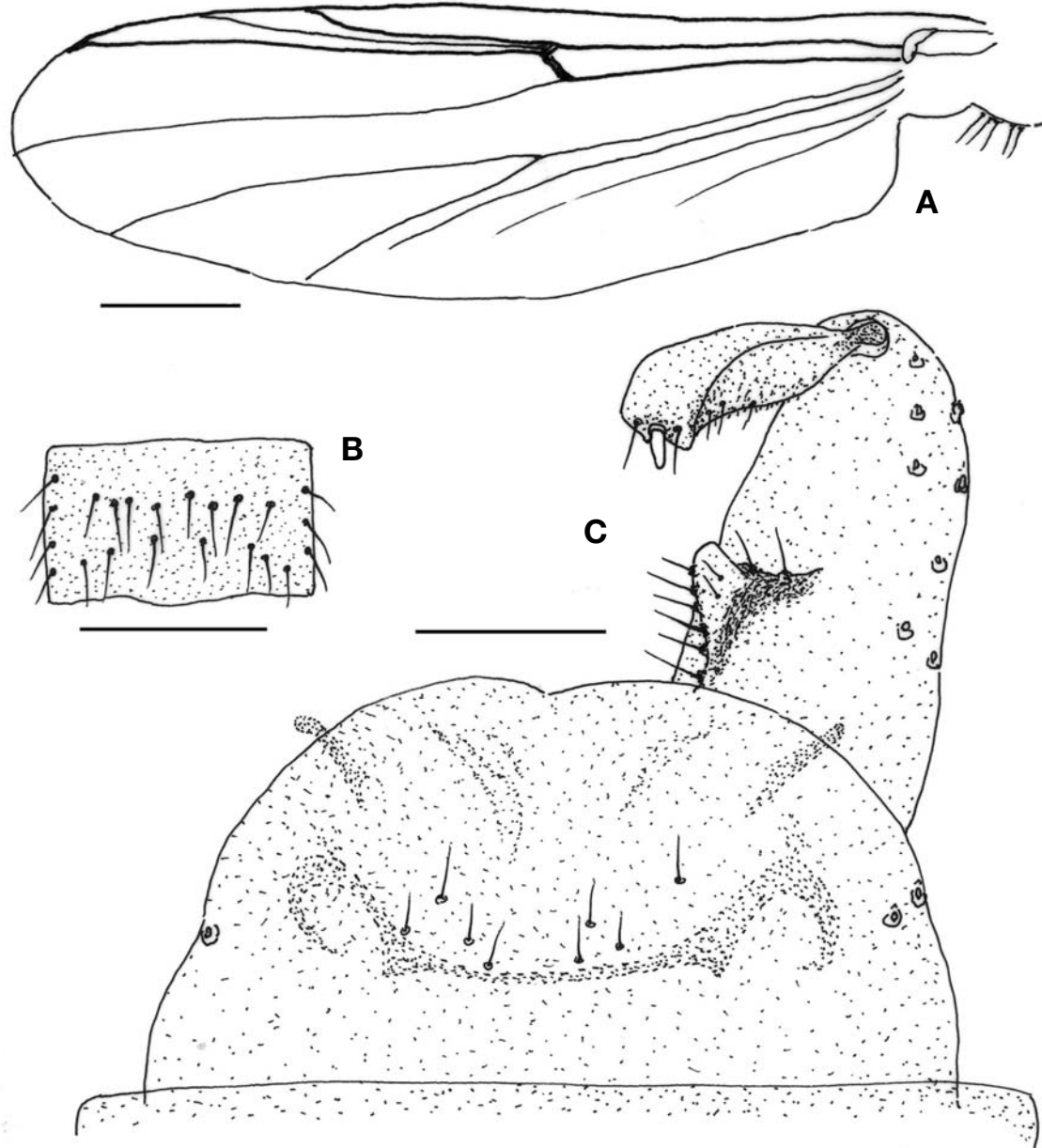
**Remarks.** *Paratrichocladius tamaator* is very similar to *Pa. rufiventris* (Meigen). The gonocoxal inner lobe of *tamaator* has a distinct notch dorsally, and a smaller body size than *rufiventris* (WL 1.5–1.7 mm in *tamaator* vs. 2.2–2.6 mm in *rufiventris*). The lateral setae of abdominal tergites III–IV are also different (3–5 setae in *tamaator* vs. 9–11 setae in *rufiventris*).

