

## Eight Rare Species of Chironomidae (Insecta: Diptera) New to Korea

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### ABSTRACT

Eight species of Chironomidae (Diptera) which are new to Korea are described with illustrations. They are extremely rare species in Korea, as only one or two specimens have been collected since 1977 throughout the country. *Microchironomus tener*, *Stictochironomus akizukii* and *Paratendipes nubilus* belong to subfamily Chironominae, and the other five species: *Diplocladius cultriger*, *Limnophyes minimus*, *Metriocnemus fulvofasciatus* and *Parametriocnemus stylatus* belong to subfamily Orthocladiinae.

**Key words:** taxonomy, chironomidae, new record, Korea

### INTRODUCTION

Since 32 species of Chironomidae were reported for the first time in Korea by Ree and Kim (1981), 20 more species were added during the period of 1981-2003, and Na (2004) described 16 unreported species and 4 new species on her Master degree dissertation. In total, 72 species of Chironomidae have been reported in Korea. Adults were collected by aspirating, sweeping or light traps and slide-mounted with phenol balsam (Ree and Kim, 1981). The slide-specimens are kept in good condition even after thirty years of preparation.

### SYSTEMATIC ACCOUNTS

#### <sup>1</sup>\**Microchironomus tener* (Kieffer, 1918) (Fig. 1)

*Chironomus tener* Kieffer, 1918; Edwards, 1929.

*Tendipes (Cryptochironomus) tener*: Goetghebuer, 1937.

*Leptochironomus tener*: Pinder, 1979.

*Microchironomus tener*: Sasa and Kawai, 1987.

*Material examined.* 1 ♂ (R-CH-675): Daejeo-dong, Buk-gu, Busan; 21 June 1979 (H.I. Ree).

*Description. Male.* HEAD: Eye bare, well produced. Frontal tubercle absent. Antenna dark brown, with 11 flagellar segments; AR 1.76. Palp with 4 segments (36 : 94 : 94 : 122 μm). Clypeus with 10 setae. THORAX: Antepnotum well

developed, not divided dorsally. Scutum with 6 acrosticals and 7 dorsocentrals each side; scutal tubercle present. Scutellum pale green, with 4 setae. Postnotum yellowish pale green. WING (Fig. 1, A): Wing length 1.54 mm. Membrane bare, with extremely fine punctuation (visible at 400 × magnification). All veins pale. Costa not produced. R<sub>2+3</sub> ending midway between R<sub>1</sub> and R<sub>4+5</sub>. FCu distal to RM. Squama fringed. Anal lobe moderately developed. LEGS: Femur yellowish green. Frontal tibia and tarsi dark brown. Mid and hind tibiae and tarsi I-III pale green, tarsi IV-V dark brown. Mid and hind tibial combs fused, each comb with a spur. Pulvillus distinct. LR 1.84. ABDOMEN: Pale green. HYPOPYGIUM (Fig. 1, B): Anal point long, slender, parallel-sided, with 4-5 setae each side at base. Superior volsella elongate, slender, with 3 setae distally (one at apex and two on inner side). Inferior volsella absent. Gonostylus internally expanded at middle and incurved, with short, pale tooth at apex and 6 rather short setae inner-distally.

*Remarks.* Morphological characteristics of the Korean specimen are mostly coincident with the descriptions of both European and Japanese specimens, except the body size (Edwards, 1929; Pinder, 1978; Sasa and Kawai, 1987). Japanese and Korean specimens are much smaller in size than those of European specimens.

#### <sup>2</sup>\**Stictochironomus akizukii* (Tokunaga, 1940) (Fig. 2)

*Chironomus akizukii* Tokunaga, 1940.

