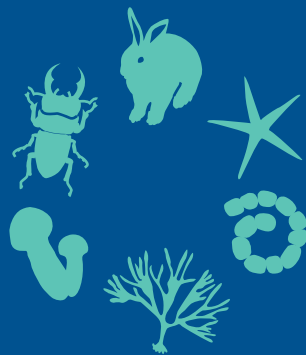


# Insect Fauna of Korea

Volume 12, Number 26

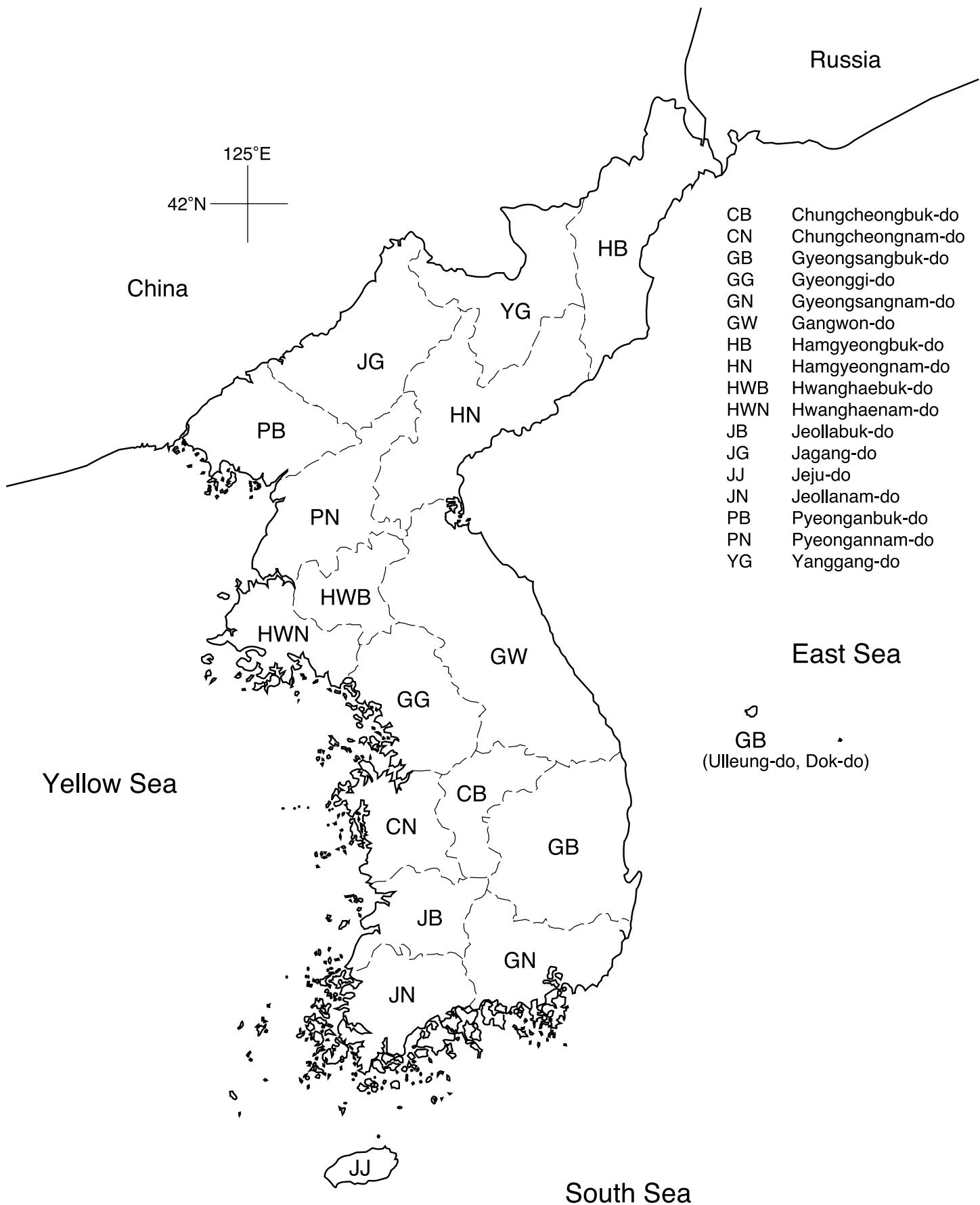
## Aquatic Coleoptera II

Arthropoda: Insecta: Coleoptera:  
Gyrinidae, Haliplidae, Noteridae, Hydrophilidae



Flora and Fauna of Korea

National Institute of Biological Resources  
Ministry of Environment



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## Aquatic Coleoptera II

Arthropoda: Insecta: Coleoptera:  
Gyrinidae, Haliplidae, Noteridae, Hydrophilidae

Dea-Hyun Lee and Kee-Jeong Ahn<sup>1</sup>

Dasari Research Institute of BioResources, Inc.

<sup>1</sup>Chungnam National University



The Flora and Fauna of Korea logo was designed to represent six major target groups of the project including vertebrates, invertebrates, insects, algae, fungi, and bacteria.

## PREFACE

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Biological resources include all organisms and their genetic characteristics. Conservation and utilization of these resources have the capacity to improve human life and to enhance the world. Therefore it is required that the practical and potential values of these organisms are conserved and used wisely. The first step towards this goal is to document our biological diversity and to investigate them in detail. Biological resources increase the competitiveness of a nation through their use as fundamental resources for making highly valued products, such as new lines of cultivar, materials, and drugs.

Many countries in the world are responsible for preserving their biodiversity and using the sustainable ways. The Ministry of Environment (MOE) of Korea has established “CBD-CHM Korea” to share of information of biodiversity.

Each nation in the world is investigating and clearing information of native species within its territory. The National Institute of Biological Resources (NIBR) of MOE has published the ‘Flora and Fauna of Korea’ since 2009 to manage biological resources in comprehensive ways and to enhance national competitiveness by building up the foundation for the sovereignty rights over biological resources. Professional research groups, consisting of professors and other taxonomic experts, have systematically examined 15,545 species of vascular plants, animals and other organisms over the past 10 years and have published their findings in 191 volumes in Korean and 196 volumes in English, and two volumes of monographs covering 216 species of invertebrates. This year, 21 volumes of the Flora and Fauna of Korea in both Korean and English versions including 704 species of vascular plants, invertebrates and insects are additionally published.

The NIBR will continue to publish and research of flora and fauna of Korea that contribute conservation and sustainable use of biological resources. Finally, I would like to express my sincere appreciation to authors who made efforts in writing the manuscripts of *the Flora and Fauna of Korea*.

Prof. Dr. Yeon Jae Bae

President

National Institute of Biological Resources



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*Coelostoma (Lachnocoelostoma) wui* Orchymont, 1940

## INTRODUCTION

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Water beetles occur in various aquatic habitats, from small stagnant pond to running big rivers. They have adapted body shape to the environment such as aerodynamic body, oar-like legs with lots of hairs, and plastron, etc. Most are predacious but some feed algae. More than 13,000 water beetle species in 30 families are recorded worldwide and they are one of the most diverse groups of aquatic insects (Short, 2017). This abundance is the result of multiple macroecological colonization from terrestrial habitats throughout more than 300 Ma of evolutionary history (Toussaint et al., 2017).

This is the second volume on Korean aquatic Coleoptera including four families, Gyrinidae, Haliplidae, Noteridae, and Hydrophilidae, following the first one of Korean Dytiscidae. The other aquatic beetle families such as Hydraenidae, Elmidae, Dryopidae, Psephenidae, etc. will be treated in the third volume of Korean aquatic Coleoptera. Gyrinidae with seven species, Haliplidae with eight species, Noteridae with three species, and Hydrophilidae with 34 species are described in this volume.

First, Gyrinidae have unique swimming behavior where adults rapidly gyrate and whirl on the surface of water. They occur stagnant or slowly running water and prefer clean oxygen-rich habitats (Brinck, 1955). The whirligig beetles comprised about 1000 species in 25 genera worldwide (Slipinski et al., 2011) and 118 species in seven genera in the Palearctic region (Mazzoldi, 2003). In Korea, seven species in three genera have been recorded (Lee and Ahn, 2015), 50 species in six genera from China, 16 species in three genera from Japan and 11 species in three genera from the Far East of Russia (Mazzoldi, 2003).

Members of the Gyrinidae are characterized by the combination of: compound eyes divided completely with one pair on the dorsal surface of the head (above the water line) and another on the ventral surface of the head (below the water line); short antennae with a broad, cup-shaped scape, subtriangular pedicel, elongate but compact flagellum; middle and hind legs broadly expanded and fringed with setae for swimming (Miller and Bergsten, 2012). They have been the subject of detailed studies of their dramatic apomorphic structural features, function (Hatch, 1926; Larsen, 1966), and phylogenetic relationships (Beutel and Roughley, 1988, 2005; Beutel, 1989a, 1989b, 1990; Hatch, 1925; Miller and Bergsten, 2012). An extensive literature deals with their ecology, behavior and chemistry (Miller and Bergsten, 2012).

Kolbe (1886) first reported the gyrenid species (*Gyrinus japonicus* Sharp) in Korea. About 50 years later, Takizawa (1931) and Kamiya (1936) reported two species (*Dineutus orientalis* Modeer and *G. japonicus* Sharp). Since Cho (1957), the first Korean beetle taxonomist, studied Korean gyrenid fauna in detail, a few entomologists have studied Korean gyrenid beetles, mainly in the local fauna. Finally, Lee and Ahn (2015) presented a review of Korean Gyrinidae with seven species in three genera.

Haliplidae, the second family dealt with in this study, have the unique character of the presence of metacoxal plates. They occur diverse freshwater habitats and most species inhabit in stagnant or slowly run-

ning water, crawling plants along shores. They often come to the water surface to supply air under elytra and metacoxal plates (Vondel, 1995). Haliplidae contain about 240 described species in five genera worldwide (Vondel, 2005b, 2007, 2013). In the Korean peninsula, eight species in two genera are recorded (Lee et al., 2015); 29 species in two genera of China (Jia and Vondel, 2011), 11 species in two genera of Japan and 10 species in two genera of the Far East of Russia (Vondel, 2005b, 2007, 2013).

Members of Haliplidae are characterized by the combination of: body yellow to reddish brown, streamlined with many punctures; filiform antennae; strongly enlarged metacoxal plates; slender legs with fringe of swimming hair; tarsal formula 5-5-5; and sternite VII pointed apically (Vondel, 1995, 2005a). The phylogenetic relationships of haliplid genera were studied by Beutel and Ruhnau (1990).

It was Clark (1863) who described the first Korean haliplid species, *Haliphus simplex* Clark and *H. eximius* Clark. About 70 years later, Takizawa (1931) and Kamiya (1936, 1940) added five species to the Korean fauna. Since Cho (1969) reported four haliplid species, a few entomologists have studied Korean haliplid beetles, mainly in the local fauna. Recently, Lee et al. (2015) reviewed Korean Haliplidae.

The third family, Noteridae burrow in muddy substrate and their forelegs usually modified for it. They occur in shallow stagnant water with plentiful vegetation. Both larvae and adults are predator and preferably feed on oligochaete worm, chironomid larvae, or dead insects or crustaceans (Uéno, 1957; Ruhnau, 1985; Dattner, 1997). They contain about 280 described species in 16 genera worldwide (Short, 2017). In the Korean peninsula, three species in two genera are recorded (Jung et al., 2011); 10 species in three genera of China (Nilsson, 2011), 13 species in four genera of Japan and 2 species in one genus of the Far East of Russia (Nilsson, 2003, 2011).

Members of Noteridae are characterized by the combination of: anterior margin of metacoxal phragma extending anteriorly beyond origin of metacoxal furca; noterid platform present; scape pseudosegmented (Beutel and Roughley, 1987; Miller, 2009). The noterid beetles were previously included in the Dytiscidae but now they are classified as a distinct family (Crowson, 1955; Beutel and Roughley, 1987, 1988; Belkaceme, 1991). Recent studies also support the present classification based on both morphological (Beutel et al., 2006; Miller, 2009) and molecular data (Ribera et al., 2002).

Takizawa (1932) first identified *Noterus japonicus* Sharp in Korea. Since Kwon and Suh (1984) reported two species (*N. angustulus* Zaitzev and *Canthydrus politus* Sharp), a few Korean entomologists have studied Korean noterid beetles, mainly in the local fauna.

The last water beetle family treated in this study is the Hydrophilidae, the largest group of the superfamily Hydrophiloidea. They are often abundant in various habitats of stagnant waters, but also commonly inhabit in streams, rivers and seepage. Most aquatic species are classified in the subfamily Hydrophilinae and most terrestrial ones in the Sphaeridiinae. Adults are mostly saprophagous, feeding on different kinds of decaying organic matter, whereas larvae are predaceous, feeding on various invertebrates (Fikáček et al., 2010). They contain about 2950 species in 170 genera worldwide (Hansen, 1999; Short and Hebauer, 2006; Short and

Fikáček, 2011) and 769 species in 51 genera in the Palaearctic region (Hansen, 2004). In Korea, 41 species in 20 genera are recorded (Cho and Park, 2010; Jung et al., 2011), 177 species in 39 genera from China, 122 species in 34 genera from Japan and 104 species in 20 genera from the Far East of Russia (Hansen, 2004).

Members of the Hydrophilidae are characterized by the combination of: lateral margins of pronotum forming a continuous convex line with elytra; surface of pronotum even; protibia with two rows of outermost spines closely aggregated; femur with ridges defining tibial groove; metaventrite with raised middle portion; labial palpomere 4 with long setae apically; procoxal cavity with long fissure (Archangelsky et al., 2005).

It was Kolbe (1886) who recorded the first hydrophilid species (*Philhydrus simulans* Sharp) in Korea. About 40 years later, Okamoto (1924), Mochizuki and Matsui (1939), and Ishii (1940) reported five species in five genera. Since Cho (1969) first studied Korean hydrophilid fauna as a Korean entomologist, a few entomologists such as Kwon and Suh (1986) have studied Korean hydrophilid beetles, mainly in the local fauna. Later, Lee et al. (1988, 1992) recorded 26 species in 15 genera including five additional species new to Korea and no taxonomic review has been performed since then. Accordingly, this study is an updated contribution worth undertaking for Korean Hydrophilidae.

In this review, a total of 52 water beetle species in four beetle families (Gyrinidae, Haliplidae, Noteridae, and Hydrophilidae) is recognized in the Korean peninsula. Detailed taxonomy of the species and genera of four Korean aquatic Coleoptera families is presented. We provide keys to the species, habitus photographs and illustrations of aedeagus of all 52 Korean water beetle species.

## MATERIALS AND METHODS

---

We studied more than 3000 adult specimens of Korean Gyrinidae, Halipidae, Noteridae, and Hydrophilidae. Most of the materials examined for this work were collected during our fieldworks of the last ten years and deposited in the Chungnam National University Insect Collection (CNUIC), Daejeon, Korea. Also, S. H. Lee's personal collection during his fieldworks from 1988 to 2011 was used for this study. Many type series and voucher specimens were borrowed from the Natural History Museum (BMNH), London, United Kingdom, the Hokkaido University Museum (HUNHM), Sapporo, Japan and the Ehime University Museum (EUMJ), Matsuyama, Japan. Specimens are usually prepared in pinned specimens for the observation of morphological characters, and we used only part in ethanol-preserved collections.

Habitus photographs were prepared from multilayered shots taken with a Canon camera (Canon EOS 5Ds, Canon, Tōkyō, JAPAN) and an extreme macro lens (Canon MP-E 65 mm, Canon). Digital images of habitus were merged using image stacking software Helicon Focus 5.3 (Helicon Soft Ltd, Kharkov, Ukraine) and edited by Adobe Photoshop CS4 (Adobe Systems, San Jose, CA, USA). Dry specimens for SEM photographs were sputter-coated with platinum (Cressington 208 auto sputter coater, Hertfordshire, UK) and examined under an SEM (S-4800, Hitachi, Tokyo, Japan).

The arrangement and concept of subfamilies, tribes and genera in the Hydrophilidae are those of Short and Fikáček (2013). Terms of taxonomic characters and measurements of specimens mainly follow Holmen (1987) and Miller and Bergsten (2012) in Gyrinidae, Holmen (1987) and Vondel (1991) in Haliplidae, Roughley (2001) and Dattner (2005) in Noteridae, and Komarek (2004) and Archangelsky et al. (2005) in Hydrophilidae. The subdivision of China and Russia follows the standards of Löbl and Smetana (2003). We used Roman numerals for segments of tagmata and Arabic numerals for articles of appendages. Permanent microscope slides were prepared using the techniques described by Hanley and Ashe (2003).

The listings of names of species within genera are alphabetical. Diagnoses and keys for higher taxa are based only on Korean specimens and some literature. Therefore, we provide detailed description of adults of the species although there is some redundancy of characters. Parts of Gyrinidae (Lee and Ahn, 2015), Halipidae (Lee et al., 2015), and Hydrophilidae (Lee and Ahn, 2008, 2009, 2016a, 2016b, 2016c, 2017) were previously published in the journals, and slightly revised and edited here. Primary distributional entries are provided according to the names of countries where each species is found. Korea is listed first, and eastern Asian countries alphabetically, and then all other countries alphabetically as well. Secondary entries (if any) are the subunits of large countries such as China and Russia. We used the following abbreviation of provinces in Korea: PB, Pyeonganbuk-do; PN, Pyeongannam-do; GW, Gangwon-do; GG, Gyeonggi-do; CB, Chungcheongbukdo; CN, Chungcheongnam-do; GB, Gyeongsangbuk-do; GN, Gyeongsangnam-do; JB, Jeollabuk-do; JN, Jeollanam-do; and JJ, Jeju-do.

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## TAXONOMIC NOTES

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### Class Insecta Linnaeus, 1758

### Order Coleoptera Linnaeus, 1758

### Suborder Adephaga Schellenberg, 1806

### Family Gyrinidae Latreille, 1810

#### Key to the genera of Korean Gyrinidae

- 1. Pronotum with transverse depression on medial part; elytra with rows of punctures ..... *Gyrinus*
- Pronotum without transverse depression; elytra without rows of punctures ..... 2
- 2. Labrum short and broad; elytra without compact setae ..... *Dineutus*
- Labrum long and subtriangular; elytra with compact setae ..... *Orectochilus*

### Genus *Dineutus* MacLeay, 1825

#### Genus *Dineutus* MacLeay, 1825

*Dineutus* MacLeay, 1825: 133. Type species: *Dineutus politus* MacLeay, 1825.

**DIAGNOSIS:** Head (Lee, 2016: Fig. 2.2A) about 2.0 times as wide as long, polygonal microreticulation present. Clypealium with long setae. Antennae with 6 antennomeres. Maxilla without galea; cardo and stipes with few setae on apico-lateral part. Pronotum (Lee, 2016: Fig. 2.2A) convex, transverse groove absent; anterior margin bisinuate, anterior angle acute, posterior angle nearly rectangular, posterior margin rounded. Scutellar shield (Lee, 2016: Fig. 2.2B) concealed when elytra closed. Elytra widest at middle; punctato-striae, compact setae, subelytral suture absent. Prosternum (Lee, 2016: Fig. 2.2D) transverse, anterior margin rounded. Prosternal process linear-form and posterior margin rounded. Anterior margin of mesoventrite (Lee, 2016: Fig. 2.2E) acute, posterior part bifid. Metaventricle (Lee, 2016: Fig. 2.2F) broad, diamond-shaped,

flattened; anterior part acute, lateral parts transverse. Sternite II without pit and groove. Sternite VIII (Lee, 2016: Fig. 2.2H) with compact and short seta on lateral margins (Lee and Ahn, 2015).

## Subgenus *Spinosodineutes* Hatch

### 1. *Dineutus (Spinosodineutes) orientalis* (Modeer, 1776) (Pls. 1A, B, 2A)

*Gyrinus orientalis* Modeer, 1776: 160.

*Dineutus marginatus* Sharp, 1873: 56.

*Dineutus quadrispina* Fairmaire, 1878: 88.

*Dineutus (Spinosodineutes) orientalis*: Ochs, 1930: 9.

**DESCRIPTION:** Length 9.0–10.0 mm. Body oval, flattened with microreticulation.

**Color:** Dorsal surface mostly dark grey, and clypeus, labrum, interorbital area metallic green, and lateral part of pronotum, margin of elytra yellow.

**Head:** Frons without groove. Clypeus wider than labrum and anterior margin sinuated. Labrum with small punctures and anterior margin rounded. Interorbital area with vertical suture on anterior part. Anterior margin of ligula slightly bisinuate, with short spine. Maxillary palpi shorter than labial palpi; palpomere 4 as long as 1–3 combined. Labial palpomere 3 about 2.5 times as long as 2. Cardo and stipes with few setae on apico-lateral part. Mentum and ligula without setae. Gula with two pits on medial part and few setae on lateral margins.

**Thorax:** Postero-lateral and apical parts of elytron sharply pointed. Antero-medial margin of prosternum strongly rounded. Prosternal process nearly parallel-sided. Profemur longer than protibia, a row of setae present on ventral part. Protarsomere 1 about 3.0 times as long as 2. Protarsal claw shorter than protarsomere 1. Postero-lateral and apical parts of elytron sharply pointed. Epipleuron reached on lateral part of sternite VI and rounded anterior part. Mesoventrite with vertical plica on posterior part. Mesocoxa with small rounded groove on posterior part. Metepisternum without pit or groove. Metatibial inner spine about 2.0 times as long as outer spine.

**Abdomen:** Tergite VIII with compact long setae and posterior margin slightly acute. Sternite V–VII with long setae on lateral margins. Postero-medial part of sternite IV protruded and rounded in female. Median lobe of aedeagus (Pl. 2A) shorter than paramere; basal part widest; apical part acute; sperm-groove as in Pl. 2A. Paramere (Pl. 2A) slightly curved at anterior fourth part; apical margin rounded.

**SPECIMENS EXAMINED:** NORTH KOREA: Gangwon Prov.: 1♂1♀, Uonsan-city, Anbyon-gun, Pisan-ri, 23 vii 2008, Changdo Han; SOUTH KOREA: Gangwon Prov.: 2♂♂1♀, Cheorwon-gun, Dongsong-eup, Odeok-ri, Hakji-reservoir, 15 ix 1990; Gyeongbuk Prov.: 3♂♂3♀♀, Euiseong-gun, Geumseo-myeon, Sujeong-ri, 27 vii 2010, SW Jung, DH Lee, valley (1♂, on slide); 1♂1♀, Gumi-si, Okgye-dong, 18 vi 1990, SH Lee; 1♀, Gyeongju-si, Geoncheon-eup, Sinpyeong-ri, 28 v 1993, SH Lee; 1♂, Gyeongju-si, Wolseong-dong, 5 vi 1987, HM Lee; Gyeonggi Prov.: 1♀, Incheon-si, Ganghwa-gun, Gyodong-myeon, 6 x 2009, HM Lim; 1♂, same data as former except for, Naega-myeon, 16 ix 1990, SH Lee, pond; 1♀, Suwon-si, 24 vi 1969; Jeju Prov.: 1♂, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 11 vi 2005, DH Lee, pond; 1♂, Seogwipo-si, Daejeong-eup, Boseong-ri, 9 vii 1985; Jeonnam Prov.: 1♂, Haenam-gun, Hwangsan-myeon, Namri-ri, 13 vi 2010, SH Lee; 1♂, Hawsun-gun, Dong-myeon, Jangdong-ri, 3 viii 2009, SH Lee.