<sup>2</sup>\*Genus *Rheocricotopus* Thienemann and Harnisch

<sup>3</sup>\**Rheocricotopus chalybeatus* (Edwards, 1929) (Fig. 3)

*Spamiotoma* (*Trichocladius*) *chalybeatus* Edwards, 1929: 331 (type locality: England, Yorks); Tokunaga, 1938: 319. *Rheocricotopus chalybeatus*: Brundin, 1956: 118; Sasa and Kawai, 1987: 43; Sasa and Hasegawa, 1988: 239; Sasa, Kawai and Ueno, 1988: 30; Sasa and Suzuki, 1993: 114; Langton and Pinder, 2007: 138.

Korean name: <sup>1</sup>\*타마깃깔따구 (신칭), <sup>2</sup>\*유아기깔따구속 (신칭), <sup>3</sup>\*삼각유아기깔따구 (신칭)



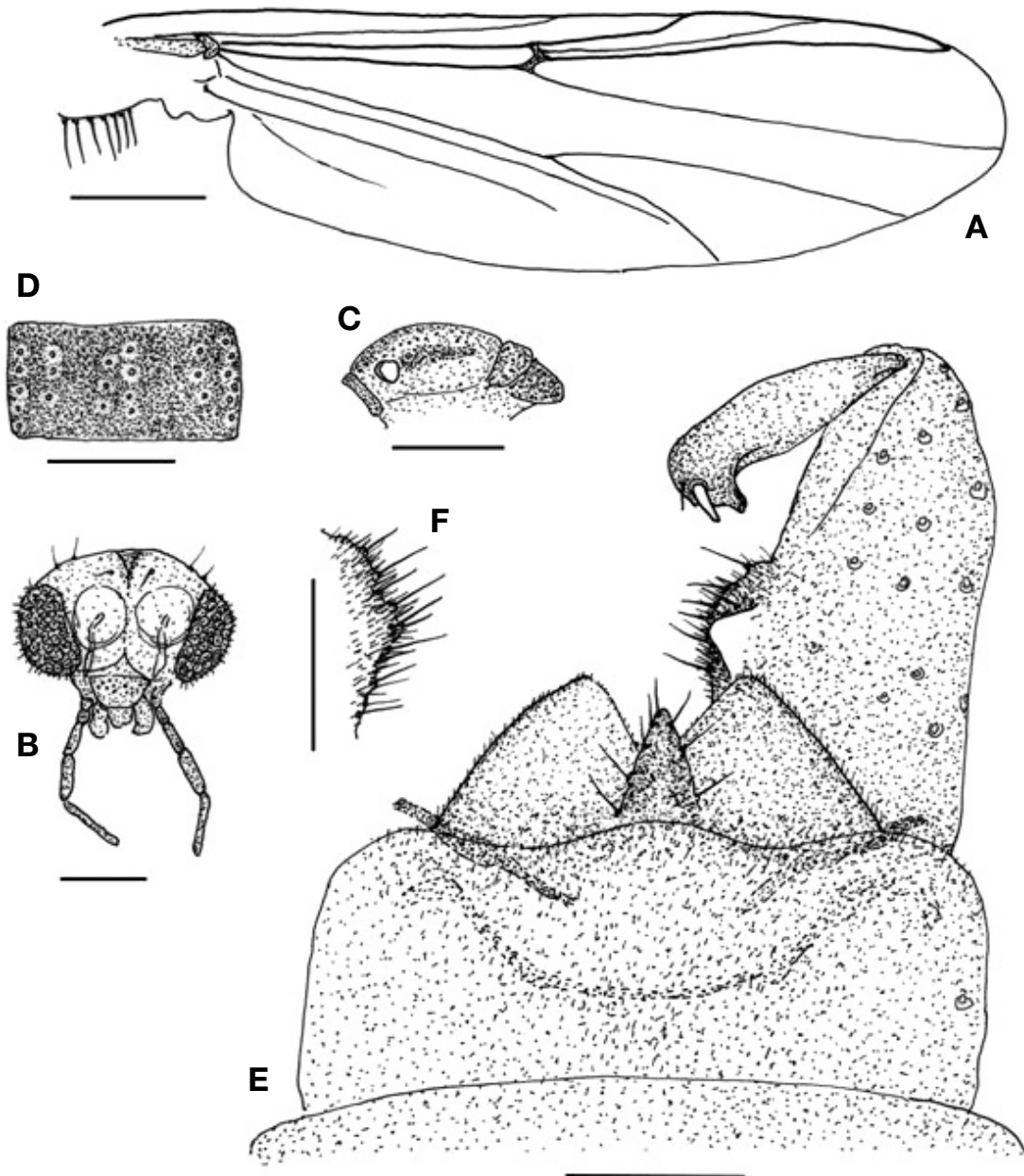
**Fig. 2.** *Paratricocladius tamaator* Sasa, 1981 (male). A, Wing; B, 4th tergite of abdomen; C, Hypopygium. Scale bars: A, B=0.2 mm, C=0.05 mm.