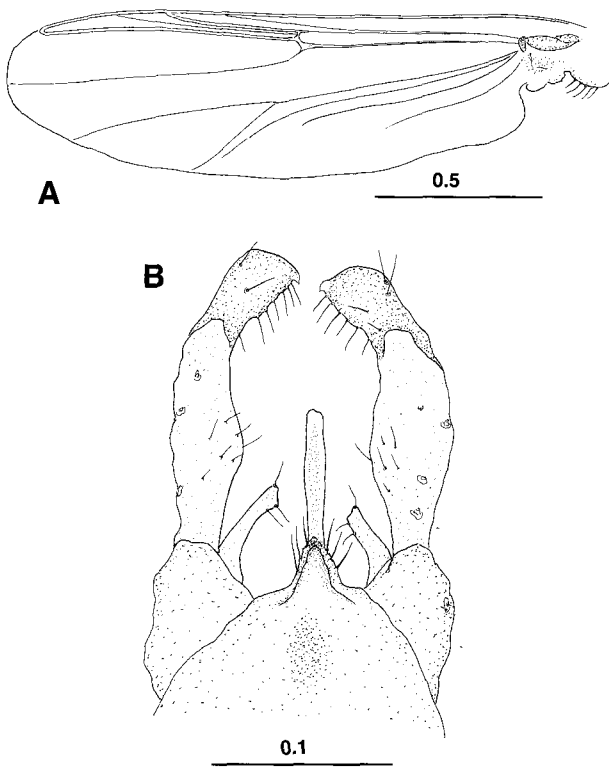
*Stictochironomus akizukii*: Hashimoto, 1982; Sasa, 1984, 1985a, b, 1988, 1991; Sasa and Kawai, 1987; Sasa and Okazawa, 1991.

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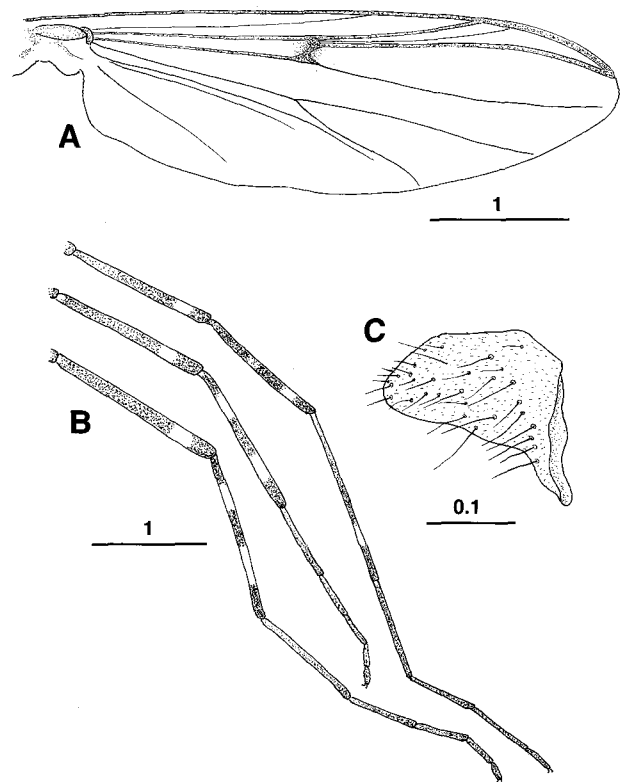
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**Fig. 1.** *Microchironomus tener* (male). A: wing; B: hypopygium. Scale in mm.



**Fig. 2.** *Stictochironomus akizukii* (female). A: wing; B: legs (front, mid and hind from above); C: cercus (lateral). Scale in mm.

*Material examined.* 1 ♀ (R-CH-461): Ichon-dong, Seoul; 26 April 1978 (H.I. Ree).

*Description. Female.* HEAD: Antenna with 5 segments. Eye with a long and narrow dorsomedial projection. Frontal tubercle absent. Palp with 4 segments (179 : 123 : 125 : 326 μm). 14-18 supraorbitals on each side. Clypeus with 35 setae. THORAX: Dark brown in ground color. Scutum with a small hump (tubercle) on middle; 18 acrosticals, 24 dorsocentrals and 7-9 prealars on each side. Scutellum with 34 setae. WING (Fig. 2, A): Wing length 3.7 mm. Costa not produced, ending above the tip of  $M_{1+2}$ .  $R_{2+3}$  well separated from  $R_1$ . FCu slightly distal to RM. RM pigmented, with dark spot around.  $Cu_1$  almost straight. Squama fringed. LEGS (Fig. 2, B): Ground color dark brown. Femur with a white ring near apex. Tibia with two broad white rings. Tarsi I-V dark. Combs of mid tibia fused, with two short spurs; combs of hind tibia fused with one short spur. Pulvillus moderately developed (half as long as claws). LR 1.3. ABDOMEN: Tergites dark brown with unclear narrow pale band on hind margins. Cercus shown in Fig. 2, C.