**DISTRIBUTION:** Korea, China (Fujian, Guangdong, Guizhou, Guangxi, Hebei, Jiangsu, Liaoning), Japan, Russia (Far East).

**REGION:** Palaearctic.

**KOREA:** GW, GB, GG, JJ, JN (Lee, 2016: Fig. 2.8B).

**KOREAN RECORDS:** *Dineutus (Spinodineutes) orientalis*: Mazzoldi, 1995: 160; 2003: 26; Lee and Ahn, 2015: 89. *Dineutus orientalis*: Kamiya, 1936: 16; 1940: 130; Mochizuki and Tsunekawa, 1937: 78; Mochizuki and Matsui, 1939: 56; Cho, 1957: 201; 1963: 46; 1969: 191; Kim and Nam, 1982: 25; Lee et al., 1985: 402; Kwon and Suh, 1986: 98; Yoon, 1988: 617; Lee et al., 1992: 55; Kim et al., 1994: 134; Lee, 1994: 15; Hua, 2002: 41; Han et al., 2007: 271; Han et al., 2008: 261; Park et al., 2008: 248; Cho and Park, 2010: 95. *Dineutus marinatus*: Okamoto, 1924: 167; Takizawa, 1931: 15; Yoshino, 1935: 16; Kusanagi, 1936: 323 [synonym of *D. orientalis*].

## Genus *Gyrinus* Geoffroy, 1762

### Genus *Gyrinus* Geoffroy, 1762

*Gyrinus* Geoffroy, 1762: 193. Type species: *Dytiscus natator* Linneaus, 1758.

**DIAGNOSIS:** Head (Lee, 2016: Fig. 2.3A) about 3.0 times as wide as long, microreticulation present. Frons with two rounded depressions. Antennae with 9 antennomeres, 2 with sparse punctures and rugous, 9 with compact short setae on apico-lateral part. Clypealium with long setae on antero-lateral part. Galea with one article. Pronotum with transverse depression on medial parts, lateral parts rugous, anterior margin slightly sinuate, anterior angle acute, posterior margin slightly rounded, posterior angle acute. Elytron (Lee, 2016: Fig. 2.3B) with 11 punctato-striae, compact setae absent, apical margin of elytron rounded, subelytral suture (Lee, 2016: Fig. 2.3C) present. Epipleura reached on lateral part of sternite VII and anterior part of

epipleura rounded. Prosternum (Lee, 2016: Fig. 2.3D) transverse, anterior margin slightly rounded, prosternal process linear-form, gradually broad at posterior part. Metaventricle (Lee, 2016: Fig. 2.3E) elongate, diamond-shaped, flattened; anterior part very acute, lateral parts curved upwardly. Tergite VIII (Lee, 2016: Fig. 2.3F) with compact long setae and posterior margin rounded. Sternites III–VII with weak depression on lateral part. Sternite VII (Lee, 2016: Fig. 2.3G) with long setae on lateral margins. Sternite VIII (Lee, 2016: Fig. 2.3H) with long setae on postero-lateral parts and posterior margin rounded (Lee and Ahn, 2015).

## Subgenus *Gyrinus* Geoffroy, 1762

*Gyrinus* Geoffroy, 1762: 193. Type species: *Dytiscus natator* Linnaeus, 1758.

### Key to the species of subgenus *Gyrinus* in Korea

1. Hypomeron and epipleura yellowish brown to brown; apical part of median lobe more than 3 times as narrow as basal part ..... *G. (G.) pullatus*
- Hypomeron and epipleura dark brown; apical part of median lobe less than 3 times as narrow as basal part ..... 2
2. Medial part of mesoventrite with deep pit and large groove; median lobe slightly shorter than paramere and apical margin rounded ..... *G. (G.) gestroi*
- Medial part of mesoventrite with shallow pit and vertical plicae; median lobe distinctly shorter than paramere and apical margin broadly rounded ..... *G. (G.) japonicus*

## 2. *Gyrinus (Gyrinus) gestroi* Régimbart, 1883 (Pls. 1C, D, 2B)

*Gyrinus gestroi* Régimbart, 1883: 165.

**DESCRIPTION:** Length 4.5–6.0 mm. Body oval, with microreticulation and dorsal part convex.

**Color:** Dorsal surface glossy and black. Ventral surface mostly black, and ventral part of antennomere 2, mouthpart, prosterum, legs, posterior part of sternite VII, sternite VIII yellowish brown to brown, and hypomera, epipleura brown.

**Head:** Clypeus rugous, as wide as labrum. Interorbital area rugose. Maxillary palpomere 4 as long as 1–3 combined. Labial palpomere 3 about 1.5 times as long as 2. Ligula with a row of spines on antero-medial part. Mentum with sparse setae on medial part. Gula with a pit on medial part.

**Thorax:** Pronotum with a rows of punctures on antero-lateral parts. Prosternal process widest anterior

margin and narrowest anterior third. Profemur longer than tibia and a row of setae present on anterior margin. Protarsomere 5 longest, about 2.0 times as long as 4. Protarsal claw as long as tarsomere 4. Elytra widest anterior third. Anterior margin of mesoventrite rounded and posterior margin bifid, with very deep pit and large groove on postero-medial part, with large groove on antero-lateral parts. Mesocoxa separated, two rows of setae present on postero-inner part. Mesotrochanter with few setae on baso-lateral part. Mesotibia with a short spine on postero-lateral part. Metepisternum with a deep pit and oval groove on anterior part. Metatibial inner spine about 3.0 times as long as outer.

*Abdomen:* Sternite II with deep pit and transverse groove on anterior part. Median lobe of aedeagus (Pl. 2B) nearly parallel-sided at middle to apex, slightly shorter than paramere; apical margin rounded; sperm-groove as in Pl. 2B. Paramere (Pl. 2B) broader than median lobe; subapical part widest; apical margin broadly rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Jeju Prov.: 1♂, Bukjeju-gun, Jocheon-eup, Gyora-ri, 10 v 1974; 1♂1♀, same data as former except for, 27 vii 2005, DH Lee, pond; 3♂♂3♀♀, same data as former except for, Seonheul-ri, 11 vi 2005 (1♂, on slide); 1♂, same data as former except for, 28 vii 2005, SH Lee, (1♂, on slide); 2♂♂1♀, same data as former except for, 22 v 2006; 2♂♂2♀♀, same data as former except for, 25 ix 2008; 1♂, same data as former except for, 15 vi 2011 (1♂, on slide); 2♂♂2♀♀, Jeju-si, Ara-dong, Gwaneum-temple, 22 vii 1990, SH Lee; 1♀, same data as former except for, Jeju National University, 11 vii 1985; 1♂, Seguiipo-si, Pyoseon-eup, 10 vii 1985; 1♀, Seogwipo-si, Seoho-dong, 23 vii 1990, SH Lee, pond; 1♂, Seogwipo-si, Seongsan-eup, Ojo-ri, 24 vii 1990.

**DISTRIBUTION:** Korea, Japan.

**REGION:** East Palaearctic.

**KOREA:** JJ (Lee, 2016: Fig. 2.8A).

**KOREAN RECORDS:** *Gyrinus gestroi*: Kwon and Suh, 1986: 98; Lee et al., 1992: 54; Kim et al., 1994: 134; Lee, 1995: 13; Park et al., 2008: 247; Cho and Park, 2010: 95; Lee and Ahn, 2015: 93.

### 3. *Gyrinus (Gyrinus) japonicus* Sharp, 1873 (Pls. 1E, F, 2C)

*Gyrinus japonicus* Sharp, 1873: 55.

*Gyrinus (Gyrinus) japonicus*: Cheo, 1934: 210.

*Gyrinus japonicus francki* Zaitzev, 1953: 355. Synonymized by Mazzoldi, 2003: 27.

**DESCRIPTION:** Length 6.5–8.5 mm. Body oval, with microreticulation and dorsal part convex.

**Color:** Dorsal surface black. Ventral surface mostly black, and mouthpart, prosterum, legs, sternite VIII brown to reddish brown, and hypomera, epipleura dark brown.

*Head:* Clypeus rugous, as wide as labrum. Interorbital area rugose. Maxillary palpomere 4 as long as 1–3 combined. Labial palpomere 3 about 1.5 times as long as 2. Ligula with a row of compact spines on antero-medial part. Mentum with sparse setae on medial part. Gula with a pit on medial part.

*Thorax:* Pronotum with a rows of punctures on antero-lateral parts. Prosternal process widest anterior margin and narrowest anterior third. Profemur longer than tibia and a row of setae present on anterior margin. Protarsomere 5 longest, about 2.0 times as long as 4. Protarsal claw as long as tarsomere 4. Elytra widest anterior third. Anterior margin of mesoventrite acute and posterior margin bifid; with shallow pit and vertical plica on postero-medial part; with shallow plica on antero-lateral parts. Mesocoxa separated, two rows of setae present on postero-inner part. Mesotrochanter with few setae on baso-lateral part. Mesotibia with a short spine on postero-lateral part. Metepisternum with a pit and shallow groove on anterior part. Metatibial inner spine about 3.0 times as long as outer.

*Abdomen:* Sternite II with small pit and transverse plica on anterior part. Median lobe of aedeagus (Pl. 2C) parallel-sided at middle to apex, shorter than paramere, narrowest at middle; apical margin nearly straight; sperm-groove as in Pl. 2C. Paramere (Pl. 2C) widest subapical part; anterior margin slightly acute.

**TYPE MATERIAL:** Syntype, 1♂1♀ (NHM), with labels as follows: “*Gyrinus japonicus* Types D. S. Yokohama. Lewis, Type, Sharp Coll. 1905–313., Japan. G. Lewis.”.

**SPECIMENS EXAMINED:** NORTH KOREA: 6♂♂9♀♀, Pyongyang-city, Arouned Pyongyang-Hotel, Near Daedong-River, 15 vii 2008, Changdo Han; 16♂♂13♀♀, Pyongyang-city, Mt. Daesong-San, 24 vi 2009, Changdo Han; SOUTH KOREA: Chungbuk Prov.: 1♂, Yeongdong-gun, Yongsan-myeon, Sinhang-ri, 9 v 2009, SH Lee, pond; Chungnam Prov.: 1♂, Daejeon-si, Yusong-gu, Gyesan-dong, Sutonggol, 11 vii 1999, KJ Ahn, valley; 8♂♂12♀♀, Gongju-si, Banpo-myeon, Hakbong-ri, Mt. Gyeoryongsan, 25 vii 1992, SH Lee; 2♀♀, Yesan-gun, Deoksan-myeon, Sacheon-ri, Surak-temple, 26 vii 1995, SH Lee; Gangwon Prov.: 7♂♂6♀♀, Samcheok-si, Geundeok-myeon, Hamaengbang-ri, Chodang-reservoir, 7 ix 1990; Gyeongbuk Prov.: 1♀, Daegu-si, Buk-gu, Baekan-dong, 4 vi 1985; 13♂♂12♀♀, Gumi-si, Haepyeong-myeon, Songgok-ri, Dori-temple, 5 viii 1994, SH Lee; 1♀, Gumi-si, Okgye-dong, 18 vi 1990, SH Lee; 1♂, Gunwi-gun, Hyoryeong-myeon, Gogok-ri, 6 vi 2010, SH Lee, pond; 4♂♂6♀♀, Gyeongju-si, Geoncheon-eup, Sinpyeong-ri, 28 v 1993, SH Lee; 1♀, Gyeonju-si, Jinhyeon-dong, Bulguk-temple, 23 vi 1991, SH Lee; 6♂♂6♀♀, Gyeongju-si, Naenam-myeon, Yongjang-ri, Hawgok-pond, 25 iv 1994, SH Lee, pond; 1♀, Kimcheon-si, Buhang-myeon, Daeya-ri, 29 viii 2011, DH Lee, SW Jung, mountain stream; 36♂♂38♀♀, Pohang-si, Bukgu, Jukjang-myeon, Duma-ri, 1 x 1989, SH Lee; 1♂♂2♀♀, Pohang-si, Gigye-myeon, Hwabong-ri, 5 iv 1993, SH Lee, pond; 1♂1♀, Sangju-si, Jungdong-myeon, Osang-ri, 18 vi 1990, SH Lee, pond; 1♂3♀♀, Uljin-gun, Seo-myeon, Wangpi-ri, 23 iv 1994, SH Lee, stream; 1♂, Ulsan-si, Ulju-gun, Samnam-myeon, Gacheon-ri 30 vi 2003, YB Cho, MJ Jeon, DH Lee, mountain stream (1♂, on slide); 8♂♂8♀♀, Yeongdeok-gun, Yeonghae-myeon, Myogok-ri, 6 vi 1994, SH Lee, pond; Gyeonggi Prov.: 1♂1♀, Anseong-si,

10 ix 1977, DW Oh; 1 ♀, Pocheon-si, Byeolnae-myeon, Yongam-ri, Mt. Yongamsan [= Sori-bong], 16 vii 1992, SH Lee; 1 ♀, Seoul-si, Gangbuk-gu, Ui-dong, Sogui-stream, 23 vi 2007, JG Lee, valley; 1 ♂, Yongin-si, Suji-gu, Sinbong-dong, 19 vii 1988, JH Lee; Gyeongnam Prov.: 1 ♂, Busan-si, Seo-gu, Ulmang-dong, 26 iv 2009, SH Lee; 1 ♂, Goseong-gun, Gacheon-myeon, Bukpyeong-ri, 13 viii 1995, SH Lee; 2 ♀ ♀, Euiryeong-gun, Yongdeok-myeon, Imok-ri, Deokam-pond, 18 v 2009, SH Lee, pond; 2 ♂ ♂ 5 ♀ ♀, Geoje-si, Geoje-myeon, Seosang-ri, Geoje-reservoir, 28 vii 2009, SH Lee, reservoir; 2 ♂ ♂, Habcheon-gun, Samga-myeon, Eojeon-ri, 8 v 2009, SH Lee, pond; 1 ♀, Hamyang-gun, Aneui-myeon, Sangwon-ri, Yongchu-temple, 16 vii 1985; 5 ♂ ♂ 2 ♀ ♀, Sacheon-si, Gonmyeong-myeon, Yongsan-ri, Dasol-temple, 14 viii 1995, SH Lee; 1 ♂ 2 ♀ ♀, Sacheon-si, Sanan-myeon, 13 viii 1995, SH Lee; 1 ♂, Sancheong-gun, Sancheong-eup, Jeonggok-ri, Jipum-church, 8 v 2009, SH Lee; Jeju prov.: 1 ♂, Bukjeju-gun, Jocheon-eup, Gyorae-ri, 18 viii 1992; 4 ♂ ♂ 3 ♀ ♀, Jeju-si, Ara-dong, Gwaneum-temple, 22 vii 1990, SH Lee (1 ♂, on slide); 1 ♂, Jeju-si, Hangyeo-nyong-myeon, Yongsu-ri, 17 vii 1992, SH Lee; Jeonbuk Prov.: 20 ♂ ♂ 27 ♀ ♀, Jeongeub-si, Naejaong-dong, Mt. Naejangsan, 4 viii 1990, SH Lee; 2 ♂ ♂ 2 ♀ ♀, Namwon-si, Sandong-myeon, Daesang-ri, Guijeong-temple, 28 vii 2008, DH Lee, pond; 6 ♂ ♂ 6 ♀ ♀, Namwon-si, Sannae-myeon, Ibseok-ri, Silsang-temple, 12 vi 2008, DH Lee, pond (1 ♂, on slide); 1 ♀, Namwon-si, Unbong-eup, Maeyo-ri, 9 v 2009, SH Lee; Jeonnam Prov.: 2 ♂ ♂ 1 ♀, Haenam-gun, Songji-myeon, Geumgang-ri, 27 vii 2010, SH Lee, pond; 1 ♂, Gurye-gun, Gurye-eup, Sinseong-ri, Si-dong, 18 vi 2003, CH Park; 1 ♂, Janseong-gun, Bukha-myeon, Sinseong-ri, Mt. Naejangsan, 2 iv 2010, JC Jeong (1 ♂, on slide).

**DISTRIBUTION:** Korea, China (Northeast Territory), Japan, Russia (Far East).

**REGION:** Eastern Palaearctic.

**KOREA:** PN, GW, GG, CB, CN, JB, JN, GB, GN, JJ (Lee, 2016: Fig. 2.8A).

**KOREAN RECORDS:** *Gyrinus japonicus*: Kolbe, 1886: 179; Takizawa, 1931: 18; Kamiya, 1936: 20; Mochizuki and Tsunekawa, 1937: 78; Mochizuki and Matsui, 1939: 55; Ishii, 1940: 43; Cho, 1957: 201; 1969: 191; Kim and Nam, 1982: 25; Lee et al., 1985: 402; Yoon, 1988: 616; Kim and Lee, 1991: 65; Lee et al., 1992: 54; Park and Kim, 1993: 110; Lee, 1994: 15; Lee, 1995: 13; Mazzoldi, 1995: 158; Nilsson et al., 2001: 29; Hua, 2002: 41; Mazzoldi, 2003: 27; Lee and Ahn, 2015: 95. *Gyrinus japonicus francki*: Kwon and Suh, 1986: 98; Kim et al., 1994: 134; Kim, 1995: 132; Cho and Park, 2010: 95 [synonym of *G. japonicus*].

#### 4. *Gyrinus (Gyrinus) pullatus* Zaitzev, 1908 (Pls. 1G, H, 2D)

*Gyrinus pullatus* Zaitzev, 1908: 244.

**DESCRIPTION:** Length 6.0–7.0 mm. Body oval, with microreticulation and dorsal part convex.

**Color:** Dorsal surface black. Ventral surface mostly reddish brown, and ventral part of antennomere 2, mouthpart, prosterum, legs, hypomera, epipleura, posterior part of sternite VII, VIII yellowish brown to

brown.

*Head:* Clypeus rugous, as wide as labrum. Interorbital area rugose. Maxillary palpomere 4 as long as 1–3 combined. Labial palpomere 3 about 1.5 times as long as 2. Ligula with spine on anterior margin. Mentum with sparse setae on medial part. Gula with a pit on medial part.

*Thorax:* Pronotum with a rows of punctures on antero-lateral parts. Prosternal process widest anterior margin and narrowest anterior third. Profemur longer than tibia and a row of setae present on anterior margin. Protarsomere 5 longest, about 2.0 times as long as 4. Protarsal claw as long as tarsomere 4. Elytra widest anterior third. Anterior margin of mesoventrite rounded and posterior margin bifid; with deep pit and vertical groove on postero-medial part; with deep groove on antero-lateral parts. Mesocoxa separated, two rows of setae present on postero-inner part. Mesotrochanter with few setae on baso-lateral part. Mesotibia with a short spine on postero-lateral part. Epipleura reached on lateral part of sternite VII. Metepisternum with a deep pit on anterior part. Metatibial inner spine about 3.0 times as long as outer.

*Abdomen:* Sternite II with pit and transverse, thick plica on anterior part. Median lobe of aedeagus (Pl. 2D) narrowed apically, shorter than paramere; narrowest at anterior fifth; apical margin nearly straight; sperm-groove as in Pl. 2D. Paramere (Pl. 2D) widest subapical part; apical margin slightly acute.

**SPECIMENS EXAMINED:** SOUTH KOREA: Gyeongbuk Prov.: 1♂, Gyeongju-si, Jinhyeon-dong, Bulguk-temple, 23 vi 1991, SH Lee; 1♂, Gyeongju-si, Naenam-myeon, Hwagok-ri, 25 iv 1993, SH Lee, pond; 1♂ 1♀, Pohang-si, Nam-gu, Yeonil-eup, 22 vi 1992, SH Lee; 1♀, Uljin-gun, Wonnam-myeon, Maehwa-ri, Maehwa-stream, 10 vi 1995, SH Lee; 1♀, Yeongdeok-gun, Changsu-myeon, Changsu-ri, 5 vi 1994, SH Lee, pond; 15♂♂15♀♀, Yeongdeok-gun, Yeonghae-myeon, Myogok-ri, 6 vi 1994, SH Lee, pond (1♂, on slide).

**DISTRIBUTION:** Asia: Korea, China (Liaoning, Jilin), Russia (East Siberia, Far East), Europe: Estonia, Finland, Russia (North European Territory), Sweden.

**REGION:** Palaearctic.

**KOREA:** GB (Lee, 2016: Fig. 2.8A).

**KOREAN RECORDS:** *Gyrinus pullatus*: Holmen, 1987: 49; Mazzoldi, 1995: 159; 2003: 28; Nilsson et al., 2001: 31; Hua, 2002: 41; Lee and Ahn, 2015: 98.

## Genus *Orectochilus* Dejean, 1833

### Genus *Orectochilus* Dejean, 1833

*Orectochilus* Dejean, 1833: 59. Type species: *Gyrinus villosus* O.F. Müller, 1776.

**DIAGNOSIS:** Body long oval, microreticulation and pubescence present on most dorsal part. Labrum semi-circular, slightly wider than long and long setae present anterior margin. Antennae with 9 antennomeres.

Pronotum without transverse depression. Scutellar shield (Lee, 2016: Fig. 2.5A) transverse and visible when elytra closed. Elytron (Lee, 2016: Fig. 2.5B) with compact setae. Prosternum (Lee, 2016: Fig. 2.5D) with few setae on anterior part; prosternal process saggitiform, widest anterior three-fourth. Mesoventrite (Lee, 2016: Fig. 2.5E) with setae on anterior margin, vertical plica on postero-medial part; anterior part acute. Metaventricle (Lee, 2016: Fig. 2.5F) cruciform, vertical process present on medial part. Metepisternum (Lee, 2016: Fig. 2.5E) without pit and groove. Metatibia with two spines of equal length. Sternite II without pit, transverse groove present on anterior part. Sternites IV–VI with short setae on medial part. Sternites VII–VIII (Lee, 2016: Fig. 2.5H) with compact long setae on medial parts. Sternite VII with long setae on posterior margin. Sternite VIII (Lee, 2016: Fig. 2.5I) longer than wide, long setae present on medial and lateral parts; apex bifid (Lee and Ahn, 2015).