**Material examined.** 5♂♂ (RCH 4040, 4041, 4050, 4106, 4122), Korea, Jeju-do, Seoguiipo-si, 2 Sep 1988, Ree HI.

**Diagnosis.** Small to medium sized, dark brown species (WL 1.4 mm). Eye hairy, reniform. Scutum with large, oval humeral pit. Costa not produced. Anal point triangular, with round tip and several lateral setae. Gonocoxite with two inner lobes. Gonostylus parallel-sided, abruptly bent inward at tip, with distinct crista dorsalis. AR 1.15. LR 0.63.

**Description (male).** **Head (Fig. 3B):** Eye reniform, hairy. Antenna brown, with 13 segments. AR 1.15. Palp brown,

with 5 segments: 29, 54, 93, 107, 171  $\mu\text{m}$  (1 : 1.9 : 3.2 : 3.7 : 5.9). Clypeus brown, with 13–15 setae. **Thorax:** Brown in ground color. Antepronotum dark brown, well developed, with 1–3 ventral setae. Scutum brown, vittae dark brown, with large oval humeral pit (Fig. 3C); Acrosticals minute (not able to count); 15 erect dorsocentrals, arising from distinct pale pit; 3–4 prealars. Scutellum dark brown, with 8 setae. Postnotum dark brown. Haltere yellowish brown, elliptic. **Wing (Fig. 3A):** WL 1.4 mm. Membrane bare. Costa not produced from  $R_{4+5}$ .  $R_{2+3}$  ending on middle of  $R_1$  and



**Fig. 3.** *Rheocricotopus chalybeatus* (Edwards, 1929) (male). A, Wing; B, Head (frontal); C, Thorax (lateral); D, 3rd tergum of abdomen; E, Hypopygium; F, Gonocoxal inner lob (ventral). Scale bars: A=0.3 mm, B, D=0.2 mm, C=0.5 mm, E, F=0.05 mm.

$R_{4+5}$ .  $R_{4+5}$  distal to  $M_{1+2}$ .  $Cu_1$  slightly bent in middle. An reaching FCu. FCu slightly distal to RM. Anal lobe moderately developed. Squama with setae. **Legs:** All segments brown, Tarsi I–V of mid and hind legs slightly lighter (brownish yellow). Fore tibia with a long, narrow apical spur; mid tibia with 2 short spurs; hind tibia with 1 short, 1 long and 10–12 comb spurs. Pulvillus moderately developed. LR 0.63. **Abdomen:** All tergites dark brown; all sternites brownish yellow. Tergal setae arise as shown in Fig. 3D. **Hypopygium**

(**Fig. 3E**): Anal tergite with large, triangular bilobes distally, without any setae. Anal point wide at base, tapered apically, with round tip and several lateral setae. Gonocoxite rather long, slightly narrowed distally, with 2 gonocoxal inner lobes: dorsal lobe triangular with round tip, bare; ventral lobe wider with many setae and microtrichia. Gonostylus parallel-sided, abruptly bent inward at tip, with distinct cristadorsalis and megaseta.