*Remarks.* This species is widely distributed in Japan, whereas extremely rare in Korea. Only one female was collected

in Seoul in 1978. *St. akizukii* collected in Korea is not clear whether it is *St. histrio* Fabricius which is very similar to *akizukii* and widely distributed in Europe, because the male has not been collected in Korea. Hypopygium of the male is the decisive character in adult morphology.

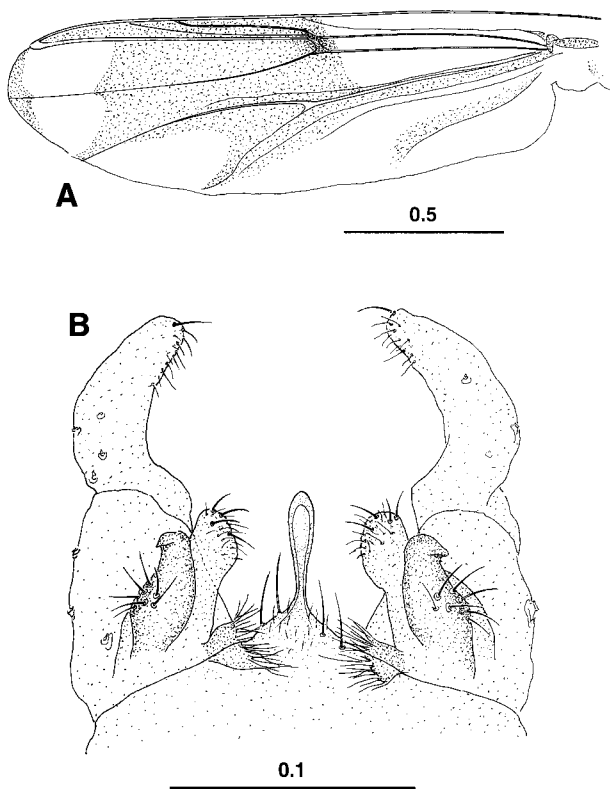
<sup>1</sup>*Paratendipes nubilus* (Meigen, 1830) (Fig. 3)

*Stictochironomus nubilus* Meigen, 1830; Goetghebuer, 1928. *Paratendipes nubilus*: Yamamoto, 1995.

*Material examined.* 1 ♂ (R-CH-1005): Daeheung Temple, Haenam, Jeollanam-do; 10 September 1978 (H.I. Ree).

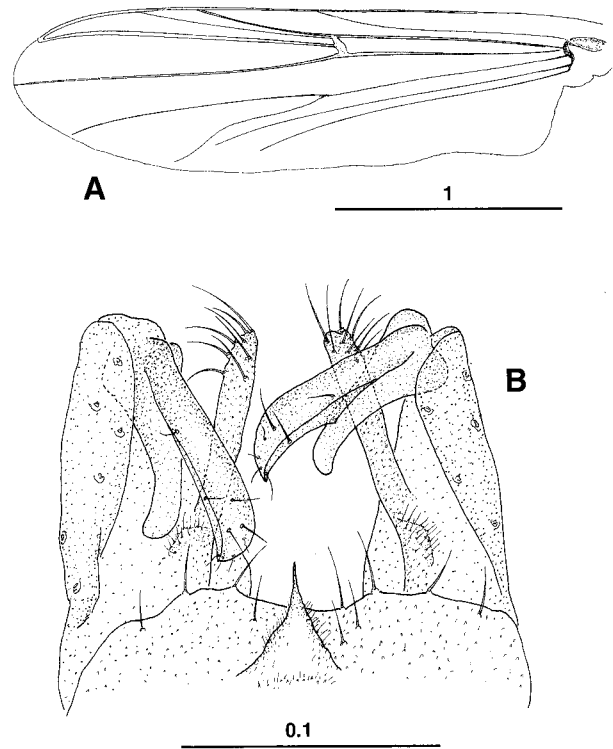
*Description. Male.* HEAD: Eye bare, with well developed dorsal projection. Frontal tubercle absent, Antenna light brown, with 13 flagellomeres; pedicel brown; AR 1.6. Clypeus with 11 setae. Palp light brown, with 5 palpomeres (29 : 30 : 130 : 144 : 202 μm). THORAX: Light brown in ground color. Anteropronotum brown, reaching to front margin of scutum. Scutum brown; central and lateral vittae absent. Scutellum light brown, with 4 setae. Postnotum brown. Halter pale. WING (Fig. 3, A): Wing length 1.77