### Key to the species of Korean *Orectochilus*

1. Body longer than 7.0 mm; apical part of elytron protruded; median lobe of aedeagus longer than paramere ..... *O. regimbari*
- Body shorter than 7.0 mm; apical part of elytron not protruded; median lobe of aedeagus shorter than paramere ..... 2
2. Body black; apical part of elytra acute in dorsal view; paramere curved at middle; apical margin of gonocoxa rounded ..... *O. punctipennis*
- Body brown; apical part of elytra broadly rounded in dorsal view; paramere nearly straight; apical margin of gonocoxa broadly rounded ..... *O. villosus*

## 5. *Orectochilus punctipennis* Sharp, 1884 (Pls. 1I, J, 2F)

*Orectochilus punctipennis* Sharp, 1884: 449.

**DESCRIPTION:** Length 6.5 mm. Body long oval, with microreticulation, pubescence present on most dorsal part.

**Color:** Dorsal and ventral surface mostly black; Antennae, mouthpart, hypomera, epipleura, front leg brown; middle and hind legs, sternite V–VII yellowish brown.

**Head:** Head without pubescence on vertex and postero-lateral part. Frons without groove. Clypeus transverse, narrower than labrum and without pubescence; anterior margin sinuated. Maxillary palpomere 4 longer than 1–3 combined. Labial palpomere 3 broad, longer than 2. Gula with many setae on anterior part.

**Thorax:** Pronotum widest posterior part; anterior angle rectangular; posterior angle rounded. Prosternum with few setae on anterior part. Protrochanter with compact setae on dorsal part. Profemur longer than pro-

tibia and a row of setae on ventral part. Protibia with 2 rows of setae on ventral part. Protarsomere 1 about 2.0 times as long as 2. Protarsal claw as long as protarsomere 1. Elytra widest a half, posterior margin acute in dorsal view. Anterior part of epipleuron acute. Mesoventrie with setae on anterior margin; posterior part slightly rounded. Mesocoxa with vertical plicae on inner part.

*Abdomen*: Median lobe of aedeagus shorter than paramere. Apical margin of gonocoxa (Pl. 2F) rounded.

**TYPE MATERIAL**: Syntype, 1 ♂ (NHM), with labels as follows: “*Orectochillus punctipennis*. Types D. S. Tokio. Japan. Lewis, Type, Japan. G. Lewis., Sharp Coll. 1905–313.”.

**SPECIMENS EXAMINED**: SOUTH KOREA: Gangwon Prov.: 1 ♀, Gangneung-si, Okgyeo-myeon, Jusu-ri, 17 viii 2011, SW Jung.

**DISTRIBUTION**: Korea, Japan, Russia (Far East).

**REGION**: Eastern Palaearctic.

**KOREA**: GW (Lee, 2016: Fig. 2.8B).

**KOREAN RECORDS**: *Orectochilus punctipennis*: Lee and Ahn, 2015: 99.

**REMARKS**: This species can be distinguished from *O. regimbarti* by small size (shorter than 7.5 mm) and median lobe of aedeagus shorter than paramere. It also differs from *O. villosus* by body black, posterior margin of the elytron acute, paramere curved at middle, apical margin of gonocoxa (Pl. 2F) rounded.

## 6. *Orectochilus regimbarti* Sharp, 1884

*Orectochilus regimbarti* Sharp, 1884: 448.

**DISTRIBUTION**: Korea, Japan, Russia (Far East).

**REGION**: Eastern Palaearctic.

**KOREA**: Unknown.

**KOREAN RECORDS**: *Orectochilus regimbarti*: Kwon and Suh, 1986: 99; Kim et al., 1994: 134; Cho and Park, 2010: 95; Lee and Ahn, 2015: 102.

**REMARKS**: This species has been recorded in Korea by Kwon and Suh (1986), Kim et al. (1994) and Cho and Park (2010), only in their checklists without any taxonomic comments. We could not find any Korean specimens and the occurrence of this species in Korea is suspicious. However, its occurrence in Korea is probable because it is known from neighbouring countries [Japan and Russia (Far East)]. Therefore, we cite this species here based on the previous records until we will find clear evidence.

## 7. *Orectochilus villosus* (Müller, 1776) (Pls. 1K, L, 2E)

*Gyrinus villosus* Müller, 1776: 68.

*Gyrinus modeeri* Marsham, 1802: 100. Synonymized by Illiger, 1807: 299.

*Orectochilus villosus*: Dejean, 1883: 59.

**DESCRIPTION:** Length 5.5–6.5 mm. Body long oval, with microreticulation, pubescence present on most dorsal part.

**Color:** Dorsal surface dark brown. Ventral surface mostly brown; ventral part of antennomere 2, mouthpart, hypomera, epipleura, legs yellowish brown.

**Head:** Head without pubescence on postero-lateral margins. Frons without groove. Clypeus transverse, narrower than labrum and without pubescence; anterior margin sinuated. Maxillary palpomere 4 longer than 1–3 combined. Labial palpomere 3 broad, longer than 2. Gula with many setae on anterior part.

**Thorax:** Pronotum widest posterior part and with 4 rows transverse punctures; anterior and posterior angle rectangular. Prosternum with few setae on anterior part. Prothrochanter with compact setae on dorsal part. Profemur longer than protibia and a row of setae on ventral part. Protibia with 2 rows of setae on ventral part. Protarsomere 1 about 2.0 times as long as 2. Protarsal claw slightly shorter than protarsomere 1. Elytra widest a half, posterior margin broadly rounded. Anterior part of epipleuron acute. Mesoventrite with setae on anterior margin; posterior part slightly acute. Mesocoxa without vertical plicae on inner part.

**Abdomen:** Tergite VIII longer than wide, with compact setae; posterior margin rounded. Median lobe of aedeagus (Pl. 2E) slender, shorter than paramere and widest basal part; apical part acute; sperm-groove as in pl. 2E. Paramere (Pl. 2E), nearly straight, with long setae on lateral and apical part, widest basal part; apical part rounded. Apical margin of gonocoxa broadly rounded.

**SPECIMENS EXAMINED:** Gyeonggi Prov.: 1♂<sup>3</sup>♀♀, Namyangju-si, Wabu-eup, Paldang-ri, Paldang-lake, 10 vi 1962, JS Lee (1♂<sup>1</sup>♀, on slide).

**DISTRIBUTION:** Asia: Korea, China (Liaoning), Cyprus, Iran, Iraq, Israel, Japan, Kazakhstan, Russia (East Siberia, Far East, West Siberia), Syria, Turkey, Uzbekistan, Europe: Andora, Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Liechtenstein, Lithuania, Macedonia, Norway, Poland, Portugal, Russia (Central European Territory, North European Territory), Slovakia, Slovenia, Spain, Sweden, Switzerland, The Netherlands, Ukraine, Yugoslavia.

**REGION:** Palaearctic.

**KOREA:** GG (Lee, 2016: Fig. 2.8B).

**KOREAN RECORDS:** *Orectochilus villosus*: Yoon, 1988: 615; Kim et al., 1994: 134; Cho and Park, 2010: 96; Lee and Ahn, 2015: 103.

## Family Haliplidae Kirby, 1837

### Key to the genera of Korean Haliplidae

1. Posterior part of metacoxal plate rounded; maxillary palpomere 3 longer than 4 ..... *Haliplus*
- Posterior part of metacoxal plate acute; maxillary palpomere 3 shorter than 4 ..... *Pelodytes*

## Genus *Haliplus* Latreille, 1802

### Genus *Haliplus* Latreille, 1802

*Haliplus* Latreille, 1802: 77. Type species: *Dytiscus impressus* Fabricius, 1787.

*Haliaplus* Ádám, 1993: 80. Type species: *Dytiscus laminatus* Schaller, 1783.

**DIAGNOSIS:** Pronotum without two black spot. Prosternal process (Lee, 2016: Fig. 3.4A) without plica on postero-lateral part. Metaventral process (Lee, 2016: Fig. 3.5A) without suture. Metacoxal plate (Lee, 2016: Fig. 3.2F) reached on sternite IV. Sternite VII (Lee, 2016: Fig. 3.6A) with many setose punctures (Lee et al., 2016).

### Key to the subgenera of Korean *Haliplus*

1. Body shorter than 3.0 mm; pronotum with basal plica ..... *Haliplus*
- Body longer than 3.0 mm; pronotum without basal plica ..... *Liaphlus*

## Subgenus *Haliplus* Latreille, 1802

### 8. *Haliplus (Haliplus) simplex* Clark, 1863 (Pls. 3A, B, 5A, 6A)

*Haliplus simplex* Clark, 1863: 419.

*Haliplus medvedevi* Gramma, 1980: 294.

*Haliplus minutus* Takizawa, 1931: 45.

**DESCRIPTION:** Length 2.6–3.5 mm. Body fusiform, convex, pronotum and elytra discontinuous.

**Color:** Head mostly orange color, black spot present on posterior margin. Pronotum yellow to orange with

black punctures. Elytra yellow to orange with rows of punctures, sparse marking and vertical band black. Ventral surface mostly orange to reddish brown.

*Head:* Head with punctures; posterior punctures larger than others; posterior part protruded. Labrum with micropunctures, anterior margin sinuated. Clypeus transverse and anterior margin straight. Frontoclypeal suture indistinct. Vertex without puncture. Gula with few setae on antero-lateral parts. Gena with two vertical furrows. Mandible with sparse setae on apico-lateral part, asymmetrical, pointed apical part; light with a small mesal teeth; left without it. Maxillary palpomere 3 longest, about 2.0 times as long as 2; 4 slender and shortest. Galea narrowest sub-apical part. Basistipes with a long seta on lateral part. Labial palpomere 2 longest, about 1.5 times as long as 1, wide apical part; 3 slender and shortest. Mentum with 2 long setae and antero-median margin slightly bifid.

*Thorax:* Pronotum with small punctures, black large puncture absent; narrow plica present on posterior part; antero-lateral part with setae. Lateral margins slightly curved and short setae present. Postero-lateral margins obtuse. Prosternum with setigerous punctures, short setae present on antero-lateral margins. Prosternal process with sparse setae and small spines present on medial part, narrowest at middle; widest at posterior margin. Proepisternum with setigerous punctures. Proepimeron without puncture. Procoxal cavity with compact short spines on basal part, few setigerous punctures on lateral part, one groove on posterior part. Protrochanter with compact short spines on anterior part. Profemur with 2 rows setae, each setae present on antero-dorsal and antero-ventral part, micropunctures present on basal part. Protibia and protarsus with compact micropunctures. Protibia shorter than profemur; two tibial spines present on apical part; anterior spine longer than posterior spine. Protarsomere 1 about 2.0 times as long as 2, 5 longest, about 3.0 times as long as 4. Protarsal claw slightly longer than tarsomere 4, about 5 setae present on baso-ventral part. Elytra widest anterior third, long setae sparsely present on postero-lateral part, posterior margin straight. Epipleura with large setigerous punctures except anterior part. Mesepimeron without setigerous punctures. Mesocoxa with a long seta on ventral part, compact short spines present on basal part. Mesotrochanter without micropuncture. Mesofemur with a row of setae on antero-ventral part, 5 compact setae present on postero-basal part. Mesotibia and mesotarsus with compact micropunctures. Mesotibia as long as mesofemur; tibial spine curved; posterior spine with two rows of short setae on ventral part. Mesotarsomere 1 about 2.0 times as long as 2, 5 longest, about 3.0 times as long as 4. Mesotarsal claw slightly longer than tarsomere 4, about 5 setae present on baso-ventral part. Metaventre with a row of setigerous punctures along transverse suture, vertical groove present on posterior part, impressed on medial part. Metaventral process with sparse setae except posterior part, narrowest anterior margin, widest anterior three-fifth, posterior sides parallel. Metacoxal plate with small and large setigerous punctures, posterior margin nearly straight. Metafemur, metatibia and metatarsus with compact micropunctures. Metafemur as long as metatibia, with a row of long setae on ventral part. Metatibia and metatarsus with micropunctures. Metatibial anterior spine with a row of setae on dorsal part, posterior spine with two rows of setae on ventral part. Metatarsomere 1 as long as 5,

about 1.5 times as long as 2. Metatarsal claw about 2.0 times shorter than tarsomere 4.

*Abdomen:* Sternite IV with puncture on lateral parts and few setae on lateral margins. Sternites V–VI with large setigerous punctures on posterior part and setae present on lateral part. Sternite VII with setigerous punctures, many setae and small punctures present on margin. Median lobe (Pl. 5A) of aedeagus thick, bent, widest anterior half, apical margin rounded. Parameres (Pl. 6A) asymmetrical, left shorter than right; left paramere semi-circular, without setae; right paramere broad, protruded baso-lateral part; digitus absent.

**SPECIMENS EXAMINED:** NORTH KOREA: 1♂, Korea, Sogam, 6 viii 1977, M. Josifou, *Haliplus hummeli* Falk., det. Gueorguiev 1990 (NMW); Pyeongnam Prov.: 1 ex., Korea, Pyongyang City, Mt. Daesong-san, 20 ix 1979, leg. Dr. H. Steinmann et Dr. T. Vásárhelyi, no. 555 (HNHM). SOUTH KOREA: Chungbuk prov.: 2 exx, Cheongju-si, Heungdeok-gu, Hyuam-dong, 7 v 2005, DH Lee, pond (1♀, on slide); 1 ex, same data as former except for, 1 vi 2005; 1 ex, same data as former except for, Gangseo-dong, 17 vi 2005; 3 exx, same data as former except for, Hyuam-dong, 15 x 2005 (1♂, on slide); 1 ex, same data as former except for, 23 x 2005 (1♀, on slide); 1 ex, Danyang-gun, Mapo-eup, Eoegok-ri, 28 vii 1991, SH Lee; 1 ex, Goisan-gun, Iin-pond, 18 viii 1990; 14 exx, Jincheon-gun, Chopyeong-myeon, Hwasan-ri, Chopyeong-reservoir, 31 vii 1994, SH Lee; 33 exx, Okcheon-gun, 8 vii 1991, SH Lee; 5 exx, Yeongdong-gun, Sangchon-myeon, Mulhan-ri, Mulhan-valley, 22 vii 1995, SH Lee; Chungnam prov.: 1 ex, Buyeo-gun, Gyuam-myeon, Gyuam-ri, 12 viii 2005, DH Lee, stream; 1 ex, Cheongyang-gun, Mumak-pond, 25 vii 1995, SH Lee; 3 exx, Daejeon-si, Yuseong-gu, Juk-dong, 28 v 2005, DH Lee, pool; 3 exx, same data as former except for, 15 iv 2006, pond; 1 ex, same data as former except for, 7 v 2006, springfed pool; 17 exx, Yesan-gun, Sinam-myeon, Byeol-ri, Sabgyocheon, 26 vii 1995, SH Lee; Gangwon prov.: 2 exx, Chuncheon-si, Chiljin-dong, 5 viii 1988; 3 exx, Chuncheon-si, Baengrimsuryeonwon, 22 vii 1992, SH Lee; 1 ex, Hoingseong-gun, Hoingseong-eup, Gaejeon-ri, 29 vii 1991, SH Lee; 4 exx, Hongcheon-gun, 2003, JG Kim; 5 exx, Hongcheon-gun, Hwachon-myeon, Gulbun-ri, 29 vii 1991, SH Lee; 1 ex, Inje-gun, Nam-myeon, Namjeon-ri, 1 viii 1991, SH Lee; 2 exx, Myeongju-gun [= Gangneung-si], Hasi-dong, 4 viii 1988; 3 exx, Wonsoeng-gun [= Wonju-si], Haenggu-dong, Dongmak-pond, 3 viii 1988; 8 exx, Yanggu-gun, Yanggu-eup, Dongsu-ri, 1 viii 1991, SH Lee; 1 ex, same data as former except for, Dong-myeon, Wolun-ri, Wolun-reservoir, 26 vii 2009; Gyeongbuk Prov.: 3 exx, Bonghwa-gun, Bonghwa-eup, Yugok-ri, Cheonma-pond, 2 viii 1988; 1 ex, Yeongpung-gun [= Yeongju-si], Munsu-myeon, 2 viii 1988; Gyeonggi-Prov.: 4 exx, Pocheon-si, Idong-myeon, Jangam-ri, Idong-bridge, 18 vii 1992, SH Lee; Gyeongnam Prov.: 4 exx, Ulsan-si, Ulju-gun, Eonyang-ri, Sinheung-village, 2 x 1988; Jeju prov.: 7 exx, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 12 vi 2005, DH Lee, pond (1♀, on slide); 2 exx, same data as former except for, 27 vii 2005, LH Lee; 1 ex, same data as former except for, 26 ix 2008, DH Lee, pond; 2 exx, same data as former except for, Dongbaekro, 15 vi 2011 (1♂1♀, on slides); 8 exx, Jeju-si, Jorimisae-pond, 2 viii 2008, SH Lee; 23 exx, Jeju-si, Hanrim-eup, Opo [= Ongpo-ri], 24 vii 1990, SH Lee; 3 exx, Namjeju-gun [= Seogwipo-si], Seongsan-eup, Siheung-ri, 27 vii 1990, SH Lee.

**DISTRIBUTION:** Korea, China (Anhui, Beijing, Guangdong, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, Zhejiang), Japan, Russia (Far East).

**REGION:** Palaearctic.

**KOREA:** PN, CB, CN, GW, GG, GB, GN, JJ (Lee, 2016: Fig. 3.9B).

**KOREAN RECORDS:** *Haliphus simplex*: Clark, 1863: 419; Cho, 1957: 198; 1969: 167; Yoon, 1988: 621; Vondel, 1998: 135; Vondel, 2003: 31; Park et al., 2008: 203; Cho and Park, 2010: 94; Lee et al., 2015: 124. *Haliphus (Liaphlus) simplex*: Kwon and Suh, 1986: 92; Kim et al., 1994: 132.

## Subgenus *Liaphlus* Guignot, 1928

### Key to the species of subgenus *Liaphlus* in Korea

1. Elytra without black marking ..... *H. (L.) eximius*  
– Elytra with black marking ..... 2
2. Metaventral process widest at posterior margin ..... *H. (L.) sharpi*  
– Metaventral process widest at middle ..... 3
3. Prosternal process widest at anterior margin ..... *H. (L.) disruptus*  
– Prosternal process widest at posterior margin ..... 4
4. Anterior part of elytra with transverse marking ..... *H. (L.) basinotatus*  
– Anterior part of elytra without transverse marking ..... *H. (L.) chinensis*

### 9. *Haliphus (Liaphlus) basinotatus* Zimmermann, 1924 (Pls. 3C, D, 5B, 6B)

*Haliphus basinotatus* Zimmermann, 1924: 137.

**DESCRIPTION:** Length 3.6–4.0 mm. Body fusiform, convex, pronotum and elytra discontinuous.

**Color:** Head mostly orange color, black spot present on posterior margin. Pronotum yellow to orange with black setigerous punctures. Elytra yellow to orange with rows of punctures, sparse marking, transverse black band on anterior part and vertical narrow band along the elytral suture black. Ventral surface mostly orange to reddish brown.

**Head:** Head with setigerous punctures except vertex; posterior punctures larger than others. Labrum with micropunctures, anterior margin sinuated. Clypeus transverse and anterior margin straight. Frontoclypeal suture indistinct. Vertex without puncture. Gula with indistinct micropunctures. Gena with two vertical furrows. Mandible with sparse setae on apico-lateral part, asymmetrical, pointed apical part; light with a small mesal

teeth; left without it. Maxillary palpomere 3 longest, about 3.0 times as long as 2; 4 slender and shortest. Galea narrowest sub-apical part. Basistipes with a long seta on lateral part. Labial palpomere 2 longest, about 2.0 times as long as 1; 3 slender and shortest. Mentum with 2 long setae on median part and short setae on posterior part, antero-medial margin bifid.

*Thorax:* Pronotum with various setigerous punctures; posterior punctures larger than others. Antero-lateral part with long setae. Lateral margins slightly curved and short setae present. Postero-lateral margins obtuse. Prosternum with setigerous punctures, short setae present on antero-lateral margins. Prosternal process with more or less sparse setigerous punctures, narrowest anterior two-fifth; widest posterior margin. Proepisternum with setigerous punctures. Proepimeron without puncture. Procoxal cavity with pubescence on basal part, few setigerous punctures on lateral part, one groove on posterior part. Protrochanter with micropunctures on anterior part. Profemur with 2 rows setae, each setae present on antero-dorsal and antero-ventral part. Protibia and protarsus with compact micropunctures. Protibia shorter than profemur; two tibial spines present on apical part; anterior spine longer than posterior spine. Protarsomere 1 about 2.0 times as long as 2, 5 longest, about 2.5 times as long as 4. Protarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ventral part. Elytra widest anterior third, long setae sparsely present on postero-lateral part, posterior margin straight. Epipleura with large setigerous punctures except anterior part. Mesepimeron without punctures. Mesocoxa with sparse punctures, pubescence present on basal part. Mesotrochanter without micropuncture. Mesofemur with a row of setae on antero-ventral part, 5 compact setae present on postero-basal part. Mesotibia and mesotarsus with compact micropunctures. Mesotibia as long as mesofemur; tibial spine curved; posterior spine with a row of setae on ventral part. Mesotarsomere 1 about 2.0 times as long as 2, 5 longest, about 2.5 times as long as 4. Mesotarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ventral part. Metaventrite with a row of punctures along transverse suture, vertical groove present on posterior part. Metaventral process with sparse setae, narrowest anterior margin; widest at middle. Metacoxal plate with small and large setigerous punctures, posterior margin rounded. Metafemur, metatibia and metatarsus with compact micropunctures. Metafemur as long as metatibia, with a row of setae on apical fifth. Metatibia and metatarsus with micropunctures. Metatibial anterior spine with a row of setae on dorsal part, posterior spine with two rows of setae on ventral part. Metatarsomere 1 as long as 5, about 1.5 times as long as 2. Metatarsal claw about 2.0 times shorter than tarsomere 4.