**Distribution.** Europe, Japan, Mongolia, Korea.

**Remarks.** The morphological key characters of the Korean specimens are consistent with those described for European and Japanese specimens (Edwards, 1929; Lehmann, 1969; Sasa and Kawai, 1987). This species showed a wide range of the geographical variation in body size, i.e. the WL of England specimen was 2.5 mm (Edward, 1929), that of Germany's 1.6–2.0 mm (Lehmann, 1969), that of Japanese's 1.3 mm (Sasa and Kawai, 1987), and that of Korean's 1.4 mm. In China, nine species of *Rheocricotopus* have been reported, but not *chalybeatus* (Wang and Zheng, 1992). In eastern Siberia, Russia, only one species, *Rh. effuses*, has been recorded (Kravtsova, 2000). *Rh. chalybeatus* was reported in Mongolia (Shcherbina and Zelentsov, 2008).

Subfamily Tanypodinae Thienemann and Zavrel  
Genus *Ablabesmyia* Johannsen

<sup>1</sup>\**Ablabesmyia jeongi* n. sp. (Fig. 4)

**Material examined.** Holotype: ♂ (RCH-5876), Korea, Gangweon-do, Chuncheon-si, Wudu-dong, 1 May 2009, Jeong KY. Paratypes: 3♂♂ (RCH-5881, 5888, 5891), same as holotype.

**Diagnosis.** Yellowish brown, medium-sized species (WL 2.9 mm). Wing membrane covered with macrotrichia, 3 cloudy patches on anterior and middle of cell  $r_{4+5}$ , RM, and FCu. MC distal to FCu and proximal to RM. Gonocoxite large; gonocoxal basal lobe complicated in structure, basal blade and dorsal blade directed outward. AR 1.90.

**Description (Male).** **Head:** Eye bare, dorsomedially produced. Antenna dark brown, 14 segmented, 14th segment short with an apical seta. AR 1.90. Palp dark brown, with 5 segments: 65, 137, 209, 144, 335  $\mu\text{m}$  (1 : 2.1 : 3.2 : 2.2 : 5.2). Clypeus dark brown, roughly square, with 35 setae. **Thorax:** Yellowish brown in ground color. Anteprenotum yellowish brown. Scutum brown, with inconspicuous dark brown vittae; 30–34 short dorsocentrals and 28–30 prealars. Scutellum yellowish brown, with 29 short setae. Postnotum dark brown. **Wing (Fig. 4A):** WL 2.9 mm. Membrane with macrotrichia, faint cloudy patches on anterior part and middle of  $r_{4+5}$ , on middle of  $m_{1+2}$ , on anterior end of  $Cu_1$ , on middle of an, and on RM and FCu. MC distal to FCu and proximal to RM.  $R_{4+5}$  distal to  $M_{1+2}$  and proximal to  $M_{3+4}$ . Anal lobe moderately developed. Squama fringed. **Legs:** Femur pale yellow with a subapical dark ring. Tibia pale yellow with subbasal, middle and apical dark rings (Fig. 4B). Tarsus I pale with middle and apical dark rings, tarsi II–III pale with an apical dark ring, tarsi IV–V brownish yellow. Pulvillus absent. **Abdomen (Fig. 4C):** Tergites I–V pale with faint shade on

middle; tergites VI–VII yellowish brown. **Hypopygium (Fig. 4D):** Anal tergite extremely small. Gonocoxite large; basal lobe of gonocoxite complicated in structure: basal blade and dorsal blade directed outward, lateral filaments long, branched in number. Gonostylus narrow, long, with several teeth and an apical filament.

**Female.** Unknown.

**Etymology.** This species is named after Dr. K.Y. Jeong, who collected the type specimens.

**Distribution.** Korea.

**Remarks.** This new species has a gonocoxal basal lobe with very unique structures, particularly the outward direction of the long dorsal blade and the short basal blade, which have not previously been observed in other congeners.

<sup>2</sup>\*Genus *Hayesomyia* Murray and Fittkau

<sup>3</sup>\**Hayesomyia tripunctata* (Goetghebuer, 1922) (Fig. 5)  
*Ablabesmyia tripunctata* Goetghebuer, 1922: 59 (type locality: Allemagne); 1937: 37.