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**Fig. 3.** *Paratendipes nubilus* (male). A: wing; B: hypopygium. Scale in mm.

mm. Costa not produced. RM oblique, not pigmented.  $R_{2+3}$  ending well separated from  $R_1$ . FCu slightly beyond of RM. Postcubitus well developed.  $Cu_1$  sharply curved at end. An just reaching to FCu. Wing membrane with microtrichiae; dark cloud on cells of  $r_{2+3}$ , basal half  $r_{4+5}$ , mid  $m_{1+2}$ , basal  $m_{3+2}$ , above An vein and wing apex. Squama with several hairs. LEGS: LR 1.03. All femurs brown; front tibia pale; mid and hind tibial comb scales fused, with 2 short spines. Pulvillus absent. ABDOMEN: Pale brown, with darker line longitudinally on middle. HYPOPYGIUM (Fig. 3, B): Anal point pale, slender, apically expanded. Gonostylus remarkably concave internally, with short setae inter-apically. Superior volsella broad basally, slightly narrowed towards tip, with hook-like tip, 9-10 setae on outer-middle. Median volsella short with numerous simple hairs. Inferior volsella rather short and broad with numerous short bristles apically. **Remarks.** This species is very rare not only in Korea but in Japan (Yamamoto, 1995) and in Europe (Goetghebuer, 1928). Yamamoto (1995) reported that this species was found in North Korea.



**Fig. 4.** *Diplocladius cultriger* (male). A: wing; B: hypopygium. Scale in mm.

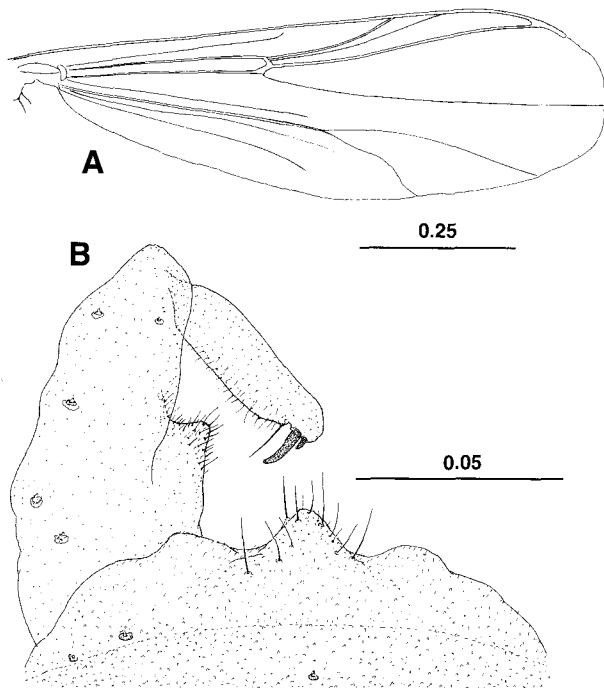
<sup>1</sup>\**Diplocladius cultriger* Kieffer, 1908 (Fig. 4)

*Diplocladius cultriger* Kieffer, 1908; Edwards, 1929; Goetghebuer, 1932; Johansen and Townes, 1952; Brundin, 1956; Tokunaga, 1964; Pinder, 1978; Sasa, 1984; Sasa and Kawai, 1987; Sasa and Okagawa, 1991; Sasa and Hirabayashi, 1993.