*Abdomen:* Sternite IV with puncture on lateral parts. Sternites V–VI with large setigerous punctures on posterior part and small punctures and setae present on margin. Sternite VII with setigerous punctures except anterior part, many setae present on margin. Median lobe (Pl. 5B) of aedeagus slender, slightly bent, larger than parameres, rounded on apical part. Parameres (Pl. 6B) asymmetrical, left shorter than right; left broad and dense setae present on median and sub-apical part; right slender, slightly curved and sparse setae present on medial part; digitus with dense setae on apical part.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 2 exx, Cheongju-si, Heungdeok-gu, Gangseo-

dong, 25 iv 2005, DH Lee, pond (2♀♀, on slides); 1 ex, same data as former except for, Hyuam-dong, 5 v 2006 (1♀, on slide); 13 exx, Okcheon-gun, 8 vii 1991, SH Lee; 1 ex, Yeongdong-gun, Sangchon-yeon, Mulhan-ri, Mulhan-valley, 22 vii 1995, SH Lee; 1 ex, Yeongdong-gun, Hwangan-myeon, Sintan-ri, 9 v 2009, SH Lee; Chungnam Prov.: 1 ex, Cheongyang-gun, Mumak-pond, 25 vii 1995, SH Lee; 1 ex, Daejeon-si, Yu-seong-gu, Juk-dong, 28 x 2005, DH Lee, pool; Gangwon Prov.: 1 ex, Cheorwon-gun, Kimhwa-eup, Wasuri, Namdae-cheon, 9 ix 2008, DH Lee, beside stream; 1 ex, Hongcheon-gun, Nam-myeon, myeongdong-ri, 14 v 2003, TH Kang; Gyeongbuk Prov.: 3 exx, Bonghwa-gun, Bonghwa-eup, Yugok-ri, Cheonma-pond, 2 viii 1988; 1 ex, Gimcheon-si, Daehang-myeon, Unsu-ri, Jikji-pond, 1 ix 2004, SH Lee; 1 ex, Seongju-gun, Seongju-eup, Daehwang-ri, Makgol-pond, 3 viii 1991, SH Lee; Gyeonggi Prov.: 1 ex, Yangpyeong-gun, Danwol-myeon, Deoksu-ri, Baekdong, 14 v 2003, CH Park; Jeonbuk Prov.: 1 ex, Buan-gun, Byeonsan-myeon, Docheong-ri, 13 v 2004, CH Park, ex pond.

**DISTRIBUTION:** Korea, China (Heilongjiang, Jilin, Liaoning, Nei Mongol), Japan, Mongolia, Russia (Far East).

**REGION:** East Palaearctic.

**KOREA:** CB, CN, GW, GG, GB, JB (Lee, 2016: Fig. 3.9A).

**KOREAN RECORDS:** *Haliphus (Liaphlus) basinotatus basinotatus*: Vondel, 2003: 31. *Haliphus (Liaphlus) basinotatus*: Vondel, 1991: 87; 1995: 119; Kim et al., 1994: 132. *Haliphus basinotatus*: Park et al., 2008: 200; Cho and Park, 2010: 94; Lee et al., 2015: 125.

## 10. *Haliphus (Liaphlus) chinensis* Falkenström, 1932 (Pls. 3E, F, 5C, 6C)

*Haliphus chinensis* Falkenström, 1932: 191.

**DESCRIPTION:** Length 3.8–4.0 mm. Body oval, acute apically, convex, pronotum and elytra discontinuous.

**Color:** Head mostly orange color, black spot present on posterior margin. Pronotum yellow to orange with black punctures. Elytra yellow to orange with rows of punctures, sparse marking and vertical band along the elytral suture black. Ventral surface mostly orange to reddish brown.

**Head:** Head with setigerous punctures except vertex; posterior punctures larger than others. Labrum with micropunctures, anterior margin sinuated. Clypeus transverse and anterior margin straight. Frontoclypeal suture indistinct. Vertex without puncture. Gula with indistinct micropunctures. Gena with two vertical furrows. Mandible with sparse setae on apico-lateral part, asymmetrical, pointed apical part; light with a small mesal teeth; left without it. Maxillary palpomere 3 longest, about 2.0 times as long as 2; 4 slender and shortest. Galea narrowest sub-apical part. Basistipes with a long seta on lateral part. labial palpomere 2 longest, about 2.0 times as long as 1; 3 slender and shortest. Mentum with 2 long setae on medial part, antero-

-medial margin bifid.

*Thorax*: Pronotum with setigerous punctures; posterior punctures larger than others. Antero-lateral part with long setae. Lateral margins slightly curved and short setae present. Postero-lateral margins obtuse. Prosternum with setigerous punctures, short setae present on antero-lateral margins. Prosternal process with more or less compact large setigerous punctures, narrowest anterior half; posterior margin widest. proepisternum with setigerous punctures. Proepimeron without puncture. Procoxal cavity with pubescence on basal part, few setigerous punctures on lateral part. Protrochanter with micropunctures on anterior part. Profemur with 2 rows setae, each setae present on antero-dorsal and antero-ventral part. Protibia and protarsus with compact micropunctures. Protibia shorter than profemur; two tibial spines present on apical part; anterior spine longer than posterior spine. Protarsomere 1 about 2.0 times as long as 2, 5 longest, about 2.5 times as long as 4. Protarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ventral part. Elytra widest anterior third, long setae sparsely present on postero-lateral part, posterior margin straight. Epipleura with large setigerous punctures anterior part and medial part. Mesepimeron without punctures. Mesocoxa with many setigerous punctures, pubescence present on basal part. Mesotrochanter without micropuncture. Mesofemur with a row of setae on antero-ventral part, 5 compact setae present on postero-basal part. Mesotibia and mesotarsus with compact micropunctures. Mesotibia as long as mesofemur; tibial spine curved; posterior spine with two rows of setae on baso-ventral part. Mesotarsomere 1 about 2.0 times as long as 2, 5 longest, about 2.5 times as long as 4. Mesotarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ventral part. Metaventrite with a row of punctures along transverse suture, vertical groove present on posterior part. Metaventral process with sparse setae, narrowest anterior margin, widest anterior half. Metacoxal plate with small and large setigerous punctures, posterior margin rounded. Metafemur, metatibia and metatarsus with compact micropunctures. Metafemur as long as metatibia, with a row of setae on apical two-fifth. Metatibia and metatarsus with micropunctures. Metatibial anterior spine with a row of setae on dorsal part, posterior spine with two rows of setae on ventral part. Metatarsomere 1 as long as 5, about 1.5 times as long as 2. Metatarsal claw about 2.0 times shorter than tarsomere 4.

*Abdomen*: Sternite IV with setigerous puncture on lateral parts. Sternites V–VI with large setigerous punctures on posterior part and setae present on lateral part. Sternite VII with setigerous punctures on medial part and long setae on margin, small setae present on anterior margin. Median lobe (Pl. 5C) of aedeagus more or less slender, bent, longer than parameres, rounded on apical part. Parameres (Pl. 6C) asymmetrical, left shorter than right; left semicircular, long setae present on median and apical part; right long triangular, slightly curved, sparse setae present on median and apical part, digitus with compact setae on apical part.

**SPECIMENS EXAMINED**: SOUTH KOREA: Gyeonggi Prov.: 1 ex, Incheon-si, Namdong-gu, Nonhyeon-dong, Mansu-stream, 6 viii 1988, SH Lee; Jeonbuk Prov.: 2 exx, Buan-gun, Docheong-myeon, Docheongjae-wi-dumbeong, 12 v 2004, CH Park (1♂, on slide).

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Guizhou, Jiangsu, Nei Mongol, Sichuan, Shanghai, Shandong, Shanxi, Xinjiang, Yunnan, Zhejiang).

**REGION:** Palaearctic.

**KOREA:** GG, JB (Lee, 2016: Fig. 3.9A).

**KOREAN RECORDS:** *Haliphus (Liaphlus) chinensis*: Vondel, 1991: 87; 2003: 31; Lee et al., 2015: 126. *Haliphus (Liaphlus) ovalis*: Kwon and Suh, 1986: 92; Kim et al., 1994: 132 [misidentification of *H. chinensis*]. *Haliphus ovalis*: Takizawa, 1931: 141; Kamiya, 1936: 47; Cho, 1957: 198; 1969: 166; Yoon, 1988: 622; Cho and Park, 2010: 94 [misidentification of *H. chinensis*].

## 11. *Haliphus (Liaphlus) diruptus* Balfour-Browne, 1947 (Pls. 3G, H, 5D, 6D)

*Haliphus diruptus* Balfour-Browne, 1947: 436.

**DESCRIPTION:** Length 3.8 mm. Body oval, acute apically, convex, pronotum and elytra discontinuous.

**Color:** Head mostly orange color, black spot present on posterior margin. Pronotum yellow to orange with black punctures. Elytra yellow to orange with rows of punctures, sparse marking of lateral part, transverse band on medial part and vertical narrow band along the elytral suture black. Ventral surface mostly orange to reddish brown.

**Head:** Head with setigerous punctures except vertex; posterior punctures larger than others. Labrum with micropunctures, anterior margin sinuated. Clypeus transverse and anterior margin straight. Frontoclypeal suture indistinct. Vertex without puncture. Gula with indistinct micropunctures. Gena with two vertical furrows. Mandible with sparse setae on apico-lateral part, asymmetrical, pointed apical part; light with a small mesal teeth; left without it. Maxillary palpomere 3 longest, about 2.5 times as long as 2; 4 slender and shortest. Galea narrowest sub-apical part. Basistipes with a long seta on lateral part. Labial palpomere 2 longest, about 2.0 times as long as 1; 3 slender and shortest. Medial part of mentum bifid.

**Thorax:** Pronotum with setigerous punctures; posterior punctures larger than others. Antero-lateral part with long setae. Lateral margins slightly curved and short setae present. Postero-lateral margins obtuse. Prosternum with setigerous punctures, short setae present on antero-lateral margins. Prosternal process with large setigerous punctures, narrowest anterior two-fifth; anterior margin widest; side of posterior part subparallel. Proepisternum with setigerous punctures. Proepimeron without puncture. Procoxal cavity with pubescence on basal part, few setigerous punctures on lateral part. Protrochanter with micropunctures on anterior part. Profemur with 2 rows setae, each setae present on antero-dorsal and antero-ventral part. Protibia and protarsus with compact micropunctures. Protibia shorter than profemur; two tibial spines present on apical part; anterior spine longer than posterior spine. Protarsomere 1 about 1.8 times as long as 2, 5 longest, about 2.0

times as long as 4. Protarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ventral part. Elytra widest anterior third, long setae sparsely present on postero-lateral part, posterior margin straight. Epipleura with large setigerous punctures anterior part and medial part. Mesepimeron without punctures. Mesocoxa with many setigerous punctures, pubescence present on basal part. Mesotrochanter without micropuncture. Mesofemur with a row of setae on antero-ventral part, 5 compact setae present on postero-basal part. Mesotibia and mesotarsus with compact micropunctures. Mesotibia as long as mesofemur; tibial spine curved; posterior spine with two rows of setae on baso-ventral part. Mesotarsomere 1 about 2.0 times as long as 2, 5 longest, about 2.2 times as long as 4. Mesotarsal claw slightly longer than tarsomere 4, about 5 setae present on baso-ventral part. Metaventrete with a row of punctures along transverse suture, vertical groove present on posterior part. Metaventral process with a pit on posterior part, narrowest anterior margin, widest anterior half. Metacoxal plate with small and large setigerous punctures, posterior margin rounded. Metafemur, metatibia and metatarsus with compact micropunctures. Metafemur as long as metatibia, with a row of setae on apical two-fifth. Metatibia and metatarsus with micropunctures. Metatibial anterior spine with a row of setae on dorsal part, posterior spine with two rows of setae on ventral part. Metatarsomere 1 longest, about 1.5 times as long as 2, 5 about 1.2 times as long as 4. Metatarsal claw about 2.0 times shorter than tarsomere 4.

*Abdomen:* Sternite IV with puncture on lateral parts. Sternites V–VI with large setigerous punctures on posterior part and setae present on lateral part. Sternite VII with setigerous punctures except anterior part, many setae present on margin. Median lobe (Pl. 5D) of aedeagus more or less slender, bent, longer than parameres, rounded on apical part. Parameres (Pl. 6D) asymmetrical, left shorter than right; left paramere semicircular, long setae present on median and baso-lateral part; right paramere long triangular, slender, curved; digitus with sparse setae.

**TYPE MATERIAL:** Holotype: 1♂ (NHM), with labels as follows: “Type, China. Tientsin. F. M. Thomson. 1904–229., *Haliplus simplex* Rég.-Zimm., *Haliplus diruptus* nom. Nov. J. Balfour-Browne det., HOLOTYPE, *Haliplus diruptus* Balfour Browne det. B. J. v. Vondel 1990”. Paratype: 1♀ (NHM), with labels as follows: “Cotype, China. Tientsin. July 1902. F. M. Thomson. 1904–229., *Haliplus diruptus* Paratype, J. Balfour-Browne det., PARATYPE, *Haliplus diruptus* Balfour Browne det. B. J. v. Vondel 1990”.

**SPECIMENS EXAMINED:** NORTH KOREA: 1 ex. Korea, 1956, Dr. M. Magyar, Sarivon, vii.11[11 vii 1956], Type, *Haliplus sharpi* var. *homologus* n. var. cf. texte, R. Mouchamps det. 63 (ISNB) [nomen nudum]. SOUTH KOREA: Gangwon Prov.: 1♂, Cheorwon-gun, Dongsong-eup, Igil-ri, Togyo-reservoir, N38°16'15.48" E127°17'20.39" 216 m, 6 x 2008, DH Lee, pond.

**DISTRIBUTION:** Korea, China (Anhui, Beijing, Fujian, Guizhou, Hainan, Heilongjiang, Hong Kong, Hubei, Hunan, Jiangsu, Liaoning, Shaanxi, Shanghai, Shandong, Tianjin, Yunnan), Japan, Russia (Far East), India, Myanmar, Taiwan, Vietnam.

**REGION:** Palearctic and Oriental.

**KOREA:** GW (Lee, 2016: Fig. 3.9B).

**KOREAN RECORDS:** *Haliplus (Liaphlus) diruptus*: Vondel 1991: 95; 1995: 120; 2003: 31; Lee et al., 2015: 128.

## 12. *Haliplus (Liaphlus) eximius* Clark, 1863 (Pls. 4A, B, 5E, 6E)

*Haliplus eximius* Clark, 1863: 418.

*Haliplus modestus* Zimmermann, 1924: 139.

*Haliplus higoensis* Kanô and Kamiya, 1931: 1.

*Haliplus emmerichi* Falkenström, 1936a: 79.

**DESCRIPTION:** Length 3.6–4.0 mm. Body fusiform, convex, pronotum and elytra discontinuous.

**Color:** Head mostly orange color, black spot present on posterior margin. Pronotum yellow to orange with black punctures. Elytra yellow to orange with rows of black punctures, marking absent. Ventral surface mostly orange to reddish brown.

**Head:** Head with setigerous punctures except vertex; posterior punctures larger than others. Labrum with micropunctures, anterior margin sinuated. Clypeus transverse and anterior margin straight. Frontoclypeal suture indistinct. Vertex without puncture. Gula with indistinct micropunctures. Gena with two vertical furrows. Mandible with sparse setae on apico-lateral part, asymmetrical, pointed apical part; light with a small mesal teeth; left without it. Maxillary palpomere 3 longest, about 2.5 times as long as 2; 4 slender and shortest. Galea narrowest sub-apical part. Basistipes with a long seta on lateral part. Labial palpomere 2 longest, about 1.2 times as long as 1; 3 slender and shortest. Medial part of mentum bifid.

**Thorax:** Pronotum with various setigerous punctures; posterior punctures larger than others; antero-lateral part with compact setae. Lateral margins slightly curved and short setae present. Postero-lateral margins obtuse. Prosternum with setigerous punctures, short setae present on antero-lateral margins. Prosternal process with sparse setigerous punctures, narrowest anterior two-fifth; widest anterior four-fifth. Proepisternum with setigerous punctures. Proepimeron without puncture. Procoxal cavity with pubescence on basal part, few setigerous punctures on lateral part, one groove on posterior part. Protochanter with micropunctures on anterior part. Profemur with 2 rows setae, each setae present on antero-dorsal and antero-ventral part, micropunctures present on basal part. Protibia and protarsus with compact micropunctures. Protibia shorter than profemur; two tibial spines present on apical part; anterior spine longer than posterior spine. Protarsomere 1 about 1.8 times as long as 2, 5 longest, about 2.0 times as long as 4. Protarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ventral part. Elytra widest anterior third, long setae sparsely present on postero-lateral part, posterior margin straight. Epipleura with large setigerous punctures except anterior part. Mesepimeron without punctures. Mesocoxa with sparse setigerous punctures, pubescence present

on basal part. Mesotrochanter without micropuncture. Mesofemur with a row of setae on antero-ventral part, 5 compact setae present on postero-basal part. Mesotibia and mesotarsus with compact micropunctures. Mesotibia as long as mesofemur; tibial spine curved; anterior spine with two rows of setae on ventral part. Mesotarsomere 1 about 1.8 times as long as 2, 5 longest, about 2.0 times as long as 4. Mesotarsal claw slightly longer than tarsomere 4, about 5 setae present on baso-ventral part. Metaventrite with a row of punctures along transverse suture, vertical groove present on posterior part. Metaventral process with sparse setigerous punctures, narrowest anterior margin, widest posterior part, posterior sides parallel. Metacoxal plate with small and large setigerous punctures, posterior margin slightly rounded. Metafemur, metatibia and metatarsus with compact micropunctures. Metafemur as long as metatibia, with a row of setae on apical two-fifth. Metatibia and metatarsus with micropunctures. Metatibial anterior spine with a row of setae on dorsal part, posterior spine with two rows of setae on ventral part. Metatarsomere 1 as long as 5, about 1.5 times as long as 2. Metatarsal claw about 2.0 times shorter than tarsomere 4.

*Abdomen*: Sternite IV with puncture on lateral parts. Sternites V–VI with large setigerous punctures on posterior part and setae present on lateral part. Sternite VII with setose punctures except anterior part, many setae present on margin. Median lobe (Pl. 5E) of aedeagus very slender, slightly bent, about 2.0 times as long as right parameres, rounded on apical part. Parameres (Pl. 6E) asymmetrical, left shorter than right; left paramere semi-circular, many short setae present on median and apical part; right paramere slender, slightly curved, digitus with sparse setae.

**TYPE MATERIAL**: Syntype: 1♂ (NHM), with labels as follows: “Type, China 2059., *Haliplus eximius* Clark China., *Haliplus eximius* Clark det. B. J. v. Vondel 1990”

**SPECIMENS EXAMINED**: NORTH KOREA: 1 ex., Korea, 1956, Dr. M. Magyar, Tson-Bon San, vii 1[1 vii 1956], b. Mouchamps det. 63, *Haliplus eximius* Clk. (ISNB). SOUTH KOREA: Gyeongbuk Prov.: 1 ex, Gimcheon-si, Nam-myeon, Obong-ri, 9 x 2005, SH Lee; Jeju Prov.: 3 exx, Bukjeju-gun, Jocheon-eup, Seon-heul-ri, 12 vi 2005, DH Lee, pond (1♂, on slide); 6 exx, same data as former except for, 26 ix 2008 (2♂♂, on slides); 5 exx, Jeju-si, Jorimisae-pond, 2 viii 2008, SH Lee; 3 exx, Namjeju [= Seogwipo-si], Galmaemot, 26 vii 2006, SH Lee.

**DISTRIBUTION**: Korea, China (Beijing, Fujian, Guangdong, Guizhou, Hunan, Jiangsu, Liaoning, Sichuan, Shanghai, Xinjiang, Zhejiang), Japan, Indonesia, Vietnam.

**REGION**: Palaearctic and Oriental.

**KOREA**: GB, JJ (Lee, 2016: Fig. 3.9B).

**KOREAN RECORDS**: *Haliplus (Liaphlus) eximius*: Kwon and Suh, 1986: 92; Vondel, 1991: 97; 1995: 121; 2003: 31; Kim et al., 1994: 132; Lee et al., 2015: 129. *Haliplus eximius*: Clark, 1863: 418; Régimbart, 1899: 190; Takizawa, 1931: 140; Kamiya, 1936: 42; Cho, 1957: 197; 1969: 166; Yoon, 1988: 623; Lee, 1994: 15; Hua, 2002: 34; Park et al., 2008: 201; Cho and Park, 2010: 94.

### 13. *Haliplus (Liaphlus) sharpi* Wehncke, 1880 (Pls. 4C, D, 5F, 6F)

*Haliplus sharpi* Wehncke, 1880: 74.

*Haliplus tsukushensis* Yoshimura, 1932: 102.

*Haliplus amrishi* Makhan, 1999: 272.

**DESCRIPTION:** Length 3.6–4.0 mm. Body fusiform, convex, pronotum and elytra discontinuous.

**Color:** Head mostly orange color, black spot present on posterior margin. Pronotum yellow to orange with black punctures. Elytra yellow to orange with rows of punctures, sparse marking of lateral part, transverse black band on anterior part and vertical broad band along the elytral suture black. Ventral surface mostly orange to reddish brown.

**Head:** Head with setigerous punctures except vertex; posterior punctures larger than others. Labrum with micropunctures, anterior margin sinuated. Clypeus transverse and anterior margin straight. Frontoclypeal suture indistinct. Vertex without puncture. Gula with indistinct micropunctures. Gena with two vertical furrows. Mandible with sparse setae on apico-lateral part, asymmetrical, pointed apical part; light with a small mesal teeth; left without it. Maxillary palpomere 3 longest, about 2.5 times as long as 2; 4 slender and shortest. Galea narrowest sub-apical part. Basistipes with a long seta on lateral part. Labial palpomere 2 longest, about 2.0 times as long as 1; 3 slender and shortest. Mentum with 2 long setae on medial part and short setae on posterior part, antero-medial margin bifid.

**Thorax:** Pronotum with various setigerous punctures; posterior setigerous punctures larger than others. Antero-lateral part with long setae. Lateral margins slightly curved and short setae present. Postero-lateral margins obtuse. Prosternum with setigerous punctures, short setae present on antero-lateral margins. Proster-nal process with setae, narrowest anterior half; posterior sides nearly parallel. Proepisternum with setigerous punctures. Proepimeron without puncture. Procoxal cavity with pubescence on basal part, few setigerous punctures on lateral part, one groove on posterior part. Protochanter with micropunctures on anterior part. Profemur with 2 rows setae, each setae present on antero-dorsal and antero-ventral part. Protibia and protar-sus with compact micropunctures. Protibia shorter than profemur; two tibial spines present on apical part; anterior spine longer than posterior spine. Protarsomere 1 about 1.5 times as long as 2, 5 longest, about 2.3 times as long as 4. Protarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ven-tral part. Elytra widest anterior third, long setae sparsely present on postero-lateral part, posterior margin straight. Epipleura with large setigerous punctures except anterior part. Mesepimeron without punctures. Me-socoxa with sparse setigerous punctures, pubescence present on basal part. Mesotrochanter without micro-puncture. Mesofemur with a row of setae on antero-ventral part, 5 compact setae present on postero-basal part. Mesotibia and mesotarsus with compact micropunctures. Mesotibia as long as mesofemur; tibial spine curved; anterior spine with two rows of setae on baso-ventral part. Mesotarsomere 1 about 1.5 times as long

as 2, 5 longest, about 2.3 times as long as 4.. Mesotarsal claw more or less longer than tarsomere 4, about 5 setae present on baso-ventral part. Metaventrite with a row of punctures along transverse suture, vertical groove present on posterior part. Metaventral process with sparse setae, narrowest anterior margin, widest posterior margin. Metacoxal plate with small and large setigerous punctures, posterior margin slightly rounded. Metafemur, metatibia and metatarsus with compact micropunctures. Metafemur as long as metatibia, with a row of setae on apical two-fifth. Metatibia and metatarsus with micropunctures. Metatibial anterior spine with a row of setae on dorsal part, posterior spine with two rows of setae on ventral part. Metatarsomere 1 as long as 5, about 1.5 times as long as 2. Metatarsal claw about 2.0 times shorter than tarsomere 4.