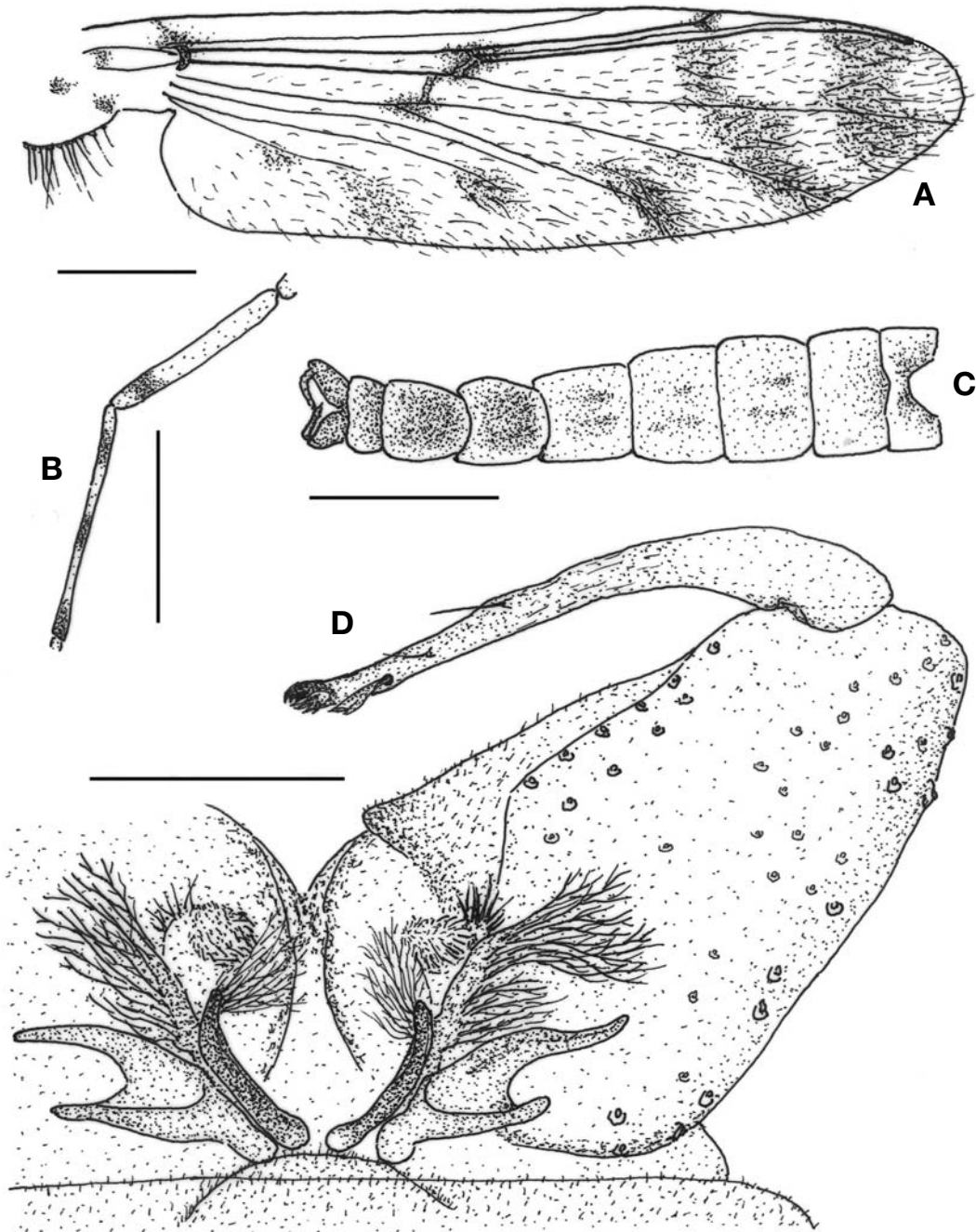
*Hayesomyia tripunctata* (Goetghebuer): Langton and Pinder, 2007: 46.