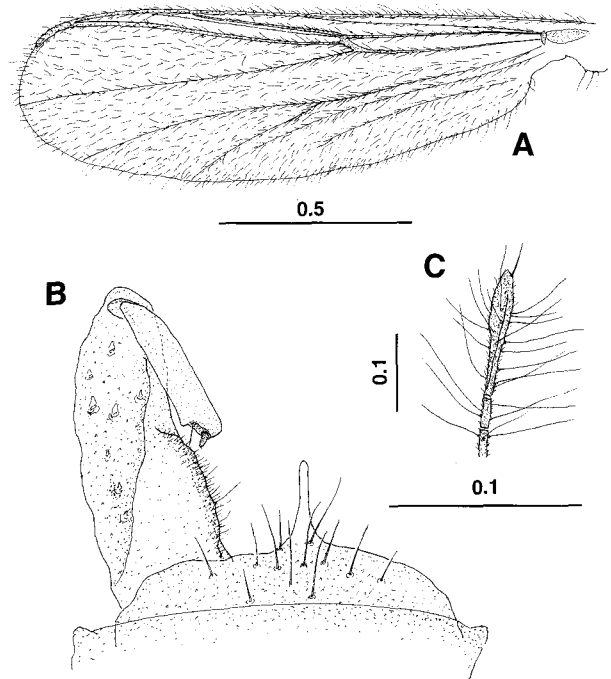
**Materials examined.** 2♂ (R-CH-401, 425): Nokbeon-dong, Seoul; 14 April 1978 (H.I. Ree).

**Description. Male.** HEAD: Dark brown in ground color. Eye not produced, reniform, heavily pubescent. Antenna with 13 segments. AR 2.1. Palp 4 segmented (72 : 115 : 122 : 180  $\mu$ m). Clypeus rectangular, with 12 setae. THORAX: Ground color uniformly dark brown. Dorsocentrals 6-7 on each side, arising from clear pale pit. Scutellum with 7-8 setae. WING (Fig. 4, A): Wing length: 2.5 mm. Wing membrane finely granular under high power magnification. Costa not produced.  $R_{2+3}$  separated from both  $R_1$  and  $R_{4+5}$ , ending mid between  $R_1$  and  $R_{4+5}$ . FCu under RM.  $Cu_1$  curved. Anal vein extending beyond FCu. Squama bare. LEGS: All segments uniformly dark brown. Front tibia with a long terminal spur. Mid tibia with two long terminal spurs. Hind tibia

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**Fig. 5.** *Lymnophyes minimus* (male). A: wing; B: hypopygium. Scale in mm.



**Fig. 6.** *Metriocnemus fulvofasciatus* (male). A: wing; B: hypopygium; C: tip of antenna. Scale in mm.

with two terminal spurs (one long and the other short) and 11-12 free comb spines. Pulvillus rudimented. LR 0.75. ABDOMEN: Uniformly dark brown. HYPOPYGIUM (Fig. 4, B): Ninth tergite quadrangular, posterior margin almost straight. Anal point very small, sharply pointed at tip (look like a spine). Gonocoxite with long, finger-like inner lobe, covered with numerous macrotrichiae and 8-9 moderately long setae apically. Gonostylus forked into two long branches: dorsal one longer with 4 subapical and 3 apical small setae, and ventral one slightly shorter without setae.

*Remarks.* Dorsal branch of gonostylus illustrated by Pinder (1978) is not same as Korean specimens, but similar to that of Sasa (1984) illustration. Antennal ratio of Korean specimens is 2.1, whereas 1.7-1.9 for Japanese specimens (Sasa, 1984) and nearly 3 for England specimens (Edwards, 1929).

<sup>1</sup>\**Lymnophyes minimus* (Meigen, 1818) (Fig. 5)

*Spaniotoma minima* Meigen, 1818.

*Spaniotoma (Lymnophyes) minima*: Edwards, 1929.

*Lymnophyes hudsoni*: Seather, 1975; Sasa and Kikuchi, 1986;

Sasa and Kawai (1987); Sasa 1988, 1990.