*Abdomen:* Sternite IV with puncture on lateral parts. Sternites V–VI with large setigerous punctures on posterior part and setae present on lateral part. Sternite VII with setigerous punctures except anterior part, many setae present on margin. Median lobe (Pl. 5F) of aedeagus more or less slender, slightly curved, longer than parameres, rounded on apical part. Parameres (Pl. 6F) asymmetrical, left shorter than right; left triangular, many setae present on median and sub-apical part; right long triangular, slightly curved and sparse setae present on medial part, digitus with compact setae.

**SPECIMENS EXAMINED:** NORTH KOREA: 2♂♂, 1♀, Korea, 1956, Dr. M. Magyar, Sarivon, vii 12, 14, 22 [12–22 vii 1956], R. Mouchamps det. '62, *Haliplus sharpi* When. (ISNB); 1♀, Korea, Prov.: South Pyongan, Pyongyang, room of Hotel Te-dong, No. 302, 30 vii 1975, leg. J. Papp et A. Vojnits, *Haliplus sharpi* Wehncke, Det, Ádám 1981 (CNCI); 4 exx, Korea, Kaebong City, Kaesong, Hotel Janamsan, at light, 30 vii 1982, No. 888, Forró and Ronkay (HNHM); 1 ex., Korea: S, Hwanghae Prov.: Haeju, Mt. Suyong-san, at light, 31 vii 1982, No. 894, Forró and Ronkay (HNHM). SOUTH KOREA: Chungbuk Prov.: 1 ex, Yeongdong-gun, Sangchon-myeon, Mulhan-ri, Mulhan-valley, 22 vii 1995, SH Lee; Chungnam Prov.: 3 exx, Buyeo-gun, Buyeo-eup, Yongjeong-ri, 3 x 2011, SH Lee; 1 ex, Daejeon-si, Yuseon-gu, Wolpyeong-dong, 15 viii 2005, DH Lee, stream; 1 ex, same data as former except for, Juk-dong, 7 v 2006, springfed pool (1♀, on slide); Gangwon Prov.: 1 ex, Inje-gun, Nam-myeon, Namjeon-ri, 1 viii 1991, SH Lee; 1 ex, Pyeongchang-gun, Baesujang, 29 vii 1994, SH Lee; Gyeongbuk Prov.: 1 ex, Pohang-si, Nam-gu, Jigok-dong, 26 iv 1992; 1 ex, Pohang-si, Yeonil-eup, Yugang-ri, 23 viii 1992, SH Lee; Gyeonggi Prov.: 1 ex, Icheon-si, Hobeob-myeon, Dongsan-ri, 13 v 2003, CH Park, ex pond; 1 ex, Suwon-si, National Academy of Agricultural Science, 26 vi 1996, black light trap; 1 ex, Yangpyeong-gun, Jije-myeon, Sugok-ri, 2003, JG Kim (1♂, on slide); 1 ex, Yongin-si, Geunsam-myeon, Duchang-ri, 2003, JK Kim.

**DISTRIBUTION:** Korea, China (Anhui, Fujian, Chongqing, Guizhou, Liaoning, Sichuan, Shanghai, Yunnan), Japan, Taiwan.

**REGION:** East Palaearctic.

**KOREA:** PN, HB, HN, CB, CN, GW, GG, GB (Lee, 2016: Fig. 3.9A).

**KOREAN RECORDS:** *Haliplus* (*Liaphlus*) *sharpi*: Kwon and Suh, 1986: 92; Vondel, 1991: 129; Kim et al.,

1994: 132; Vondel, 1995: 123; 1998: 135; 2003: 32; Lee et al., 2015: 129. *Haliphus sharpi*: Takizawa, 1931: 142; Cho, 1957: 198; Lee, 1994: 15; Hua, 2002: 34; Park et al., 2008: 202; Cho and Park, 2010: 94. *Haliphus simplex*: Kamiya, 1936: 48; 1940: 114 [misidentification of *H. sharpi*].

## Genus *Peltodytes* Régimbart, 1879

### Genus *Peltodytes* Régimbart, 1879

*Peltodytes* Régimbart 1879: 450. Type species: *Dytiscus caesus* Duftschmid, 1805.

**DIAGNOSIS:** Pronotum with two black spots on postero-medial part. Prosternal process (Lee, 2016: Fig. 3.4F) with grooves on postero-lateral part. Metaventral process (Lee, 2016: Fig. 3.5F) with suture on antero-lateral part. Metacoxal plate (Lee, 2016: Fig. 3.3B) reached on sternite VII. Sternite VII (Lee, 2016: Fig. 3.6F) without punctures (Lee et al., 2015).

### Key to the species of the Korean *Peltodytes*

1. Posterior part of head without two black spots; posterior tooth of metacoxal plate pointed on apical part..... *P. intermedius*
- Posterior part of head with two black spots; posterior tooth of metacoxal plate rounded on apical part..... *P. sinensis*

### 14. *Peltodytes intermedius* (Sharp, 1873) (Pls. 4E, F, 5G, 6G)

*Cnemidotus intermedius* Sharp, 1873: 55.

*Peltodytes intermedius* Régimbart, 1899: 191.

**DESCRIPTION:** Length 3.0–4.0 mm. Body rounded oval, convex, with many setigerous punctures.

**Color:** Head mostly orange color. Pronotum yellow with black punctures on lateral and posterior parts. Elytra yellow with 10 rows punctures, sparse markings and subsutural line black. Ventral surface mostly orange to reddish brown.

**Head:** Head rounded with setigerous punctures. Black marking and small setigerous punctures present behind eye; black marking small or indistinct, not reached to margin of eye. Clypeus asymmetrical, right part protruded. Labrum broad, 1.5 times as wide as long, anterior margin of labrum slightly rounded. Mandible asymmetrical, right mandible with a long tooth, left mandible with two rounded teeth. Maxillary palpomere 4

longest, about 1.5 times as long as 3, acute apical part, many setigerous punctures present. Galea slender and acute apical part. Basistipes with a long seta on lateral part. Labial palpomere 1 longest, 2 shortest and wider than long, 3 acute apical part and many setigerous punctures present. Mentum more or less acute anterior margin and 2 setae present on medial part.

*Thorax:* Pronotum pentagonal and punctures present. Large black punctures present on lateral and posterior parts. Pronotal anterior and posterior corner acute. Lateral bead distinct. Prosternum without puncture. Prosternal process convex, with sparse setigerous punctures, narrowest anterior half, posterior margin widest and emarginate. Proepisternum with black punctures. Procoxal cavity with small setigerous punctures in medial part. Profemur with setae on margin, many long seta present on apico-lateral part. Protibia as long as profemur. Protibial posterior spine curved, about 2.0 times as long as anterior spine. Protarsomere 1 as long as 5, about 2.0 times as long as 2. Elytra subparallel, widest anterior third, anterior corner obtuse and apical part nearly straight. Epipleuron broad, reached to lateral part of sternite VII, many black punctures present on sub-basal and medial parts. Mesepisternum with black punctures on lateral part. Mesotibial posterior spine curved, about 1.2 times as long as anterior spine. Mesotarsomere 1 as long as 5, about 2.0 times as long as 2. Metaventrite with black punctures on lateral parts and a row of punctures present on posterior part. Metaventral process narrowest anterior margin, widest anterior half, side of posterior part subparallel, deep pit present on posterior part. Metacoxal plate broad with setigerous punctures, protruded tooth present on posterior margin. Apical part of tooth rounded. Metafemur with a row of setae on apical part. Metatibia longer than metafemur. Metatarsomere 1 longest, about 2.0 times as long as 2, 5 about 1.5 times as long as 4.

*Abdomen:* Sternites II–VII without punctures. Sternite VII with 20 setae on lateral and posterior part, acute apical margin. Median lobe (Pl. 5G) of aedeagus tongue-shaped, larger than parameres, rounded on apical part. Parameres (Pl. 6G) asymmetrical, left shorter than right; left triangular, sub-apical part parallel-sided, apical part slightly acute with dense setae; right paramere long, curved, narrowest anterior half, rounded with dense setae on apical part.

**TYPE MATERIAL:** Lectotype: 1 ex (NHM), with labels as follows: “Type, Japan, Japan. Lewis., Sharp Coll 1905–313., *Cnemidotus intermedius* Type D.S., LECTOTYPE designated by B. J. v. Vondel 1990”.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 3 exx, Boeun-gun, Boeun-eup, Jisan-ri, 17 viii 1989; 2 exx, Cheongwon-gun, Munri-myeon, 21 vii 1988, YB Cho; 2 exx, Okcheon-gun, 8 vii 1991, SH Lee; 42 exx, Yeongdong-gun, Haksan-myeon, Bongso-ri, 31 vii 1990, SH Lee; 3 exx, Yeongdong-gun, Sangchon-yeon, Mulhan-ri, Mulhan-valley, 22 vii 1995, SH Lee; 1 ex, Yeongdong-gun, Hwanggan-myeon, Sintan-ri, 9 v 2009, SH Lee; Chungnam Prov.: 7 exx, Daejeon-si, Daedeok-gu, Sintanjin-dong, 21 vii 1988; 1 ex, Geumsan-gun, Jewon-myeon, Cheonnae-ri, 15 iv 2004, DH Lee, JI Yeon, pond; 1 ex, same data as former except for, Daesan-ri, 18 iv 2004, DH Lee, pool (1 ♀, on slide); Gangwon Prov.: 1 ex, Chuncheon-si, Dong-myeon, Gamjeong-ri, Yeonsangol, 23 vii 1992, SH Lee; 15 exx, Hongcheon-gun, Hwachon-myeon,

Gulbun-ri, 29 vii 1991, SH Lee; 14 exx, Yanggu-gun, Yanggu-eup, Dongsu-ri, 1 viii 1991, SH Lee; 2 exx, Yeongwol-gun, Jucheon-myeon, Docheon-ri, E37°16'37.33" N128°14'23.61" 302 m, 21 v 2012, DH Lee, pond (1♂1♀, on slides); Gyeongbuk Prov.: 1 ex, Bonghwa-gun, Bonghwa-eup, Yugok-ri, Cheonma-pond, 2 viii 1988; 1 ex, Gumi-si, Haepyeong-myeon, Songgok-ri, Dori-temple, 5 viii 1994, SH Lee; 1 ex, Gumi-si, Okgye-dong, 18 vi 1990, SH Lee; 2 exx, Gunwi-gun, Hyoryeong-myeon, Jeonggi-ri, Jeonggi-pond, 18 vi 1990, SH Lee; 1 ex, Gyeongju-si, Geoncheon-eup, 6 vi 1991, SH Lee; 3 exx, Uljin-gun, Pogang-pond, 22 viii 1987; 1 ex, Gimcheon-si, Gammun-myeon, Deoknam-ri, Deoknam-pond, 15 ix 2005, SH Lee; 30 exx, Pohang-si, Nam-gu, Jigok-dong, 26 iv 1992, SH Lee; 36 exx, same data as former except for, Yeonil-eup, Yugang-ri, 23 viii 1992; 1 ex, Seongju-gun, Seongju-eup, Daehwang-ri, Makgol-pond, 3 viii 1991, SH Lee; 10 exx, Yeongpung-gun [= Yeongju-si], Munsu-myeon, 2 viii 1988; Gyeonggi Prov.: 3 exx, Gwangju-si, Jungdae-dong, Jungang-reservoir, 20 viii 1989; 2 exx, Gwangneung [= Pocheon-si, Sohol-myeon], Gomun-ji, 17 vii 1988, at light; Gyeongnam Prov.: 5 exx, Geoje-si, Geoje-myeon, Oksan-ri, Oksan-reservoir, 17 vii 2008, SH Lee; 1 ex, Hadong-gun, Bukcheon-myeon, Jikjeon-ri, 11 vi 2010, SH Lee; 1 ex, Sacheon-si, Yonghyeon-myeon, Onjeong-ri, 11 viii 1989; 1 ex, Sancheong-gun, Sancheong-eup, Jeonggok-ri, Jipum-church, 8 v 2009; SH Lee; 1 ex, Sancheong-gun, Sangbiryang-myeon, Gagye-ri, Matgol-pond, 7 vi 2009, SH Lee; 1 ex, Ulsan-si, Ulju-gun, Eonyang-ri, Sinheung-village, 2 x 1988; 3 exx, Ulsan-si, Buk-gu, Jeongja-dong, 22 v 2004, HC Park, stream (1♂1♀, on slides); Jeonbuk Prov.: 1 ex, Imsil-gun, Imsil-eup, Duman-ri, 31 vii 2009, SH Lee; 1 ex, Imsil-gun, Oji-myeon, Eoeun-ri, 14 viii 1989, SH Lee; 21 exx, Namwon-si, Okrim-pond, 15 viii 1989; Jeonnam Prov.: Boseong-gun, Boseong-eup, Boseong-ri, Bugok-reservoir, 16 viii 1995, SH Lee.

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Guangdong, Shanghai, Sichuan, Zhejiang), Japan, Russia (Far East), Taiwan.

**REGION:** Palaearctic.

**KOREA:** CB, CN, GW, GG, GB, GN, JB, JN (Lee, 2016: Fig. 3.9C).

**KOREAN RECORDS:** *Peltodytes intermedius*: Cho, 1957: 197; Kwon and Suh, 1986: 91; Lee et al., 1992: 59; Kim et al., 1994: 132; Lee, 1994: 14; 1995: 11; Vondel, 1995: 124; 2003: 33; Hua, 2002: 34; Park et al., 2008: 204; Cho and Park, 2010: 94; Lee et al., 2015: 131.

## 15. *Peltodytes sinensis* (Hope, 1845) (Pls. 4G, H, 5H, 6H)

*Haliphus sinensis* Hope, 1845: 15.

*Peltodytes sinensis* Régimbart, 1899: 191.

*Haliphus variabilis* Clark, 1863: 417.

*Peltodytes koreanus* Takizawa, 1931: 138.

*Peltodytes aschnae* Makhan, 1999: 269.

**DESCRIPTION:** Length 3.0–4.0 mm. Body rounded oval, convex, with many setigerous punctures.

*Color:* Head mostly orange color but two black spot on vertex. Pronotum yellow with black punctures on lateral and posterior parts. Elytra yellow with 10 rows punctures, sparse markings and subsutural line black. Ventral surface mostly orange to reddish brown.

*Head:* Head rounded with setigerous punctures. Black marking and small setigerous punctures present behind eye; black marking large and nearly reached to margin of eye. Clypeus asymmetrical, right part protruded. Labrum broad, 1.5 times as wide as long, anterior margin of labrum slightly rounded. Mandible asymmetrical, right mandible with a long tooth, left mandible with two rounded teeth. Maxillary palpomere 4 longest, about 1.5 times as long as 3, acute apical part, many setigerous punctures present. Galea slender and acute apical part. Basistipes with a long seta on lateral part. Labial palpomere 1 longest, 2 shortest and wider than long, 3 with many setigerous punctures. Mentum more or less acute anterior margin and 2 setae present on medial part.

*Thorax:* Pronotum pentagonal with setigerous punctures. Large black punctures present on lateral and posterior parts. Pronotal anterior and posterior corner acute. Lateral bead distinct. Prosternum without puncture. Prosternal process with sparse setigerous punctures, narrowest anterior four-seventh, posterior part slightly depressed, posterior margin widest and slightly rounded. Proepisternum with black punctures. Procoxal cavity with small setigerous punctures in medial part. Profemur with setae on margin, many long seta present on apico-lateral part. Protibia as long as profemur. Protibial posterior spine curved, about 2.0 times as long as lower spine. Protarsomere 1 as long as 5, about 2.0 times as long as 2. Elytra subparallel, widest anterior third. Elytral anterior corner obtuse and apical part nearly straight. Epipleuron broad, reached to lateral part of sternite VII, many black punctures present on sub-basal and medial parts. Mesepisternum with black punctures on lateral part. Mesotibial upper spine curved, about 1.2 times as long as lower spine. Mesotarsomere 1 as long as 5, about 2.0 times as long as 2. Metaventral process narrowest anterior margin, widest anterior half, side of posterior part subparallel, pit present on posterior part. Metaventral process narrowest anterior margin, widest anterior half, side of posterior part subparallel, pit present on posterior part. Metacoxal plate broad with setigerous punctures, protruded tooth present on posterior margin. Apical part of tooth rounded. Metafemur with a row of setae on apical part. Metatibia longer than metafemur. Metatarsomere 1 longest, about 2.0 times as long as 2, 5 about 1.5 times as long as 4. Sternites II–VII without punctures.

*Abdomen:* Sternite VII with 24 setae on lateral and posterior part, acute apical margin. Median lobe (Pl. 5H) of aedeagus tongue-shaped, larger than parameres, rounded on apical part. Parameres (Pl. 6H) asymmetrical, left shorter than right; left paramere semicircular, narrowest anterior fifth, apical part protruded and rounded, with dense setae; right paramere long, curved and narrowest anterior half, rounded with dense setae on apical part.

**TYPE MATERIAL:** Lectotype: 1 ex (NHM), with labels as follows: “Type, Penang, 60 15 E.I.C. sinensis. Hope, LECTOTYPE *Haliphys sinensis* Hope des. Vondel 1992”.

**SPECIMENS EXAMINED:** NORTH KOREA: 1 ex., Korea, Pyongyang City, Pyongyang, Moranbang, singled, 8.vii.1982, No. 753, Forró and Ronkay (HNHM); 7 exx., Korea, Kaebong City, Kaesong, Hotel Janamsan, at light, 30 vii 1982, No. 888, Forró and Ronkay (HNHM). SOUTH KOREA: Chungbuk Prov.: 3exx, Cheongwon-gun, 17 viii 1989; 11exx, Cheongju-si, Heungdeok-gu, Gangseo-dong, 25 iv 2005, DH Lee, pond; 2 exx, same data as former except for, Jidong-dong, 2 v 2005; 4 exx, same data as former except for, 3 v 2005; 6 exx, same data as former except for, Gangseo-dong, 4 v 2005; 4 exx, same data as former except for, Hyuam-dong, 7 v 2005; 9 exx, same data as former except for, 15 v 2005; 8 exx, same data as former except for, 1 vi 2005; 5 exx, same data as former except for, 22 vi 2005, pool; 10 exx, same data as former except for, 15 x 2005, pond (1♂: on slide); 2 exx, same data as former except for, Gangseo-dong, Hyanggagol-pond, 22 x 2005 (1♀: on slide); 5 exx, same data as former except for, Hyuamdong, 23 x 2005; 2 exx, same data as former except for, 27 vi 2006, pond; 1 ex, Chungju-si, Jisil-pond, 16 viii 1989; 14 exx, Jincheon-gun, Chopyeong-myeon, Hwasan-ri, Chopyeong-reservoir, 31 vii 1994, SH Lee; Chungnam prov.: 17 exx, Boryeong-si, Jupomyeon, Boryeong-ri, 2 x 2011, SH Lee; 3 exx, Buyeo-gun, Mt. Mansusan, 19 vii 1999, HJ Kim, at light; 6 exx, Buyeo-gun, Gyuam-myeon, Gyuam-ri, 12 viii 2005, DH Lee, stream; 30 exx, Buyeo-gun, Buyeo-eup, Yongjeong-ri, 3 x 2011, SH Lee; 1 ex, Cheonan-si, Choengsu-dong, Choengsu-pond, 14 ix 1990, SH Lee; 17 exx, Cheongyang-gun, Mumak-pond, 25 vii 1995, SH Lee; 2 exx, Gongju-si, Okryong-dong, 15 ix 2005, DH Lee, pond; Gongju-si, Sagok-myeon, Namgye-ri, 22 vii 2008, DH Lee, YH Kim, JH Song, YG Ban, at light near stream; 2 exx, Nonsan-si, Noseo-myeon, 1 viii 1990, SH Lee; 1 ex, Nonsan-si, 25 vii 1995, SH Lee; 4 exx, Seocheon-gun, Maseo-myeon, Deokam-ri, 5 viii 1990, SH Lee; 7 exx, Taean-gun, Neungeon, 27 vii 1995, SH Lee; 18 exx, Yesan-gun, Sinam-myeon, Byeol-ri, Sapyocheon, 26 vii 1995, SH Lee; 14 exx, Yonyang [= Asan-si], Mojong-dong [= Onyang 3-dong], 31 vii 1994, SH Lee; Gangwon Prov.: 1 ex, Hwacheon-gun, Gandong-myeon, Yuchon-ri, 30 vii 1987; 3 exx, Pyeongchang-gun, Baesujang, 29 vii 1994, SH Lee; 1 ex, Sokcho-si, Joyang-dong, 21 v 1990, SH Lee; 8 exx, Wonsoeng-gun [= Wonju-si], Haenggu-dong, Dongmak-pond, 3 viii 1988; Gyeongbuk Prov.: 1 ex, Daegu-si, Kyungpook National University, 9 v 1976; 1 ex, Gimcheon-si, Buhang-myeon, Daeya-ri, 27 iv 2011, DH Lee, SW Jung, ex seepage pond. 1 ex, Gyeongju-si, Naenam-myeon, Yongjang-ri, Hawgok-pond, 25 iv 1994, SH Lee; 1 ex, Gyongsan-si, Yeongnam University, 12 ix 1984, R Pinger; 3 exx, Gyongsan-si, Yeongnam University, 18 iv 1985; 13 exx, Gyongsan-si, Yeongnam University, Bumae-reservoir, 25 vii 1986; 3 exx, same data as former except for, 13 v 1989; 2 exx, Pohang-si, Nam-gu, Daejam-dong, 2 v 1988, SH Lee; 2 exx, same data as former except for, 18 ix 1988, SH Lee; 3 exx, same data as former except for, Buk-gu, Gigyemyeon, Hwabong-ri, 5 iv 1993; 1 ex, Ulsan-si, Buk-gu, Jeongja-dong, 22 v 2004, HC Park, stream; Gyeonggi Prov.: 1 ex, Gwangneung [= Pocheon-si, Sohol-myeon], Neungdae, 7 vii 1992, SH Lee; 48 exx, same data as former except for, 19 vii 1992, at light; 23 exx, Icheon-si, Seolseong-myeon, 19 viii 1988; 3