**Material examined.** 1♂ 2♀, Korea, Jeollanam-do, Gureub, 2 Oct 1977, Ree HI.

**Diagnosis.** Reddish pale yellow, medium sized species (WL 2.1 mm). Eye bare. Scutum with 4 pairs of dark spots. Wing membrane thickly covered with hairs, 3 dark spots on  $R_{2+3}$ , RM, and humeral cross-vein.  $R_{2+3}$  present. Gonocoxal basal lobe large, belobed (inner branch narrow and outer branch broad). Gonostylus abruptly narrowed at tip. AR 1.96. LR 1.14.

**Description (male).** **Head:** Eye bare, with narrow dorsomedial extension. Antenna pale dark brown, with 14 segments. AR 1.96. Palp pale yellow, with 4 segments: 82, 168, 193, 250  $\mu\text{m}$  (1 : 2.1 : 2.4 : 3.1). Clypeus brownish yellow, with 28 setae. **Thorax (Fig. 5B):** Reddish yellow in ground color. Anteprenotum yellow, notched medially. Scutum brownish yellow with 4 pairs of dark spots: 1 pair on anterior margin of central vittae, 1 pair on posterior margin of central vittae, 1 pair on anterior margin of lateral vittae, and 1 pair on posterior margin of lateral vittae. One dark spot on anterior anepisternum II. 19 long, erect acrosticals; 17 dorsocentrals; 9 prealars. Scutellum yellowish brown with 17 setae. Postnotum dark brown. **Wing (Fig. 5A):** WL 2.1 mm. Membrane thickly covered with macrotrichia. 3 dark spots on  $R_{2+3}$ , RM, and humeral cross-vein. Costa not produced.  $R_{4+5}$  slightly beyond  $M_{3+4}$ .  $R_{2+3}$  present. MCu slightly distal to FCu. An well beyond FCu. Anal lobe developed. Squama fringed.

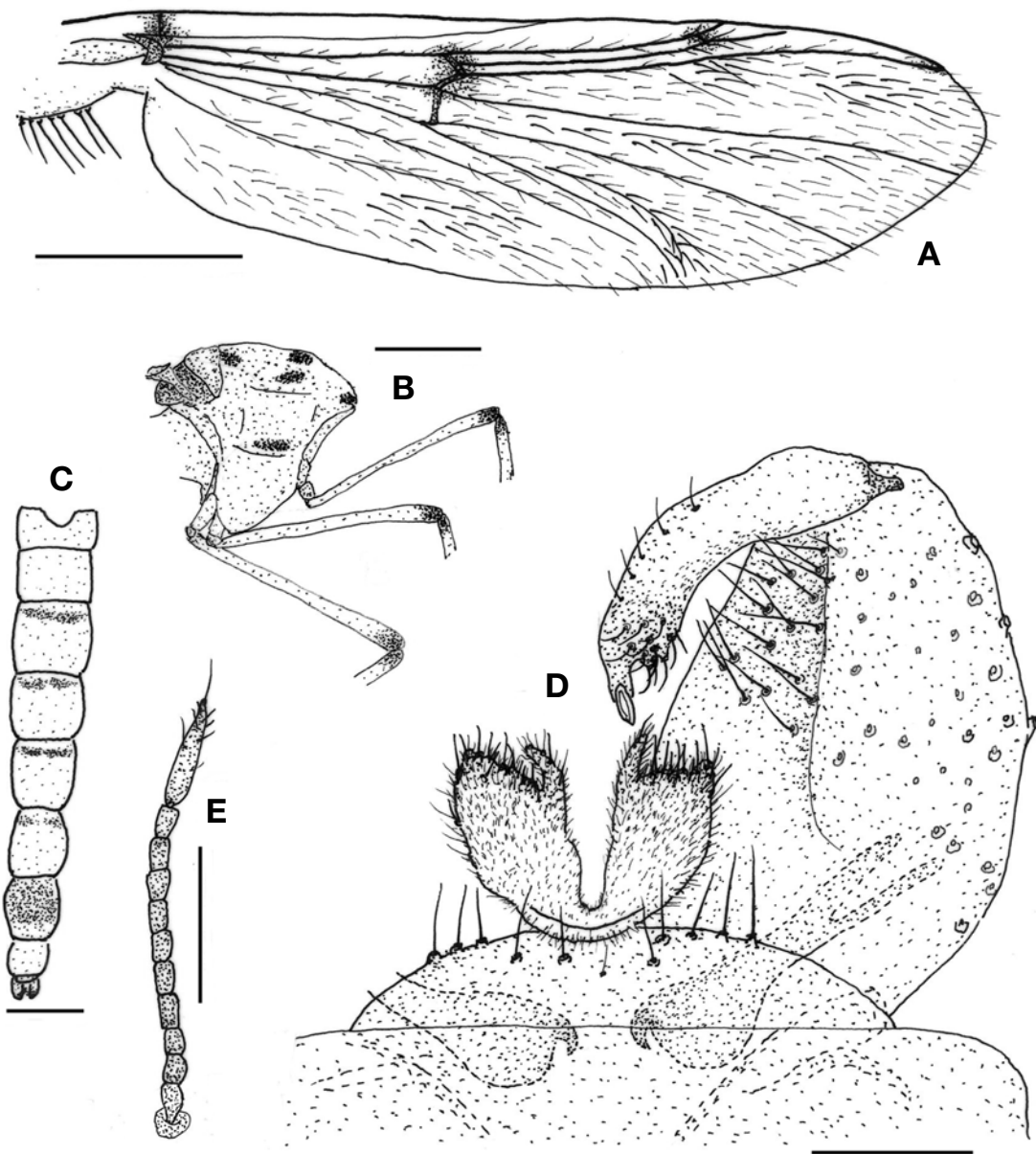
Korean name: <sup>1</sup>\*정알락깔따구 (신칭), <sup>2</sup>\*집게깔따구속 (신칭), <sup>3</sup>\*열점집게깔따구 (신칭)