*Lymnophyes minimus*: Sasa, 1993, 1995.

*Material examined.* 1♂ (R-CH-353): Mt. Soyo, Dongdu-

cheon-si. Gyeonggi-do; 12 October 1977 (H.I. Ree).

*Description. Male.* HEAD: Eye bare, without dorsomedial projection. Three vertical setae each side. Antenna with 11 segments; AR 0.52. Palp pale brown, with 4 segments (18 : 46 : 39 : 82 μm). Clypeus with 11 setae. THORAX: Ground color uniformly brown. Anteprepronotum moderately developed, with 2 setae. Scutum with 8 dorsocentrals and 5 prealars each side. Scutellum with 6 setae. WING (Fig. 5, A): Wing length 0.86 mm. Membrane covered with microtrichiae. Costa well produced from end of R<sub>4+5</sub>. R<sub>2+3</sub> running close to R<sub>4+5</sub>. FCu distal to RM. M<sub>3+4</sub> distinctly curved. An ending before FCu. Anal lobe poorly developed. LEGS: Uniformly pale brown. Front tibia with a long terminal spur. Mid tibia with 2 short terminal spurs. Hind tibia with 11 comb spurs and a long terminal spur. Tarsal segment IV much shorter than tarsal segment V. Pulvillus absent. LR 0.5. ABDOMEN: All segments uniformly brown. HYPOPYGIUM (Fig. 5, B): Anal point absent. Distal margin of middle portion of 9th tergite slightly produced with several short setae. Gonocoxite with inner lobe (inferior volcella), triangular in shape, with numerous short setae. Gonostylus simple, with 2 stout (dark brown) terminal spurs (one long, the other short) and a subapical setae.

*Remarks.* A single specimen collected from Mt. Soyo, Korea is identified as *Li. minimus*, for structure of the hypo-

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pygium and wing are well coincided with those of Japanese and European specimens, except antenal ratio which is a little smaller. AR of the Korean specimen is 0.52, whereas 0.6 for England specimens (Edwards, 1929), 0.71 for Tokushima, Japan (Sasa and Kikuchi, 1986), and 0.63 for Aiju, Japan (Sasa, 1993).

<sup>1</sup>\**Metriocnemus fulvofasciatus* Kieffer, 1921 (Fig. 6)

*Metriocnemus fulvofasciatus* Kieffer, 1921; Goetghebuer, 1950.

*Materials examined.* 2♂♂ (R-CH-342, 350): Mt. Soyo, Dongducheon-si, Gyoonggi-do; 12 October 1977 (H.I. Ree).  
*Description. Male.* HEAD: Eye bare, dorsomedial extension moderately developed. Antenna with 13 flagellomeres; last segment slightly swollen, with an apical seta (Fig. 6, C); AR 0.3. Palp dark brown with 4 segments (36 : 121 : 107 : 143 μm). 7-9 postoculars and 9 orbitals each side. Clypeus light brown, with 21 setae. THORAX: Anteprepronotum light brown, well developed, with 6-7 lateral setae. Scutum brown with unclear defined dark vittae; numerous long elected acrosticals, dorsocentrals and prelars. Halter pale. WING (Fig. 6, A): Wing length 1.4 mm. Membrane and all veins densely covered with macrotrichiae. Costa strongly extended.  $R_{2+3}$  running close to  $R_1$ .  $R_{4+5}$  just above end of  $M_{3+4}$ . FCu slightly distal to RM.  $Cu_1$  almost straight. An ending slightly distal to FCu. Anal lobe poorly developed. LEG: All segments yellowish brown. LR 0.6. Frontal tibia with a long apical spine; mid tibia with 2 long apical spines; hind tibia with a well developed spine and 9 separated comb spines. Pulvillus vestigial. ABDOMEN: Uniformly light brown. HYPOPYGIUM (Fig. 6, B): Anal point pale, moderately long (36 μm) with slightly tapering point. Gonocoxite long; inferior volsela poorly developed with numerous short hairs. Gonostylus simple with a strong apical spine and a subapical seta.