exx, Pocheon-si, Idong-myeon, Jangam-ri, Idong-bridge, 18 vii 1992, SH Lee; 1 ex, Incheon-si, Ongjin-gun, Baekryeong-myeon, 28 vii 2011, HM Lim, at light; 3 exx, Incheon-si, Ganghwa-gun, Gilsang-myeon, Jangheung-ri, Gilsang-reservoir [= Jangheung-reservoir], 26 v 2012, SH Lee; 3 exx, same data as former except for, Seondu-ri, Giljeong-stream, 27 v 2012; 18 exx, Suwon-si, Paldal-gu, Hwaseo-dong, Seoho-reservoir, 4 ix 1990, SH Lee; 1 ex, Suwon-si, National Academy of Agricultural Science, 26 vi 1996, black light trap; 3 exx, Suwon-si, Gwonseon-gu, Seodun-dong, HA Lee, 14 vii 2003; 12 exx, Yeosu-gun, Heungcheon-myeon, Hyoji-ri, Hyoji-reservoir, SH Lee; Gyeongnam Prov.: 7 exx, Busan-si, Seo-gu, Ulmang-dong, 24 vii 1991, SH Lee; 3 exx, Masan-si [= Changwon-si], Jinyeong, 12 viii 1995, SH Lee; 12 exx, Sacheon-si, Saam-pond, 13 viii 1995, SH Lee; 1 ex, Sancheong-gun, Geumseo-myeon, Maechon-ri, Sinpung-pond, 10 viii 1989, SH Lee; 4 exx, Sancheong-gun, Sancheong-eup, Jeonggok-ri, Jipum-church, 8 v 2009, SH Lee; Jeju prov.: 9 exx, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 12 vi 2005, DH Lee, pond; 2 exx, same data as former except for, 27 vii 2005, LH Lee; 1 ex, same data as former except for, 25 vi 2008, DH Lee, pond (1♀: on slide); 2 exx, same data as former except for, Dongbaekro, 15 vi 2011 (2♂: on slide); 6 exx, Jeju-si, Gujwa-eup, Jongdal-ri, 27 vii 1990, SH Lee; 21 exx, Jeju-si, Hangyeong-myeon, Yongsu-ri, 17 vii 1992, SH Lee; 3 exx, Jeju-si, Hanrim-eup, Opo [= Ongpo-ri], 24 vii 1990, SH Lee; 18 exx, Jeju-si, Jorimisae-pond, 2 viii 2008, SH Lee; 11 exx, Jeju-si, Samdo 2-dong, 23 vii 1990, SH Lee; 4 exx, Namjeju [= Seogwipo-si], Galmaemot, 26 vii 2005, SH Lee; Jeonbuk Prov.: 74 exx, Iksan-si, Hwangdeung-myeon, Hwangdeung-ri, 1 viii 1990, SH Lee; 22 exx, Imsil-gun, Samgyeo-myeon, 14 viii 1989; 10 exx, Gochang-gun, Juksan-pond, 2 viii 2009, SH Lee; 36 exx, Gimje-si, Gunyong-pond, 6 viii 1990, SH Lee; 16 exx, Gunsan-si, Seosu-myeon, Maryong-ri, Maryong-reservoir, 25 iv 2009, SH Lee; 30 exx, Gunsan-si, Miryong-dong, Mije-reservoir, 1 viii 2010, SH Lee; 1 ex, Gunsan-si, Jochon-dong, Goecheok-reservoir, 3 x 2011, SH Lee; 3 exx, Gunsan-si, Seosu-myeon, Chukdong-ri, Boku-reservoir, 3 x 2011, SH Lee; 9 exx, Jeongeub-si, Naejaong-dong, Mt. Naejangsan, 4 viii 1990, SH Lee; 2 exx, Sunchang-gun, Imgye-myeon, Tab-ri, Tabri-reservoir, 1 viii 2009, SH Lee; 15 exx, Wanju-gun, Samrye-eup, Ha-ri, 5 ix 2005, DH Lee, stream; 5 exx, Wanju-gun, Sooryang-myeon, Myeongdeok-ri, Hodong-reservoir, 26 iv 2009, SH Lee; Jeonnam prov.: 6 exx, Boseong-gun, Joseong-myeon, Supung-pond, 12 vi 2012, SH Lee; 4 exx, Gangjin-gun, Gangjin-eup, Imcheon-ri, Imcheon-reservoir, 13 vi 2010, SH Lee; 6 exx, Jangseong-gun, Buki-myeon, Owol-ri, Songsan-reservoir, 1 viii 2009, SH Lee; 1 ex, Muan-gun, Muan-eup, Soengam-ri, 2 viii 1990, SH Lee; 1 ex, Yeongam-gun, Deokjin-myeon, Jangseon-ri, Geumho-reservoir, 22 vii 1988; 6 exx, Yeongam-gun, Sijong-myeon, Taegan-ri, 22 vii 1988; 2 exx, Yeonggwang-gun, Myoryang-myeon, Deokheung-ri, Jangdeung-reservoir, 3 viii 2009, SH Lee.

**DISTRIBUTION:** Korea, China (Anhui, Beijing, Fujian, Chongqing, Guangdong, Guizhou, Guanxi, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Jiangxi, Liaoning, Shaanxi, Shanghai, Shandong, Sichuan, Yunnan, Zhejiang), Japan, Philippines, Taiwan, Vietnam.

**REGION:** Palaearctic and Oriental.

**KOREA:** PN, HB, CB, CN, GW, GG, GB, GN, JB, JN, JJ (Lee, 2016: Fig. 3.9C).

**KOREAN RECORDS:** *Peltodytes sinensis*: Kamiya, 1936: 40; Cho, 1957: 197; 1969: 165; Kwon and Suh, 1986: 91; Yoon, 1988: 620; Lee et al., 1992: 46; Vondel, 1992: 289; 1995: 124; 1998: 136; 2003: 33; Kim et al., 1994: 132; Lee, 1994: 14; Hua, 2002: 34; Han et al., 2007: 271; Han et al., 2008: 204; Park et al., 2008: 206; Cho and Park, 2010: 94; Lee et al., 2015: 131. *Peltodytes koreanus*: Takizawa, 1931: 138; Cho, 1957: 197; Kwon and Suh, 1986: 91; Kim et al., 1994: 132; Han et al., 2007: 271; Cho and Park, 2010: 94 [Synonym of *P. sinensis*]

## Family Noteridae Thomson, 1860

### Key to the genera of Korean Noteridae

1. Metaventral plate and metacoxal process with compact setae; metafemur with fringe of long setae on apical part..... *Canthydrus*
- Metaventral plate and metacoxal process with sparse spines; metafemur without fringe of long setae on apical part..... *Noterus*

## Genus *Canthydrus* Sharp, 1882

### Genus *Canthydrus* Sharp, 1882

*Canthydrus* Sharp, 1882: 269. Type species: *Hydrocanthus guttula* Aubé, 1838.

**DIAGNOSIS:** Lateral bead of pronotum relatively broad. Prosternum (Lee, 2016: Fig. 4.2C) covered with conspicuous and stiff setae. Prosternal process broad. Protibia (Lee, 2016: Fig. 4.2E) with a large and curved spur on apical part. Protarsus attached along side of protibia instead of apically. Anterior metatibial spur (Lee, 2016: Fig. 4.2G) not serrate (Miller, 2009).

## Subgenus *Canthydrus* Sharp, 1882

### 16. *Canthydrus (Canthydrus) politus* (Sharp, 1873) (Pls. 7A, B, 8A)

*Hydroanthus politus* Sharp, 1873: 51.

*Canthydrus politus* Sharp, 1882: 278.

**DESCRIPTION:** Length 2.8–3.1 mm. Body oval, widest at anterior third, with microreticulation.

*Color:* Head and pronotum yellowish brown, elytra black with yellowish four band, ventum mostly reddish brown.

*Head:* Head semicircular, widest across eyes, with small groove around eye. Labrum about 3.0 times as wide as long, anterior margin bisinuate. Eye emarginate at anterior part. Antennomere 1 narrow at middle; 2–4 longer than wide; 5–10 as long as wide; 11 elongate, slightly expanded at middle. Maxillary palpomere 1 longer than wide; 2, 3 as long as wide, with few setae on lateral part; 4 longer than 3, acute apically. Labium protruded at medial part, anterior margin rounded. Labial palpomere 1, 2 as long as wide, expanded apically; 3 longer than 1–2 combined.

*Thorax:* Pronotum widest at posterior corner, with a row of punctures and setae on anterior part, with transverse V-shaped band on posterior part; anterior margin straight; antero-lateral part protruded and acute; lateral margins rounded; posterior margin transverse V-shaped. Prosternum transverse W-shaped, with a row of setae on anterior margin, with tooth-like process on anterior part, with longitudinal ridge on medial part. Prosternal process oval, with compact thick setae, with lateral bead. Procoxal cavity rounded, with compact setae on ventro-lateral part; apical margin transverse V-shaped. Protrochanter triangular, with short spines on ventral part. Profemur slightly longer than tibia, with a fringe of setae on apico-ventral part; deeply emarginate at apical fourth. Protibia broadly rounded dorsally, apical part rounded, with a row of spines on dorso-apical part. Protarsomere 1 expanded apically, widest at middle, as long as 2–5 combined; 2 wider than long, 3 as long as wide; 4 longer than wide; 5 as long as 2–4 combined. Hypomeron with a row of stout spines on lateral margins. Elytra widest at base, with sparse short setae, slightly acute posteriorly. Mesofemur slightly longer than tibia, with a row of setae on outer-ventral part. Mesotibia expanded apically, with a row of spines on anterior margin, two rows of spines on dorsal part, a row of spines on ventral part; mesotibial spines longer than tarsomeres 1–2 combined. Mesotarsomere 1 largest, longer than wide, as long as 2–3 combined; 2 wider than long; 3 and 4 longer than wide; 5 as long as 3–4 combined. Noterid platform subquadrate, slightly expanded apically, with compact setae, with long spines on postero-lateral part, posterior margin reversed V-shaped. Metatrochanter fusiform, with a row of compact short setae. Metafemur as long as tibia, outer ventral margin rounded. Metatibia subparallel sided. Metatibial inner spine as long as tarsomere 1. Metatarsomeres longer than wide; 1 longest, as long as 2–4 combined; 4 shortest, 5 slightly longer than 4.

*Abdomen:* Sternites III–VI with a row of setae on latero-medial part. Sternite VII semicircular, with sparse setae on postero-medial part. Median lobe (Pl. 8A) of aedeagus bent and narrowest at anterior three fourth; widest at anterior a fifth.

**TYPE MATERIAL:** Lectotype: 1 ex (NHM), with labels as follows: “Lectotype, Type, Japan. Lewis., Sharp Coll 1905–313., Type 479 *Hydrocanthus politus*, LECTOTYPE *Canthydrus politus* (Sharp, 1873), des. To-

ledo 2006”

**SPECIMENS EXAMINED:** SOUTH KOREA: Jeju prov.: 9 exx, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 11 vi 2005, DH Lee, pond; 10 exx, same data as former except for, 12 vi 2005 (1♂, on slide); 2 exx, as same date former except, 11 vi 2005; 7 exx, as same date former except, 22 v 2006; 3 exx, as same date former except, 2 iii 2007; 3 exx, as same date former except, Dongbaek-park marsh, 25 ix 2008; 6 exx, Seogwipo-si, Galmae-pond, 26 vii 2005, SH Lee, pond (3♂2♀, on slides).

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Hebei, Hubei, Jiangsu, Liaoning, Sichuan, Shanghai, Shandong), Japan.

**REGION:** East Palaearctic.

**KOREA:** JJ (Lee, 2016: Fig. 4.4).

**KOREAN RECORDS:** *Canthydrus (Canthydrus) politus*: Nilsson, 2011: 16. *Canthydrus politus*: Kwon and Suh, 1986: 92; Lee et al., 1992: 46; Kim et al., 1994: 132; Nilsson, 2003: 33; Toledo, 2003: 80; Park et al., 2008: 209; Cho and Park, 2010: 94.

## Genus *Noterus* Clairville, 1806

### Genus *Noterus* Clairville, 1806

*Noterus* Clairville, 1806: 222. Type species: *Dyticus crassicornis* O.F. Müller, 1776.

**DIAGNOSIS:** Apical sensorial field of labial palp (Lee, 2016: Fig. 4.3C) rounded. Prosternal process (Lee, 2016: Fig. 4.3D) relatively narrow and rounded apically. Metacoxa (Lee, 2016: Fig. 4.3G) without fringe of seate. Anterior metatibial spur (Lee, 2016: Fig. 4.3G) not serrate (Miller, 2009).

### Key to the species of Korean *Noterus*

1. Prosternum without tooth-like process on anterior part; antennomere 6 about 2.0 times as long as 7, 8–10 not expanded laterally in male ..... *N. angustulus*
- Prosternum with tooth-like process on anterior part; antennomere 6 as long as 7, 8–10 expanded laterally in male ..... *N. japonicus*

## 17. *Noterus angustulus* Zaitzev, 1953

*Noterus angustulus* Zaitzev, 1953: 95.

**DISTRIBUTION:** Korea, China (Beijing, Heilongjiang, Jilin), Japan, Russia (Far East).

**REGION:** Eastern Palaearctic.

**KOREAN RECORDS:** *Noterus angustulus*: Kwon and Suh, 1986: 92 (North Korea); Kim et al., 1994: 132; Nilsson, 1995: 40; 2011: 28; Hua, 2002: 34; Toledo, 2003: 76; Cho and Park, 2010: 94.

**REMARKS:** This species has been recorded in Korea by Kwon and Suh (1986), Kim et al. (1994) and Cho and Park (2010), only in their checklists without any taxonomic comments. We could not find any Korean specimen and the occurrence of this species in Korea is suspicious. However, its occurrence in Korea is probable because it is known from neighbouring countries [China, Japan and Russia (Far East)]. Therefore, we cite this species here based on the previous records until we will find clear evidence.

## 18. *Noterus japonicus* Sharp, 1873 (Pls. 7C, D, 8B)

*Noterus japonicus* Sharp, 1873: 52.

**DESCRIPTION:** Length 4.1–5.0 mm. Body oval, widest at middle.

**Color:** Dorsum convex, glossy, yellowish brown, with reticulation and venter flattened mostly reddish brown to brown.

**Head:** Head semicircular, widest across eyes, with small groove around eye. Labrum about 3.0 times as wide as long, anterior margin bisinuate. Eye emarginate at anterior part. Antennomere 1 narrow at middle; 2–4 longer than wide; 5–7 as long as wide; 8–10 expanded apically; 11 semitriangular, elongate, slightly expanded at two third. Maxillary palpomere 1 longer than wide; 2, 3 as long as wide, with few setae on lateral part; 4 longer than 3, acute apically. Labium flattened at medial part, anterior margin broadly rounded. Labial palpomere 1 and 2 as long as wide, expanded apically; 3 longer than 1–2 combined.

**Thorax:** Pronotum widest at posterior corner, with a row of punctures and setae on anterior part, with a row of dots on posterior part; anterior margin straight; antero-lateral part protruded and acute; lateral margins rounded; posterior margin transverse V-shaped. Prosternum transverse W-shaped, with a row of setae on anterior margin, with tooth-like process on anterior part, with longitudinal ridge on medial part. Prosternal process oval, with compact short spines, with lateral bead; apical margin rounded. Procoxal cavity rounded, with compact setae on ventro-lateral part. Protrochanter triangular, with short spines on ventral part. Profemur about 1.5 times as long as tibia, with setae on ventral part, outer-ventral margin bisinuate, at apical fourth deeply emarginate. Protibia broadly rounded dorsally, ventro-medial part emarginate, apical part rounded, with a row of spines on dorso-apical part. Protarsomere 1 expanded apically, widest at middle, as long as 2–5 combined; 2 wider than long, 3 as long as wide; 4 longer than wide; 5 as long as 2–4 combined. Hypomeron without spine. Elytra widest at fourth, with sparse short setae, slightly acute posteriorly. Mesofemur slightly longer than tibia, with a row of setae on outer-ventral part. Mesotibia expanded apically, with a

row of spine on anterior margin, two rows of spines on dorsal part, a row of spines on ventral part; mesotibial spines longer than tarsomeres 1–2 combined. Mesotarsomere 1 largest, longer than wide, as long as 2–3 combined; 2 wider than long; 3 and 4 longer than wide; 5 as long as 3–4 combined. Noterid platform subquadrate, slightly expanded apically, with sparse short spine, posterior margin reversed V-shaped. Metatrochanter fusiform, with a row of compact short setae. Metafemur as long as tibia, outer ventral margin rounded. Metatibia subparallel sided. Metatibial inner spine as long as tarsomere 1. Metatarsomeres longer than wide; 1 longest, as long as 2–4 combined; 4 shortest, 5 slightly longer than 4.

*Abdomen:* Sternites III–VI with few setae on medial part. Sternite VII semicircular, with compact setae on postero-medial part. Median lobe (Pl. 8B) of aedeagus bent at anterior two third; slightly protruded at anterior third; narrowed anterior three fourth.

**TYPE MATERIAL:** Syntype: 1 ex (NHM), with labels as follows: “Type, Japan. Lewis., Sharp Coll 1905–313., Type 525 *Noterus japonicus*, japan.”

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 3♂♂3♀♀, Cheongju-si, Heungdeok-gu, Gangseo-dong, 25 iv 2005, DH Lee, pond (2♂♂1♀, on slides); 3♂♂4♀♀, same data as former except for, Hyuam-dong, 1 vi 2005; 1♂3♀♀, same data as former except for, Gangseo-dong, 17 vi 2005; 10♂♂12♀♀, same data as former except for, 22 ix 2005; 6♂♂2♀♀, same data as former except for, Jidong-dong, 16 x 2005; 2♂♂1♀, same data as former except for, Seochon-dong; 3♂♂5♀♀, Jincheon-gun, Chopyeong-eup, Hwasan-ri, Chopyeong-reservoir, 31 vii 1994, SH Lee, reservoir; 1♂1♀, Okcheon-gun, 8 vii 1991, SH Lee; 2♂♂, Okcheon-gun, Gunbuk-myeon, Sojeong-ri, 9 viii 2009, SH Lee, pond; 4♂♂4♀♀, Yeongdong-gun, Hwanggan-myeon, Sintan-ri, 9 v 2009, SH Lee; Chungnam Prov.: 2♂♂, Cheongyang-gun, 25 vii 1995, SH Lee, pond; 1♂, Cheonan-si, Dongnam-gu, Samryong-dong, Cheongsudong-reservoir, N36°46'38.98" E127°10'30.67" 76 m, 14 ix 1990, SH Lee, reservoir; 1♀, Daejeon-si, Daedeok-gu, Sintanjin-dong, 21 vii 1988, SH Lee; 2♀♀, Daejeon-si, Yuseong-gu, Juk-dong, 18 v 2004, DH Lee, rice field; 2♂♂3♀♀, Yesan-gun, Sinam-myeon, Bobyol-ri, Sabgyocheon, 26 vii 1995, SH Lee; Gangwon Prov.: 1♂1♀, Cheorwon-gun, Dongsong-eup, Odeok-ri, Hakji-reservoir, N38°13'56.69" E127°13'29.68" 190 m, 15 ix 1990, SH Lee, reservoir; 12♂♂7♀♀, Gangneung-si, Unjeong-dong, Gyeongpo-lake, N37°47'49.59" E128°54'15.58" 1 m, SH Lee, lagoon; 2♂♂, Hwacheon-gun, Gandong-myeon, Yuchon-ri, 30 vii 1987; 1♀, Inje-gun, Inje-eup, 31 vii 1991, SH Lee; 1♂, Jeongseon-gun, Imgye-myeon, Bancheon-ri, N37°28'07.08" E128°48'00.81" 458 m, 19 viii 1995, SH Lee, pond; 4♂♂2♀♀, Samcheok-si, Geundeok-myeon, Hamangbang-ri, Chodang-reservoir, 7 ix 1990, SH Lee, reservoir; 6♂♂4♀♀, Sokcho-si, Joyang-dong, 21 v 1990, SH Lee; 3♂♂6♀♀, Pyeongchang-gun, Baesujang, 29 vii 1994, SH Lee, pond; 5♂♂6♀♀, Yanggu-gun, Yanggu-eup, Dongsu-ri, 1 viii 1991, SH Lee; Gyeongbuk Prov.: 1♂, Andong-si, Seonggok-dong, Andong-reservoir, 27 vii 1998, SH Lee; 5♂♂7♀♀, Daegu-si, Dong-gu, Goijeon-dong, Ganam-pond, 10 ix 1988, SH Lee; 2♂♂1♀, Gumi-si, Haepyeong-myeon, Songgok-ri, Mt. Dorisan, 5 viii 1994, SH Lee;