**Fig. 4.** *Ablabesmyia jeongi* n. sp. (male). A, Wing; B, Femur and tibia (lateral); C, Abdomen; D, Hypopygium. Scale bars: A=0.5 mm, B, C=0.01 mm, D=0.01 mm.

Arculus dark. **Legs (Fig. 5B):** All segments pale yellow, with dark spots on apical end of femur and on basal end of tibia. Apical spur of fore tibia with 2 lateral teeth each side; 2 subequal spurs of mid tibia with several lateral teeth, respectively; hind tibia with 1 long spur with 1–2 lateral teeth, 1 short spur with several lateral teeth, and 7–8 comb spines.

Tarsus III of mid leg without prominently developed apical setae. Pulvillus absent. LR 1.14. **Abdomen (Fig. 5C):** Tergites I, II, VIII pale; tergites III–VI pale with basal dark markings; tergite VII brown (distal 1/3 yellowish brown). **Hypopygium (Fig. 5D):** Anal tergite small, roundly produced distally, with 12 setae; phallapodeme pale, broad ante-



**Fig. 5.** *Hayesomyia tripunctata* (Goetghebuer, 1922) (male). A, Wing; B, Thorax and femurs (lateral); C, Abdomen; D, Hypopygium; E, Antenna (female). Scale bars: A–C=0.5 mm, D=0.05 mm, E=0.2 mm.

riorly, hooked at tip, deeply forked posteriorly. Gonocoxite relatively short (164  $\mu\text{m}$  long  $\times$  129  $\mu\text{m}$  wide); gonocoxal basal lobe large, bilobed, inner branch narrow and outer branch broad, covered with small setae distally and with microtrichia. Gonostylus parallel-sided, slightly bent inward, abruptly narrowed at tip, with several subapical setae ventrally.

**Female.** General morphology same as in male, except for usual sexual differences. Antenna with 11 segments (Fig. 5E).

**Distribution.** Europe, Korea.

**Remarks.** The genus *Hayesomyia* belongs to the tribe Pentaneurini. Adult males of this genus resemble those of *Thienemannimyia* and *Rheopelopia*. The genus has a Holarctic distribution with only one species recorded from each of the Palearctic (Europe) and Nearctic regions (Langton and Pinder, 2007). It is easily identifiable by the three dark spots on the wing membrane and by the bifurcate gonocoxal basal lobe.



## ACKNOWLEDGMENTS

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