*Remarks.* Morphological characters of the Korean specimens well coincide with those of *Metriocnemus fulvofasciatus* found in Europe (Goetghebuer, 1950), except the AR difference (0.2 for the former vs 0.5 for the latter).

<sup>2</sup>\**Parametriocnemus stylatus* (Kieffer, 1924) (Fig. 7)

*Metriocnemus stylatus* Kieffer, 1924; Goetgheber, 1950.

*Parametriocnemus stylatus*: Tokunaga, 1939; Pinder, 1978; Sasa, 1981a, b, 1983; Sasa and Okazawa, 1992; Sasa and Hirabayashi, 1993.

*Material examined.* 1♂ (R-CH-997): Daeheung Temple, Haenam-gun, Jeollanam-do; 10 September 1978 (H.I. Ree).

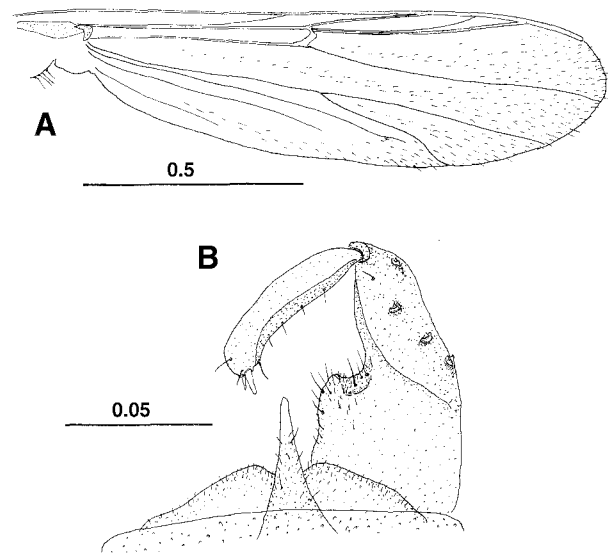
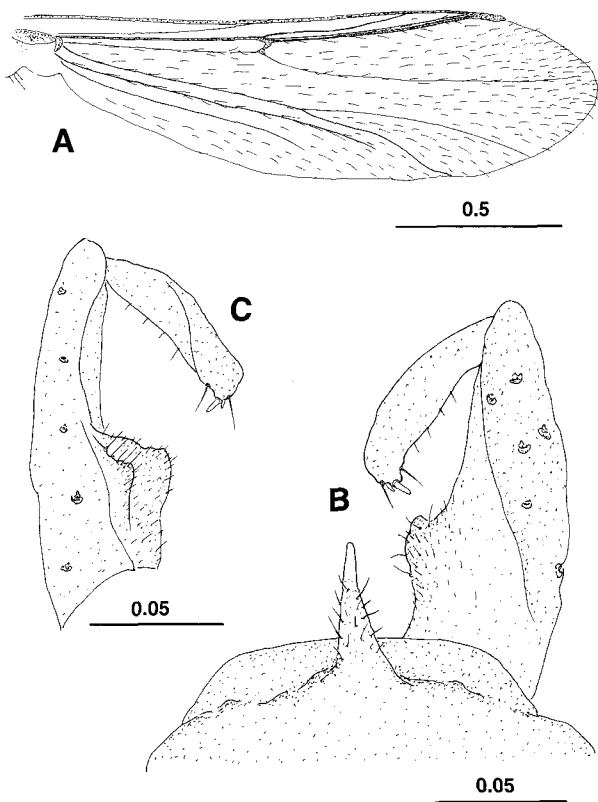


Fig. 7. *Parametriocnemus stylatus* (male). A: wing; B: hypopygium. Scale in mm.