2♂♂3♀♀, Gunwi-gun, Hyoryeong-myeon, Janggi-ri, N36°06'57.80" E128°35'40.40" 181 m, 18 vi 1990, SH Lee, pond; 3♂♂2♀♀, Gyeongju-si, Geoncheon-eup, 28 v 1993, SH Lee; 3♂♂5♀♀, Gyeongsan-si, Gyeyang-dong, Nammae-reservoir, 13 v 1989, SH Lee, reservoir; 4♂♂1♀, Pohang-si, Nam-gu, Jigok-dong, 26 iv 1992, SH Lee; 5♂♂8♀♀, Pohang-si, Nam-gu, Hwanho-dong, 23 vii 1993, SH Lee; 2♀♀, Pohang-si, Nam-gu, Daejam-dong, N36°00'55.79" E129°20'07.38" 38 m, 2 v 1988, SH Lee, pond; 1♂2♀♀, same data as former except for, 18 ix 1988; 1♂, same data as former except for, 18 viii 1991; 7♂♂2♀♀, Ulneung-gun, Buk-myeon, Hyeonpo-ri, 19 v 2011, DH Lee, pond; 1♀, Cheongsong-gun, Cheongsong-eup, N36°26'00.53" E128°03'46.11" 195 m, 11 vii 2010, DH Lee, at light; 1♀, Gimcheon-si, Buhang-myeon, Daeya-ri, 27 iv 2011, DH Lee, SW Jung, seepage pond; 2♂♂4♀♀, Yeongdeok-gun, Yeonghae-myeon, Myogok-ri, Myogok-reservoir, N36°31'15.86" E129°20'36.48" 66 m, 6 vi 1994, SH Lee, reservoir; 1♀, Yeongyang-gun, Yeongyang-eup, Samji-ri, 6 vi 1990, SH Lee; Gyeonggi Prov.: 2♂♂2♀♀, Incheon-si, Namdong-gu, Mansu-dong, 6 viii 1988, SH Lee; 2♂♂5♀♀, Incheon-si, Ganghwa-gun, Hwado-myeon, Nae-ri, 9 ix 2005, DH Lee, rice field (1♂, on slide); 13♂♂7♀♀, same data as former except for, Sagi-ri, Buno-reservoir, N37°35'53.77" E126°27'55.52" 0 m, 26 v 2012, SH Lee, reservoir; 4♀♀, Incheon-si, Ganghwa-gun, Ganghwa-eup, Gukhwa-ri, N37°44'44.40" E126°27'57.69" 68 m, 27 v 2012, SH Lee, pond; 1♀, Suwon-si, 4 xi 1989, SD Lee; 3♂♂1♀, Suwon-si, Paldal-gu, Hwaseo-dong, Seoho-reservoir, N37°16'38.37" E126°59'17.42" 35 m, 4 ix 1990, SH Lee, reservoir; Gyeongnam Prov.: 2♀♀, Changnyeong-gun, Yeongsan-myeon, Seongnae-ri, 22 viii 1987; 2♂♂3♀♀, Changwon-si, Seongsan-gu, Bulmosan-dong, 7 v 2009, SH Lee, pond; 2♀♀, Geoje-si, Geoje-myeon, Oksan-ri, Oksan-pond, N34°52'19.60" E128°35'35.50" 85 m, 17 vii 2008, SH Lee, pond; 4♂♂4♀♀, Gimhae-si, Jineong-eup, 12 viii 1995, SH Lee; 1♂, Hadong-gun, Bukcheon-myeon, Jikjeon-ri, 11 vi 2010, SH Lee, pond; 1♂2♀♀, Haman-gun, Beobsu-myeon, Daesong-ri, Daepyeong-swamp, N35°20'22.14" E128°20'15.08" 19 m, 22 v 1988, SH Lee, swamp; 5♂♂4♀♀, same data as former except for, 27 vi 2006, DH Lee; 3♂♂4♀♀, Haman-gun, Gunbuk-myeon, Yujeon-swamp, 25 v 1988, SH Lee, swamp; 1♂, Hapcheon-gun, Daeyang-myeon, Jeongyang-ri, 1 vi 1990, SH Lee; 2♂♂, Hapcheon-gun, Yaro-myeon, Jeongdae-ri, Myeonggok-reservoir, N35°42'12.74" E128°09'58.88" 113 m, 7 v 2009, SH Lee, reservoir; 1♀, Sacheon-si, 13 viii 1995, SH Lee; 1♀, Ulsan-si, Ulju-gun, Eonyang-eup, Jikdong-ri, 2 x 1988, SH Lee; Jeju Prov.: 2♂♂2♀♀, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 12 vi 2005, DH Lee, pond (1♂, on slide); 1♀, same data as former except for, Dongbaek-park, 28 vii 2005, SH Lee; 3♂♂1♀, same data as former except for, 22 v 2006, DH Lee, pond; 6♂♂5♀♀, same data as former except for, 2 iii 2007; 1♂, same data as former except for, Gyora-ri, 21 viii 2007, SH Lee (1♂, on slide); 2♂♂1♀, Bukjeju-gun, Namsaengimot, 28 vii 2005, SH Lee, pond; 3♂♂2♀♀, Jeju-si, Samdo 2-dong, 23 vii 1990; 1♂4♀♀, Jeju-si, Hangeyeong-myeon, Dumo-ri, 22 vii 1990; 7♂♂5♀♀, Jeju-si, Hanrim-eup, Opo-ri, 24 vii 1990, SH Lee, pond; 7♂♂8♀♀, Jeju-si, Gujwa-eup, Jongdal-ri, 27 vii 1990; 2♂♂, Jeju-si, Saekdal-dong, 10 v 2012, HG Min, wetland; 2♀♀, Seogwipo-si, Seongsan-eup, Siheung-ri, 27 vii 1990; 1♂, Seogwipo-si, Andeok-myeon, Sagye-ri, 25 v 2006, DH Lee, pond; Jeonbuk Prov.: 1♂1♀, Iksan-si, Samgi-myeon,

Yeondong-ri, 26 iv 2009, SH Lee; 2♂♂2♀♀, Gunsan-si, Seosu-myeon, Maryong-ri, 25 iv 2009, SH Lee; 1♀, Imsil-gun, Samgye-myeon, 14 viii 1989, SH Lee; 8♀♀, Jeongeub-si, Naejang-dong, Mt. Naejangsan, 4 viii 1990, SH Lee; 1♂1♀, Namwon-si, Sandong-myeon, Sikryeon-ri, 26 iv 2009, SH Lee; 2♂♂, Namwon-si, Unbong-eup, Maeyo-ri, N35°27'53.70" E127°32'27.28" 457 m, 9 v 2009, SH Lee, pond; ; 1♂2♀♀, Wangju-gun, 24 vii 1995, SH Lee; 1♂, Wanju-gun, Samrye-myeon, Ha-ri, 5 ix 2005, DH Lee, stream; Jeonnam Prov.: 1♂, Gangjin-gun, Gangjin-eup, Yeongpa-ri, 18 iv 2004, DH Lee, pond; 2♂♂5♀♀, Jangseong-gun, Buki-myeon, Oweol-ri, Songsan-reservoir, N35°25'13.28" E126°49'01.60" 100 m, 1 viii 2009, SH Lee, reservoir; 20♂♂26♀♀, Mokpo-si, Hadang-dong, 10 x 1990, SH Lee; 1♂1♀, Yeongam-gun, Deokjin-myeon, Jangseon-ri, 22 vii 1988, SH Lee, pond; 2♂♂1♀, same data as former except for, Sijong-myeon, Taegan-ri.

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Hainan, Hebei, Hubei, Jiangsu, Jilin, Jiangxi, Liaoning, Shaanxi, Shandong), Japan, Russia (FE).

**REGION:** Eastern Palaearctic.

**KOREA:** CB, CN, GW, GG, GB, GN, JB, JN, JJ (Lee, 2016: Fig. 4.4).

**KOREAN RECORDS:** *Noterus japonicus*: Takizawa, 1932: 18; Mochizuki and Tsunekawa, 1937: 77; Kamiya, 1938b: 20; 1940: 115; Cho, 1957: 198; 1969: 172; Mori, 1932: 2; Kwon and Suh, 1986: 92; Yoon, 1988: 612; Lee et al., 1992: 46; Kim et al., 1994: 132; Lee, 1994: 14; Lee, 1995: 11; Nilsson, 1995: 40; 2011: 29; Hua, 2002: 34; Toledo, 2003: 75; Park et al., 2008: 207; Cho and Park, 2010: 94.

## Suborder Polyphaga Emery, 1886

### Family Hydrophilidae Latreille, 1802

#### Key to the subfamilies of Korean Hydrophilidae

1. Mesoventrite fused with mesanepisterna; medial part of mesoventrite elevated into a plate ..... Sphaeridiinae
  - Mesoventrite not fused with mesanepisterna; medial part of mesoventrite not elevated into a plate ..... 2
2. Body longer than 10.0 mm; thorax with long mesofurcal arm ..... Hydrophilinae
  - Body shorter than 10.0 mm; thorax without long mesofurcal arm ..... 3
3. Scutellary stria of elytra absent or reduced; apical margin of sternite VII without emargination ..... Chaetarthriinae
  - Scutellary stria of elytra present; apical margin of sternite VII with emargination ..... 4
4. Maxillary palpomere 2 curved outward ..... Enochrinae
  - Maxillary palpomere 2 not curved outward ..... Acidocerinae

## Subfamily Hydrophilinae Latreille, 1802

**DIAGNOSIS:** Thorax with long mesofurcal arm. Tibia with swimming hairs (Short and Fikáček, 2013).

### Key to the tribes of Korean Hydrophilinae

1. Eye completely divided by a canthus of frons ..... Amphiopini
- Eye not divided by a canthus of frons ..... 2
2. Meso- and metatibia fringe with long natatory setae ..... 3
- Meso- and metatibia fringe without long natatory setae ..... 4
3. Meso- and metaventrite with a raised medial keel ..... Hydrophilini
- Meso- and metaventrite without a raised medial keel ..... Berosini
4. Sternite VII with emargination on apical margin ..... Hydrobiusini
- Sternite VII without emargination on apical margin ..... Laccobiini

## Tribe Amphiopini Kuwert, 1890

### Genus *Amphiops* Erichson, 1843

#### Genus *Amphiops* Erichson, 1843

*Amphiops* Erichson, 1843: 229. Type species: *Hydrophilus gibbus* Illiger, 1801.

*Cyprimorohus* Fairmaire, 1873: 334. Type species: *Cyprimorohus compressus* Fairmaire, 1873 (= *Coelostoma senegalense* Laporte, 1840).

**DIAGNOSIS:** Body strongly convex dorsally. Eye completely divided by a canthus of frons. Antennae with 8 antennomeres. Anterior part of mesoventrite flat. Posterior part of metaventrite elevated (Short and Fikáček, 2013).

#### 19. *Amphiops mater* Sharp, 1873 (Pls. 9A, B, 14A)

*Amphiops mater* Sharp, 1873: 62.

**DESCRIPTION:** Length 3.0–3.5 mm. Body rounded, nearly spherical, strongly convex dorsally, with com-

pact small and large punctures, without microreticulation, flat ventrally with sparse setae.

*Color:* Body mostly reddish brown to dark brown, ventral surface brown to dark brown; Antennae, palpi, hypomera, epipleura, legs mostly reddish brown.

*Head:* Head subhexagonal, widest at anterior two third. Frontoclypeal suture distinct, without few long setae. Anterior margin of clypeus slightly emarginate; anterior corner rounded. Eye not protruded. Frons about 3.0 times as wide as eye. Antennae with 8 antennomeres; 1 longest, about 3.0 times as long as 2, narrowed at middle; 2 about 4.0 times as long as 3, slightly narrowed apically; 3 subquadrate; 4 broad apically; 5 transverse dish-shaped; 6–8 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, with compact setae on anterior part, widest across posterior corner; antero-medial margin slightly emarginate; anterior corner rounded; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 longest, 1.5 times as long as 3, widest at apical third; 3 slightly shorter than 4, broad apically; 4 elongate, widest at apical third, apex truncate. Labial palpomere 1 smallest; 2 slightly longer than 3, broad apically, with few long setae on anterior part; 3 elongate, apex truncate. Gula suture non-parallel.

*Thorax:* Pronotum semicircular, 1.5 times wider than head, about 2.5 times wider than long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin rounded. Elytra rounded apically, widest at middle, slightly wider than pronotum; subsutural suture present. Prosternum transverse, convex medially, posterior margin protruded and acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal four-seventh. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 5 longest, as long as 2–4 combined, about 3.5 times as long as 4. Mesoventrite small, with longitudinal carina on posterior part. Mesofemur with pubescence on basal fifth. Mesotibial inner spine curved, shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 about 1.5 times as long as 3; 4 slightly longer than 1; 5 longest, 2.5 times as long as 4. Metaventrite flat, with sparse setae; posterior part glabrous. Metafemur with large punctures, with pubescence on basal fifth. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 longest, 3.0 times as long as 4.

*Abdomen:* Sternite VII without small emargination on apical margin. Median lobe (Pl. 14A) of aedeagus slender, widest at middle, apical part long and acute. Paramere (Pl. 14A) slender, longer than median lobe, widest at base, apical margin rounded.

*Larvae:* see Minosima and Hayashi (2012).

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 3 exx, Cheongju-si, Heungdeok-gu, Gangseo1-dong, 4 v 2005, DH Lee, ex pond (1♂, on slide); Chungnam Prov.: 3 exx, Boryeong-si, Jupo-myeon, 25 vii 1988, SH Lee; 4 exx, Cheongyang-gun, Munmak-pond, 25 vii 1995, SH Lee; 1 ex, Taeang-gun, Wonbuk-myeon,

Sindu-ri, N36°50'34.37" E126°11'53.53" 20 m, 31 vii 2013, DH Lee, ex pond on dune; Gyeongbuk Prov.: 1 ex, Gumi-si, Haepyeong-myeon, Songgok-ri, Mt. Dorisan, 5 viii 1994, SH Lee; 1 ex, Gunwi-gun, Hyoryeong-myeon, Janggi-ri, Janggi-reservoir, N36°06'57.80" E128°35'40.40", 181 m, 18 vi 1990, SH Lee, reservoir; 3 exx, Gyeongju-si, Geoncheon-eup, Sinpyeong-ri, 28 v 1993, SH Lee; Gyeonggi Prov.: 2 exx, Incheon-si, Ganghwa-gun, Naega-pond, 16 ix 1990, SH Lee; Gyeongnam Prov.: 4 exx, Busan-si, Seo-gu, Ulmang-dong, 24 vii 1991, SH Lee; 10 exx, Haman-gun, Beomsu-myeon, Daepyeong-ri, 27 vi 2006, ex swamp; 2 exx, Sacheon-si, Saam-pond, 13 viii 1995, SH Lee; Jeju Prov.: 13 exx, Jeju-si, Gujwa-eup, Jongdal-ri, 27 vii 1990, SH Lee; 3 exx, Jeju-si, Hanrim-eup, Opo [= Ongpo-ri], 24 vii 1990, SH Lee; 4 exx, Namjeju-gun [= Seogwipo-si], Seongsan-eup, Siheung-ri, 27 vii 1990, SH Lee; Jeonbuk Prov.: 2 exx, Iksan-si, Hwangdeung-myeon, Hwangdeung-ri, 1 viii 1990, SH Lee; 1 ex, Gunsan-si, Okgu-myeon, 6 viii 2009, SH Lee; 2 exx, Wanju-gun, 24 vii 1995, SH Lee; 1 ex, Wanju-gun, Samrye-eup, Ha-ri, 3 x 2005, DH Lee, ex pond; Jeonnam Prov.: 8 exx, Gwangju-si, Buk-gu, Deokeui-dong, 1 viii 2009, SH Lee; 4 exx, Muan-gun, Muan-eup, Seongam-ri, 2 viii 1990, SH Lee; 4 exx, Yeongam-gun, Taegan-pond, 22 vii 1988, SH Lee.

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Hubei, Zhejiang), Japan.

**REGION:** East Palaearctic.

**KOREA:** GW, GG, CB, CN, JB, JN, GB, GN, JJ (Lee, 2016: Fig. 8.31A).

**KOREAN RECORDS:** *Amphiops mater*: Kwon and Suh, 1986: 102; Lee et al., 1988: 80; Yoon, 1988: 635; Lee et al., 1992: 55; Kim et al., 1994: 136; Lee, 1994: 20; Han et al., 2007: 272; Han et al., 2008: 289; Park et al., 2008: 265; Cho and Park, 2010: 96. *Amphiops gibbus mater*: Cho, 1957: 212 [misidentification of *A. mater*].

## Tribe Berosini Mulsant, 1844

### Key to the genera of Korean Berosini

1. Antennae with 7 antennomeres; pronotum and elytra yellowish brown; apex of elytra rounded ..... *Berosus*
- Antennae with 8 antennomeres; pronotum and elytra glossy and black; apex of elytra slightly acute ..... *Regimbartia*

## Genus *Berosus* Leach, 1817

### Genus *Berosus* Leach, 1817

*Berosus* Leach, 1817: 92. Type species: *Dytiscus luridus* Linnaeus, 1760.

*Hygrotrophus* MacLeay, 1871: 131. Type species: *Hygrotrophus nutans* MacLeay, 1871.

*Paraberosus* Kuwert, 1890: 113. Type species: *Paraberosus nigriceps* Kuwert, 1890 (= *Hydrophilus nigriceps* Fabricius, 1801).

*Euberosus* Acloque, 1896: 94. Type species: *Dytiscus luridus* Linnaeus, 1760.

**DIAGNOSIS:** Head strongly flexed down. Eye large and globular. Antennae with 7 antennomeres. Protarsus with 4 tarsomeres in male. Scutellar shield longer than wide. Meso- and metatarsi fringe with long natatory setae. Aedeagus subcylindrical or laterally compressed (Archangelsky, 2008; Deler-Hernández et al., 2013).

### Key to the species of Korean *Berosus*

1. Subapical part of elytron without spine ..... 2
  - Subapical part of elytron with spine ..... 3
2. Body shorter than 6.0 mm; body convex dorsally; medial part of emargination on sternite VII narrowly bifid ..... *B. japonicus*
  - Body longer than 6.0 mm; body strongly convex dorsally; medial part of emargination on sternite VII widely bifid ..... *B. punctipennis*
3. Apical margin of sternite VII with emargination ..... *B. lewisius*
  - Apical margin of sternite VII rounded ..... *B. spinosus*

## Subgenus *Berosus* Leach, 1817

*Berosus* Leach, 1817: 92. Type species: *Dytiscus luridus* Linnaeus, 1760.

### 20. *Berosus (Berosus) japonicus* Sharp, 1873 (Pls. 9C, D, 14B)

*Berosus japonicus* Sharp, 1873: 61.

**DESCRIPTION:** Length 4.5–5.5 mm. Body oval, convex dorsally.

**Color:** Dorsal surface mostly yellowish brown, ventral surface mostly brown to dark brown; Antennae, palpi, hypomera, epipleura, legs mostly yellow.

**Head:** Head subtrapezoidal, black with metallic green, widest across eyes. Anterior margin of clypeus straight; anterior corner acute. Eye strongly protruded. Frons about 2.0 times wider than eye. Labrum with compact setae; anterior margin rounded. Antennae with 7 antennomeres; 1 longest, about 2.0 times as

long as 2, slightly broad apically; 2 about 2.0 times as long as 3, bulbed at apical third; 3 broad apically; 4 transverse dish-shaped, with setae on anterior part; 5–7 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; antero-medial margin slightly acute; anterior margin rounded; antero-medial part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandible with movable and articulated appendage on inner margin; apex trifid. Maxillary palpomere 1 smallest; 2 longest, about 1.5 times as long as 3, broad apically; 3 broad apically; 4 elongate, slightly shorter than 2, widest at apical third, apex truncate, apical part brown. Labial palpomere 1 smallest; 2 about 3.5 times as long as 1, broad apically with many long setae on lateral part; 3 slightly longer than 2, apex truncate, with 2 long setae on anterior part. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 1.2 times wider than head, about 2.5 times wider than long, widest at middle, with black punctures except on antero-lateral parts and median parts, with four black markings on median part; anterior margin broadly sinuate; anterior corner rounded; lateral margins sinuate and broadly rounded; posterior corner rounded; posterior margin broadly rounded. Scutellar shield black, with 17–19 punctures. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, lateral margins sinuate, with 10 punctato-striae and sparse black marking on each elytron; interval with few rows of punctures; interval 5–7 with a row of punctures on median part. Subsutural suture present. Prosternum small and reverse triangular. Prosternal process protruded; apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal two third. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 about 1.5 times as long as 3; 3 as long as 4; 4 subquadrate; 5 longest, about 3.0 times as long as 4. Mesoventral process strongly acute medially, posterior part rounded in lateral view, with sparse setae. Mesofemur with pubescence on basal three fifth and ventral margin serrate. Mesotibial inner spine as long as tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly longer than 3. Metaventrite protruded medially; postero-medial part glabrous. Metafemur with pubescence on basal two third and ventral margin serrate. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 about 1.5 times as long as 4.

*Abdomen:* Lateral and posterior margins of sternites III–VI serrate. Sternite III with reverse triangular carina on median part. Sternite VII with lateral and postero-lateral margins serrate, with rectangular emargination on apical part; emargination with distinctly pointed two teeth on baso-medial part. Median lobe of aedeagus (Pl. 14B) long, slender, widest at basal sixth, apex protruded and acute in dorsal view. Paramere (Pl. 14B) long, slender, nearly straight at subapical part in dorsal view, apex distinctly curved, acute in lateral view.

*Larvae:* see Minoshima and Hayashi (2015).

**TYPE MATERIAL:** Lectotype: 1♂ (NHM), with labels as follows: “*Berosus japonicus* Type D. S., Type, Japan., Sharp Coll. 1905–313., Lectotypus *Berosus japonicus* Sharp des. S. Schödl, 1991”.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 1♂1♀, Cheongju-si, Heungdeok-gu, Jidong-dong, 3 v 2005, DH Lee, ex casual water (1♂, on slide); 1♀, same date as former except for, Gangseoldong, 4 v 2005, ex pond; 1♂, Jecheon-si, Angmanjeon, 30 vii 1994, SH Lee; Chungnam Prov.: 1♀, Asan-si, Onyang-dong, Mojong, 31 vii 1994, SH Lee; Gangwon Prov.: 1♂, Hoingseong-gun, Cheongil-myeon, Mt. Balgyosan, 9 ix 1998, KL You, HJ Lim, KJ Ahn, at light; 1♂, Pyeongchang-gun, Baesujang, 29 vii 1994, SH Lee; Gyeongbuk Prov.: 1♀, Gyeongju-si, Song-pond, 16 ix 1989, SH Lee; 1♂2♀♀, Pohang-si, Taejeon-pond, 18 ix 1988, SH Lee; 1♂, Pohang-si, Yeongil-myeon, Haengsu-pond, 17 ix 1988, SH Lee; Gyeonggi Prov.: 1♂1♀, Yangpyeong-gun, Kaeun-pond, 20 viii 1989, SH Lee; Gyeongnam Prov.: 1♂2♀♀, Haman-gun, Yujeon-swamp, 25 v 1988, SH Lee; 2♀♀, Hamyang-gun, Aneui-myeon, Sangwon-ri, Yongchu-temple, 16 vii 1985, SH Lee; Jeju Prov.: 1♀, Bukjeju-gun, Sangumburi, 18 viii 1992, SH Lee; 1♂, Bukjeju-gun, Sobu-pond, 23 vii 1990, SH Lee; 3♂♂, Bukjeju-gun, Jocheon-eup, Seonheul-ri, Dongbaek-park, 25 ix 2008, DH Lee, ex pond; 1♂, Namjeju-gun, Galmae-pond, 26 vii 2005, SH Lee; 1♂4♀♀, Namjeju-gun, Posong-ri, 9 viii 1985, YB Cho.

**DISTRIBUTION:** Korea, China (Hubei, Hunan, Jiangxi, Zhejiang), Japan, Taiwan.

**REGION:** Eastern Palaearctic.

**KOREA:** CB, CN, GW, GB, GG, GN, JJ (Lee, 2016: Fig. 8.31B).

**KOREAN RECORDS:** *Berosus japonicus*: Lee et al., 1988: 88; Yoon, 1988: 638; Lee et al., 1992: 57; Kim et al., 1994: 136; Lee, 1994: 20; Kim and Kim, 1996b: 126; Kim, 2000: 131; Hansen, 2004: 46; Park et al., 2008: 267; Cho and Park, 2010: 96; Lee and Ahn, 2016a: 206.

## 21. *Berosus (Berosus) punctipennis* Harold, 1878 (Pls. 9E, F, 14C)

*Berosus punctipennis* Harold, 1878: 67.

**DESCRIPTION:** Length 6.0–7.0 mm. Body oval, strongly convex dorsally.

**Color:** Dorsal surface mostly yellowish brown, ventral surface most brown to dark brown; Antennae, palpi, hypomera, epipleura, legs mostly yellowish brown.

