



## Review article

Review of the *Stenus indubius* group (Coleoptera, Staphylinidae) in Korea, including five new species

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## ABSTRACT

A taxonomic review of Korean *Stenus indubius* group is presented. Five new species are described: *Stenus curvus* n. sp., *Stenus. obesus* n. sp., *Stenus sulcifer* n. sp., *Stenus tenuiculus* n. sp. and *Stenus unciformis* n. sp. Habitus photographs, illustrations of diagnostic characters and a key to the species of this group in Korea are provided.

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## Introduction

The genus *Stenus* Latreille contains more than 2300 species worldwide and has been classified into 157 species groups (Puthz, 2008). They prey on Collembola and other arthropods, occur in most terrestrial habitats, and are common in areas with high humidity, such as muddy or sandy lake shores, on rocks, in ponds, streams and rivers, or in forest leaf litter and debris (Klimaszewski, 2000; Newton et al., 2000). In East Asia, 49 species of the *Stenus indubius* group have been recorded including 27 Japanese (Naomi, 2006; Naomi and Puthz, 2013; Naomi, 2015a; Naomi and Ito, 2015a) and 21 Chinese (Tang and Li, 2012; Tang et al., 2012; Puthz, 2013) species, while only one species, *Stenus nomuraianus* Puthz, 2012, has been recorded in the South Korean fauna.

The species group is characterized by a combination of the following features: dark brown to black body with dense punctures; atrophied hind wings; elytra distinctly widened posteriorly; no or only very

narrow abdominal paratergites; and a spherical or oblong spermathecae with a collum. Naomi (2006) gives a detailed taxonomic definition of this group.

This paper, describes five new species, *S. curvus*, *S. obesus*, *S. sulcifer*, *S. tenuiculus* and *S. unciformis*, and presents habitus photographs, illustrations of distinguishing characteristics, and a key to the Korean *Stenus indubius* species group.

## Material and methods

Examined specimens were collected by sifting leaf litter at various forest drain or valley in South Korea and preserved in 80% ethyl alcohol. The last three abdominal segments from the body were dissected after softening in hot water. Adeagi, spermathecae and dissected abdominal segments were mounted in Euparal on slides following the method described by Hanley and Ashe (2003). Photographs of secondary sexual characteristics were taken with Ricoh GX100 camera attached to Nikon YS100 compound scope; habitus photographs were taken with a Canon macro photo lens MP-E 65 mm attached to a Canon EOS

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500D Camera. The specimens studied are deposited in the following institutions:

**HUNHM** Natural History Museum, Hannam University, Daejeon, Korea.

**CNUIC** Chungnam National University Insect Collection, Daejeon, Korea.

The measurements used in this paper are as follows: BL – body length, from the apical margin of head to the posterior margin of abdominal tergite X; FL – forebody length, from the apical margin of head to the posterior margin of elytra; HW – maximum width of the head across the eyes; PW – maximum width of the pronotum; EW – maximum width of elytra; PL – length of the pronotum along the midline; EL – elytra length, from the humeral angle to the apico-lateral angle.

## Systematic accounts

### Genus *Stenus* Latreille, 1797

*Stenus indubius* group Sharp, 1889

Diagnosis. Body usually blackish or brownish; body with dense punctures; elytra distinctly widened posteriorly; abdominal paratergites absent or very narrow; tarsal segment 4 bilobed; sternite IX acute apico-laterally; spherical or oblong spermathecae with a collum, and varying spermathecal duct sizes (Naomi, 2006; Puthz, 2013).

### Key to the Korean species of the *Stenus indubius* group

- 1 Frons strongly concave, median portion slightly convex or almost flat, median portion almost without punctures; pronotum with very coarse punctures; elytra with shallow longitudinal impression at the sides ..... *S. sulcifer* n. sp.
- Frons weakly concave, median portion convex, median portion with punctures; pronotum with less coarse punctures; elytra without shallow longitudinal impression at the sides. .... 2
- 2 Pronotum with a median longitudinal furrow ..... 3
- Pronotum without a median longitudinal furrow ..... 4
- 3 Median portion of frons with sparse punctures; elytra wider than long (1.13:1). .... *S. curvus* n. sp.
- Median portion of frons with dense punctures; elytra only slightly wider than long (1.04:1). .... *S. nomuraianus* Puthz
- 4 Median portion of frons with sparser punctures; pubescence of body longer, especially distinct on abdomen ..... *S. unciformis* n. sp.
- Median portion of frons with denser punctures; pubescence of body shorter, especially on abdomen ..... 5
- 5 Forebody length (2.1–2.4 mm); elytra wider than long (1.11–1.24:1); aedeagus as in Fig. 34 ... *S. tenuiculus* n. sp.
- Forebody length (1.8–2.1 mm); elytra slightly wider than long (1.05–1.09:1); aedeagus as in Figs. 19, 20 ..... *S. obesus* n. sp.