*Description. Male.* HEAD: Eye bare, with prominent dorsomedian projection. Antenna light brown, with 13 segments; last segment with 4 apical and 4 subapical setae; AR 0.88. One orbital and 5 postoculars on each side. Palp yellowish brown, with 4 segments (34 : 110 : 127 : 210 μm). Clypeus with 13 long setae. THORAX: Ground color yellowish brown. Anteprepronotum well developed. Scutum with unobvious vittae; 11 dorsocentrals on each side. Scutellum light brown, with 6 setae. Postnotum light brown. WING (Fig. 7, A): Wing membrane with macrotrichiae. Costa well produced.  $R_{2+3}$  running close to  $R_{4+5}$ .  $Cu_1$  remarkably bent (sinuous). FCu under RM. Anal lob poorly developed. Squama fringed. Wing length 1.12 mm. LEGS: Uniformly pale brown. LR 0.44. HYPOPYGIUM (Fig. 7, B): Anal point triangular form (41.4 μm long, 21.6 μm wide at base), with round apex, covered with microtrichiae and short hair on basal 2/3. Gonocoxite with broad inner lobe, bearing microtrichiae and short hairs. Gonostylus rather slender, slightly curved internally, with a stout spine, a minute spine and 3 setae apically, and 4 short setae along inner margin.

*Remarks.* The genus *Parametriocnemus* which is the first record in Korea is known from all faunal regions except the Antarctic, though only eight species are described from the Holarctic region (Cranston et al., 1989). A group of similar genera, such as *Metriocnemus* v.d. Wulp, *Parametriocnemus* Goetghebuer, *Paraphaenocladus* Thienman, *Gymnometriocnemus* Goetghebuer, *Heterotrissocladus* Spaeric, and *Togecnemus* Sasa are composed of the *Medriocnemus*

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**Fig. 8.** *Paraphaenocladius impensus* (male). A: wing; B: hypopygium; C: gonocoxite and gonostylus (ventral). Scale in mm.

complex (Sasa, 1998). Cranston et al. (1989) speculated that *Parametriocnemus* would probably be a synonym of *Paraphaenocladius*.

<sup>1</sup>\**Paraphaenocladius impensus* (Walker, 1856) (Fig. 8)  
*Metriocnemus impensus* Walker, 1856; Edwards, 1929; Goetghebuer, 1932, 1950.  
*Paraphaenocladius impensus*: Brundin, 1956; Pinder, 1978; Sasa and Okazawa, 1992.

*Material examined.* 1 ♂ (R-CH-424): Nokbeon-dong, Seoul; 28 April 1978 (H.I. Ree).

*Description. Male.* HEAD: Eye bare, with dorsal projection. Frontal tubercle absent. Antenna dark brown, with 13 segments; AR 0.73. Palp dark brown, 5 segmented (21 : 36 : 86 : 95 : 143 μm). Clypeus with 11 setae. THORAX: Antepnotum dark brown, moderately developed. Scutum with dark brown vittae; 18 fairly long acrosticals, 21 dorsocentrals and 9 prealars. Scutellum dark brown, with 9 setae. Postnotum dark brown. WING (Fig. 8, A): Membrane and veins covered with macrotrichiae. Costa extending beyond

tip of R<sub>4+5</sub>, ending much proximal to tip of M<sub>3+4</sub>. R<sub>2+3</sub> running near R<sub>4+5</sub>. FCu distal to RM. Cu<sub>1</sub> distinctly curved. An ending distal to FCu. Squama fringed. Anal lobe poorly developed. Wing length 1.5 mm. LEGS: Uniformly light brown. Front tibia with a long terminal spur; mid tibia two short terminal spurs; hind fibia with a long and a short spurs and 11 comb separated spurs. Pulvillus absent. LR 0.78. ABDOMEN: Uniformly light brown. HYPOPYGIUM (Fig. 8, B). Anal point developed with triangular base, and somewhat angulate at tip. Inner lobe of gonocoxite (inferior volsella) broad with numerous short setae and microtrichiae, and a small additional inner lobe observed ventrally (Fig. 8, C). Gonostylus simple, more or less pararell width, with a strong apical spur, a subapical short spur and 2 subapical setae; 4 short setae inner-laterally.

*Remarks.* This small brown species is common in Europe, but rare in Asia. In Korea only a single specimen was collected at Nokbeon-dong, Seoul in 1978. The description of this species in Japan generally coincided with the Korean specimen, except antepnotum. Four to seven lateral setae of antepnotum are present in Japanese specimens (Sasa and Okazawa, 1992), whereas they are absent in Korean specimen.

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