### *Stenus curvus* n. sp.

Figs. 1, 7–15

**Type material.** **Holotype.** Gyeongnam province: ♂, Ssanggyesa Temple, Unsu-ri, Hwagae-myeon, Hadong-gun, 3.vii.2006, H.K. Min (HUNHM). **Paratypes.** Gyeongnam province: 1♀, same data as holotype; Jeonbuk province (HUNHM): 2♀, Mt. Deokysan, Anseong-myeon, Muju-gun, 31.vii.2011, K.S. Oh (HUNHM); 2♀, Wolmyeongam Temple, Mt. Naebyeonsan, Junggye-ri, Byeonsan-myeon, Buan-gun, 29.v.2001, Y.B. Cho (HUNHM); Jeonnam province: 1♂, Palyeongsan forest resort, Wucheon-ri, Yeongnam-myeon, Goheung-gun, 24.vii.2011, K.S. Oh (HUNHM); 1♀, Daeheungsa Temple, Mt. Durunsan, Gurim-ri, Samsan-myeon, Haenam-gun, 20.v.2005, Y.B. Cho (HUNHM); 1♀, Mt. Jirisan, Baekmudong, Macheon-myeon, Hamyang-gun, 18.vii.2002, Y.B. Cho (HUNHM).

**Description.** BL: 4.7–5.1 mm, FL: 1.8–2.1 mm, HW: 0.91–0.99 mm, PW: 0.69–0.72 mm, EW: 0.82–0.87 mm, PL: 0.72–0.78 mm, EL: 0.72–0.76 mm.

Body black; maxillary palpi yellow; antennae with antennomeres 1–8 yellowish brown, antennomeres 9–11 reddish brown; legs yellowish brown.

Head wider than elytra (1.10–1.14:1), frons with longitudinal furrows, median portion convex, extending level of medial eye margins; punctures round, sparser on median portion than near medial margins of eyes, diameter of large punctures as wide as apical cross section of antennomere 3, interstices much smaller than half diameter of puncture except on convex median portion; pubescence sparse and fine, average length similar to those of antennomeres 4–6; antennae, when reflexed, extending slightly before posterior margin of pronotum.

Pronotum longer than wide (1.05–1.08:1), widest before middle, lateral margins moderately constricted at base, with a distinct longitudinal furrow medially; surface slightly uneven, punctures round and confluent, diameter of punctures slightly larger than those of frons, interstices much smaller than half diameter of punctures; average length of pubescence similar to that of frons.

Elytra wider than long (1.13:1), moderately constricted at base, gradually broadened posteriorly, posterior margin emarginated; elytral surface almost even, punctures round and confluent, diameter of punctures similar to those of pronotum, interstices much smaller than half diameter of punctures; average length of pubescence similar to those of pronotum.

Legs with metatarsi shorter than metatibia (0.67:1); tarsomere 4 distinctly bilobed.

Abdomen cylindrical; segment III with trace of paratergites only at base, rest of segments lacking paratergites; punctures of tergites III–VIII round, gradually becoming smaller toward posterior tergal margin, diameter of large punctures as wide as basal cross section of antennomere 3, interstices on tergite III smaller than half diameter of punctures, average length of pubescence similar to those of antennomeres 6–8.

Male. Sternite VIII (Fig. 7) with emargination at middle of posterior margin. Sternite IX (Fig. 8) with acute apico-lateral projections, apico-medial margin almost straight and slightly serrate. Tergite X (Fig. 9) widely rounded at posterior margin. Aedeagus (Fig. 10) with subparallel-sided median lobe, weakly constricted at apical portion, apical sclerotized portion broadly subtriangular, apico-lateral corners angular, apico-medial portion pointed; expulsion hooks (Fig. 11) large, separated and strongly sclerotized; parameres extending slightly beyond the apex of median lobe, each with 5–8 short setae at apico-internal area.

Female. Sternite VIII (Fig. 12) widely rounded at middle of posterior margin. Tergite X (Fig. 14) widely rounded at posterior margin. Valvifers (Fig. 13) with acute apico-lateral projection, and apico-internal margin serrate. Spermatheca (Fig. 15) with two swollen chambers connected to each other by a constricted collum, spermathecal duct with 6 distinct bends.

**Distribution.** South Korea.

**Remarks.** This new species is closely related to *S. nomuraianus* Puthz but can be distinguished by the following characters: median portion of frons with sparse punctures; elytra wider than long (1.13:1); spermatheca (Fig. 15) with two swollen chambers connected to each other by a constricted collum, spermathecal duct with 6 distinct bends.

**Etymology.** The name of this new species refers to the apical portion of paramere with a bent shape (Lat. “*curvus*” = having a bent shape).

### *Stenus nomuraianus* Puthz, 2012.

*Stenus nomuraianus* Puthz, 2012: 1369.

**Korean record.** *Stenus nomuraianus*: original description (South Korea).

**Redescription.** BL: 3.1–3.7 mm, FL: 1.7 mm, HW: 0.83 mm, PW: 0.61 mm, EW: 0.69 mm, PL: 0.59 mm, EL: 0.66 mm.

Body black; antennae with antennomeres 1–8 brown, antennomeres 9–11 reddish brown; maxillary palpi yellow; legs brown. Head wider than elytra (1.20:1); frons with longitudinal furrows, median portion convex, extending level of medial eye margins. Pronotum as long as

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