**Head:** Head subtrapezoidal, black with metallic green, widest across eyes. Anterior margin of clypeus broadly emarginate; anterior corner acute. Eye strongly protruded. Frons about 2.0 times wider than eye. Labrum with compact setae; anterior margin rounded. Antennae with 7 antennomeres; 1 longest, about 2.0 times as long as 2, slightly broad apically; 2 about 2.0 times as long as 3, bulbed at apical third; 3 broad apically; 4 transverse dish-shaped, with setae on anterior part; 5–7 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior

corner; antero-medial margin slightly acute; anterior margin rounded; antero-medial part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandible with movable and articulated appendage on inner margin; apex trifold. Maxillary palpomere 1 smallest; 2 longest, about 1.5 times as long as 3, broad apically; 3 broad apically; 4 elongate, slightly shorter than 2, widest at apical third, apex truncate, apical part brown. Labial palpomere 1 smallest; 2 about 3.5 times as long as 1, broad apically with many long setae on lateral part; 3 slightly longer than 2, apex truncate, with 2 long setae on anterior part.

*Thorax*: Pronotum subquadrate, 1.2 times wider than head, about 2.5 times wider than long, widest at middle, with black punctures except on antero-lateral parts and median parts, with four black markings on median part; anterior margin broadly sinuate; anterior corner rounded; lateral margins sinuate and broadly rounded; posterior corner rounded; posterior margin broadly rounded. Scutellar shield black, with 17–19 punctures. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, lateral margins sinuate, with 10 punctato-striae and sparse black marking on each elytron; interval with few rows of punctures; interval 5–7 with 2 rows of punctures on median part. Subsutural suture present. Prosternum small and reverse triangular. Prosternal process protruded; apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal two third. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2, about 1.5 times as long as 3; 3 shorter than 4; 4 subquadrate; 5 longest, about 3.0 times as long as 4. Mesoventral process strongly acute medially, posterior part rectangular in lateral view, with sparse setae. Mesofemur with pubescence on basal three fifth and ventral margin serrate. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly longer than 3. Metaventrite protruded medially; postero-median part glabrous. Metafemur with pubescence on basal two third and ventral margin serrate. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 about 1.5 times as long as 4.

*Abdomen*: Lateral and posterior margins of sternites III–VI serrate; Sternite III with reverse triangular carina on median part. Sternite VII serrate on lateral and postero-lateral margins, with rectangular emargination on apical part; emargination with weakly pointed two teeth on baso-medial part. Median lobe of aedeagus (Pl. 14C) long, slender, widest at basal sixth, apex slightly protruded and rounded in dorsal view. Paramere (Pl. 14C) long, slender, protruded laterally at subapical part in dorsal view, apex slightly curved, acute in lateral view.

**SPECIMENS EXAMINED**: SOUTH KOREA: Chungbuk Prov.: 1♂1♀, Cheongju-si, Heungdeok-gu, Ganso1dong, 4 v 2005, DH Lee, ex pond; 4♂♂1♀, Choengwon-gun, Chisil-pond, 16 viii 1988, SH Lee; Chungnam Prov.: 1♂1♀, Buyeo-gun, Mt. Mansusan, 19 vii 1999, KJ Ahn, at light (1♂, on slide); 1♂1♀, Cheonan-si, Cheongsu-pond, 14 ix 1990, SH Lee; 1♂, Yesan-gun, Sudeok-temple, 26 vii 1995, SH Lee;

Gangwon Prov.: 1♂1♀, Inje-gun, Namjeon-ri, 1 viii 1991, SH Lee; Gyeongbuk Prov.: 2♀♀, Pohang-si, Yeongil-myeon, Haengsu-pond, 17 ix 1988, SH Lee; 3♂♂1♀, Uljin-gun, Goseong-ri, 22 viii 1987, SH Lee; 2♂♂, Yecheon-gun, Upbu-ri, 6 vi 1989, SH Lee; 1♂, Yoongdeok-gun, Chuksan, 25 ix 1994, SH Lee; 1♀, Yeongyang-gun, Sadol-pond, 6 vi 1990, SH Lee; Gyeonggi Prov.: 1♂1♀, Icheon-si, Songho-pond, 19 viii 1989, SH Lee; 1♂, Kwangju-gun, Hongjang-pond, 20 viii 1989, SH Lee; 1♀, Poncheon-si, Gomo-ri, 17 vii 1992, SH Lee, at light; 1♀, Siheung-gun, Tochang-ri, 2 v 1985, YB Cho; 1♂, Suwon-si, Gwonseon-gu, Homaesil-dong, Mt. Chilbosan, 15 ix 2009, DH Lee, HM Lim, at light (1♂, on slide); 1♂2♀♀, Tongducheon-si, Tapdong, 7 viii 1988, SH Lee; 1♂, Yangpyeong-gun, Kaeun-pond, 20 viii 1989, SH Lee; 1♂, Yeoncheon-gun, Hwang-pond, 7 viii 1989, SH Lee; Gyeongnam Prov.: 1♀, Hamyang-gun, Aneui-myeon, Sangwon-ri, Yongchu-temple, 16 vii 1985, SH Lee; Jeju Prov.: 1♂, Namjeju-gun, Galmae-pond, 26 vii 2005, SH Lee; Jeonbuk Prov.: 1♀, Imsil-gun, Samgye-myeon, 14 viii 1989, SH Lee.

**DISTRIBUTION:** Korea, China (Heilongjiang, Nei Mongol), Japan, Russia (Far East), Taiwan.

**REGION:** East Palaearctic.

**KOREA:** CB, CN, GW, GB, GG, GN, JJ, JB (Lee, 2016: Fig. 8.31B).

**KOREAN RECORDS:** *Berosus punctipennis*: Hansen, 2004: 47; Ryndevich and Fikáček, 2013: 34; Lee and Ahn, 2016a: 209; *Berosus signaticollis*: Kamiya, 1940: 137 [misidentification of *B. punctipennis*]. *Berosus signaticollis punctipennis*: Cho, 1957: 213; 1969: 256; Kwon and Suh, 1986: 102; Lee et al., 1988: 88; Yoon, 1988: 637; Kim and Lee, 1991: 65; Kim et al., 1994: 136; Lee, 1994: 19; Lee, 1995: 15; Kim and Kim, 1996b: 126; Hua, 2002: 43; Park et al., 2008: 269; Cho and Park, 2010: 96 [misidentification of *B. punctipennis*].

**REMARKS:** According to Ryndevich and Fikáček (2013), records of *B. signaticollis* from the Far East of Asia are erroneous and all belong to *B. punctipennis*. The latter species clearly differs from *B. signaticollis* by the structure of the mesoventral elevation, which is lower in *B. signaticollis*.

## Subgenus *Enoplurus* Hope, 1838

*Enoplurus* Hope, 1838: 128. Type species: *Hydrophilus spinosus* Steven, 1808.

### 22. *Berosus (Enoplurus) lewisius* Sharp, 1873 (Pls. 9G, H, 14D)

*Berosus lewisius* Sharp, 1873: 61.

**DESCRIPTION:** Length 4.0–5.3 mm. Body long oval, convex dorsally.

**Color:** Dorsal surface mostly yellowish brown, ventral surface mostly brown; Antennae, palpi, hypomera,

epipleura, legs mostly yellowish brown.

*Head:* Head subtrapezoidal, black with metallic green, widest across eyes. Anterior margin of clypeus broadly emarginate; anterior corner acute. Eye strongly protruded. Frons about 2.0 times wider than eye. Labrum with setae; anterior margin rounded. Antennae with 7 antennomeres; 1 longest, about 2.0 times as long as 2, slightly broad apically; 2 about 2.0 times as long as 3, bulbed at apical third; 3 broad apically; 4 transverse dish-shaped, with setae on anterior part; 5–7 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; antero-medial margin slightly acute; anterior margin rounded; antero-medial part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandible with movable and articulated appendage on inner margin; apex trifid. Maxillary palpomere 1 smallest; 2 longest, about 1.5 times as long as 3, broad apically; 3 broad apically; 4 elongate, 1.3 times as long as 3, widest at apical third, apex truncate, apical part brown. Labial palpomere 1 smallest; 2 about 3.5 times as long as 1, broad apically with many long setae on lateral part; 3 slightly longer than 2, apex truncate, with 2 long setae on anterior part. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 1.2 times wider than head, about 2.5 times wider than long, widest at middle, with black punctures except on antero-lateral parts and median parts, with four black markings on median part; anterior margin broadly sinuate; anterior corner rounded; lateral margins sinuate and nearly parallel; posterior corner rounded; posterior margin broadly rounded. Scutellar shield black, with 17–19 punctures. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, lateral margins sinuate, with 10 punctato-striae and sparse black marking on each elytron, interval with few rows of punctures: interval 3 with two rows punctures. Subsutural suture present. Prosternum small and reverse triangular. Prosternal process protruded; apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal a half. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 about 1.5 times as long as 3; 3 shorter than 4; 4 subquadrate; 5 longest, about 3.0 times as long as 4. Mesoventral process protruded from anterior third to end in lateral view. Mesofemur with pubescence on basal two third and ventral margin sinuate. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly longer than 3. Metaventrite protruded medially; postero-medial part glabrous. Metafemur with pubescence on basal two third and ventral margin sinuate. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 about 1.5 times as long as 4.

*Abdomen:* Lateral margins of sternites III–VI sinuate; posterior margins serrate. Sternite III with reverse triangular carina on median part. Sternite VII serrate on lateral and postero-lateral margins, with rectangular emargination on apical part; emargination without teeth on median part. Median lobe of aedeagus (Pl. 14D) long, slender, nearly parallel-sided in dorsal view and curved at apical fourth in lateral view, apex bifid and

flattened in lateral view. Paramere (Pl. 14D) long, slender, curved at apical third and apex bulbed in lateral view.

**TYPE MATERIAL:** Syntype: 1♂ (NHM), with labels as follows: “Type, Japan., G. Lewis. 1910–320., *Berosus lewisius*. Type D.S. ”.

**SPECIMENS EXAMINED:** NORTH KOREA: 16 exx, DPR, KOREA, Pyongyang-city, Arouned Pyongyang-Hotel, Near Daedong-River, 20 vi 2008, Changdo Han; 10 exx, DPR. KOREA. Pyongyang-city, aounded Mt. RyongAck-San, Near Suna-River, 3 vii 2009, Changdo Han; SOUTH KOREA: Chungbuk Prov.: 1♂1♀, Eumseong-gun, Chuncheon-pond, 18 viii 1989, SH Lee; 2♂♂3♀♀, Goisan-gun, Idam-pond, 18 viii 1989, SH Lee; Chungnam Prov.: 1♂1♀, Cheonan-si, Cheongsu-pond, 14 ix 1990, SH Lee; 1♂, Cheongyang-gun, Mumak-pond, 25 vii 1995, SH Lee; 1♂, Nonsan-gun, Songdang-ri, 1 viii 1990, SH Lee; 5♂♂5♀♀, Taean-gun, Anmyeon-eup, Seungeon-ri, N36°29'18.5" E126°20'47.5" 26 m, DH Lee, saline pond near salt farm; 1♂1♀, Yesan-si, Sabgyocheon, 26 vii 1995, SH Lee; Gangwon Prov.: 1♀, Cheorwon-gun, Kimhwa-eup, Haksa-ri, Namdae-stream, 9 ix 2008, DH Lee, at light; 1♂, Hwacheon-gyn, Yuchon-ri, 30 vii 1991, SH Lee; 1♂2♀♀, Wonju-si, Gwangkyok-pond, 3 viii 1988, SH Lee; Gyeongbuk Prov.: 2♂♂, Daegu-si, Gyeongbuk Univ., 15 vii 1974, JH Kang; 3♀♀, Gumi-si, Mt. Geumosan, 19 vii 2001, KJ Ahn, CW Shin, at light (1♂, on slide); 2♂♂, Gyeongju-si, Geoncheon, 6 vi 1991, SH Lee; 1♀, Pohang-si, Taejam-pond, 18 ix 1988, SH Lee; 1♂, Sangju-gun, Kaeun-pond, 8 viii 1990, SH Lee; 2♂♂, Yecheon-gun, Upbu-ri, 6 vi 1988, SH Lee; 1♀, Yeongcheon-gun, Yongdo-dong, 8 x 1988, SH Lee; Gyeonggi Prov.: 1♀, Ansan-si, Danwon-gu, Daebudong-dong, Dongju-salt farm, N37°14'05.60" E126°36'19.55" 4 m, 3 xi 2014, DH Lee, IS Yoo, SG Lee, saline pond near salt farm; 1♂2♀, Icheon-gun, Songho-pond, 19 viii 1989, SH Lee; 1♀, Incheon-si, Ganghwa-gun, Gyodong-myeon, 6 x 2009, HM Lim, at light; 1♂, Yangpyeong-gun, Kaegun-pond, 20 viii 1989, SH Lee; Gyeongnam Prov.: 1♂, Euiryeong-gun, Haengjeong-pond, 8 v 2009, SH Lee; 1♂1♀, Geochang-gun, Hwanggang, 29 v 2005, SH Lee; 8♂♂8♀♀, Jinju-si, Panmun-dong, 29 vii 2005, SJ Park, JS Park, SI Lee (1♂, on slide); 2♂♂, Haman-gun, Yujeon-swamp, 25 v 1988, SH Lee; 1♂, Hapcheon-gun, Cheongyang-pond, 3 vi 1990, SH Lee; 1♀, Namhae-gun, Namri-pond, 12 vi 20012, SH Lee; Jeju Prov.: 1♂, Bukjeju-gun, Yongsu, 17 viii 1992, SH Lee; Jeonbuk Prov.: 1♂1♀, Imsil-gun, Ohun-ri, 14 viii 1989, SH Lee; 1♀, Namwon-si, Daesan-myeon, Gilgok-ri, N35°26'13.0" E127°19'0", 7 vi 2007, TK Kim, HW Kim, YH Kim, Sweeping; 1♂, Wanju-gun, 24 vii 1995, SH Lee; Jeonnam Prov.: 10♂♂8♀♀, Gangjin-gun, Maryang-myeon, 27 viii 2004, SW Choi, at light; 1♂, Goheung-gun, Daeseo-myeon, Ondong-pond, 12 vi 2010, SH Lee; 1♀, Hwasun-gun, Dong-myeon, Jangdong-pond, 3 viii 2009, SH Lee; 1♂2♀♀, Yongam-gun, Taegan-pond, 22 vii 1988, SH Lee; 1♀, Yeonggwang-gun, Jangdeung-pond, 3 viii 2009, SH Lee.

**DISTRIBUTION:** Korea, China (Heilongjiang, Nei Mongol), Japan, Russia (Far East), Taiwan.

**REGION:** East Palaearctic.

**KOREA:** PN, CB, CN, GW, GB, GG, GN, JJ, JB, JN (Lee, 2016: Fig. 8.31B).

**KOREAN RECORDS:** *Berosus (Enoplurus) lewisius*: Nitta et al., 2009: 49; Lee and Ahn, 2016a: 212. *Berosus lewisius*: Kwon and Suh, 1986: 102; Lee et al., 1988: 87; Yoon, 1988: 637; Kim et al., 1994: 136; Lee, 1994: 20; Hua, 2002: 43; Hansen, 2004: 47; Cho and Park, 2010: 96. *B. pulchellus*: Kwon and Suh, 1986: 102; Kim et al., 1994: 136; Cho and Park, 2010: 96 [misidentification of *B. lewisius*].

### 23. *Berosus (Enoplurus) spinosus* (Steven, 1808) (Pls. 9I, J, 14E)

*Hydrophilus spinosus* Steven, 1808: 8.

*Berosus (Acanthoberosus) lenkoranus* Kuwert, 1888b: 132.

*Berosus (Acanthoberosus) sanarkanti* Kuwert, 1888b: 132.

*Berosus (Acanthoberosus) schusteri* Kuwert, 1888b: 133.

**DESCRIPTION:** Length 4.5–6.0 mm. Body long oval, convex dorsally.

**Color:** Dorsal surface mostly yellowish brown, ventral surface mostly brown; Antennae, palpi, hypomera, epipleura, legs mostly yellowish brown.

**Head:** Head subtrapezoidal, black with metallic green, widest across eyes. Anterior margin of clypeus broadly emarginate; anterior corner acute. Eye strongly protruded. Frons about 2.0 times wider than eye. Labrum with compact setae; anterior margin rounded. Antennae with 7 antennomeres; 1 longest, about 1.5 times as long as 2, slightly bulbed at apical third; 2 about 2.0 times as long as 3, parallel-sided; 3 broad apically; 4 transverse dish-shaped, with setae on anterior part; 5–7 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; antero-medial margin slightly acute; anterior margin rounded; antero-medial part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandible with movable and articulated appendage on inner margin; apex trifid. Maxillary palpomere 1 smallest; 2 longest, about 1.5 times as long as 3, broad apically; 3 broad apically; 4 elongate, 1.3 times as long as 3, widest at apical third, apex truncate, apical part brown. Labial palpomere 1 smallest; 2 about 3.5 times as long as 1, broad apically with many long setae on lateral part; 3 slightly longer than 2, apex truncate, with 2 long setae on anterior part. Gula suture non-parallel.

**Thorax:** Pronotum subquadrate, 1.2 times wider than head, about 2.5 times wider than long, widest at middle, with black punctures except on antero-lateral parts and median parts, with four black markings on median part; anterior margin broadly sinuate; anterior corner rounded; lateral margins sinuate and nearly parallel; posterior corner rounded; posterior margin broadly rounded. Scutellar shield black, with 17–19 punctures. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, lateral margins sinuate, with 10 punctato-striae and sparse black marking on each elytron, interval with few rows of punctures;

interval 3 with a row of punctures. Subsutural suture present. Prosternum small and reverse triangular. Prosternal process protruded; apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal a half. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 about 1.5 times as long as 3; 3 slightly longer than 4; 4 subquadrate; 5 longest, about 3.5 times as long as 4. Mesoventral process protruded from a half to end in lateral view. Mesofemur with pubescence on basal three fifth and ventral margin sinuate. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 about 1.8 times as long as 3. Metaventricle protruded medially; postero-median part glabrous. Metafemur with pubescence on basal two third and ventral margin sinuate. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 about 1.5 times as long as 4.

*Abdomen*: Lateral margins of sternites III–VI sinuate; posterior margin serrate. Sternite III with reverse triangular carina on median part. Sternite VII serrate on lateral and postero-lateral margins, without emargination, apical part rounded. Median lobe of aedeagus (Pl. 14E) long, slender, narrowed basally in dorsal view and distinctly curved at subapical part in lateral view, apex truncated and cylindrical in lateral view. Paramere (Pl. 14E) long and slender, straight at apical third and apex not bulbed in lateral view.

**SPECIMENS EXAMINED**: SOUTH KOREA: Chungnam Prov.: 5♂♂3♀♀, Taean-gun, Wonbuk-myeon, Hwangchon-ri, N36°51'41.0"E126°11'59.9" 13 m, 4 vii 2014, DH Lee, at light nearby abandon salt farm (2♂♂, on slide); Gyeonggi Prov.: 1♂2♀♀, Ansan-si, Danwon-gu, Daebudong-dong, Dongju-salt farm, N37°14'05.60" E126°36'19.55" 4 m, 7 xi 2013, DH Lee, IS Yoo, SG Lee, saline pond near salt farm; 1♂, Hwaseong-si, Ujeong-eup, Unpyeong-ri, Hwaong-seawall, N36°35'45.00" E126°17'30.55" 3 m, 7 ix 2013, DH Lee, SG Lee, saline pond on salt marsh.

**DISTRIBUTION**: Asia: Korea, China (Tianjin, Xinjiang), Afghanistan, Iran, Kyrgyzstan, Kazakhstan, Mongolia, Tajikistan, Turkmenistan, Turkey, Uzbekistan, Russia (West Siberia); Europe: Azerbaijan, Albania, Austria, Bulgaria, Belarus, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Georgia, Greece, Hungary, Italy, Latvia, Norway, Poland, Romania, Slovakia, Russia (South European Territory) Sweden, Turkey.

**REGION**: Palaearctic.

**KOREA**: CN, GG (Lee, 2016: Fig. 8.31B).

**KOREAN RECORD**: *Berosus* (*Enoplurus*) *spinus*: Lee and Ahn, 2016a: 213.

## Genus *Regimbartia* Zaitzev, 1908

**Genus *Regimbartia* Zaitzev, 1908**

*Regimbartia* Zaitzev, 1908: 362. Type species: *Volvlus inflatus* Brullé, 1835.

*Volvlus* Brullé, 1835: 282 [Homonym]. Type species: *Volvlus inflatus* Brullé, 1835.

*Spheroides* Hope, 1838: 168 [Homonym]. No type species: designated.

*Brachygaster* Mulsant, 1853: 173 [Homonym]. No type species designated.

**DIAGNOSIS:** Body hemispherical. Antennae with 8 antennomeres. Pronotum and elytra black and glossy. Elytra with serial punctures and gradually acute at middle to apex (Komarek, 2003).

## 24. *Regimbartia attenuata* (Fabricius, 1801) (Pls. 9K, L, 14F)

*Hydrophilus attenuata* Fabricius, 1801: 253.

*Volvlus aeullnea* Brullé, 1835: 283.

*Brachygaster metallescens* Mulsant, 1853: 178.

*Brachygaster indica* Mulsant, 1853: 179.

*Volvlus profunda* Sharp, 1873: 62.

*Volvlus scaphiformis* Fairmaire, 1879: 83.

**DESCRIPTION:** Length 4.0–5.0 mm. Body long oval, strongly convex dorsally, with compact punctures, without microreticulation.

*Color:* Body mostly black; Antennae, mouthparts, prosternum, hypomera, epipleura, legs reddish brown.

*Head:* Head subtrapezoidal, widest across eyes. Anterior margin of clypeus emarginate; anterior corner rounded. Eye strongly protruded. Frons about 2.0 times as wide as eye. Labrum with compact setae; anterior margin rounded. Antennae with 8 antennomeres; 1 longest, about 2.0 times as long as 2; 2 about 3.0 times as long as 3, slightly broad apically; 3 broad apically; 4 transverse; 5 transverse dish-shaped, with setae on anterior part; 6–8 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; anterior margin rounded; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Maxillary palpomere 1 smallest; 2 longest, about 1.8 times as long as 3, broad apically; 3 broad apically; 4 longest, 2.0 times as long as 3, widest apical third, apex truncate, apical part brown. Labial palpomere 1 smallest; 2 about 3.5 times as long as 1, broad apically with many long setae on lateral part; 3 slightly longer than 2, apex truncate. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 1.5 times as wide as head, about 2.0 times as wide as long, widest across posterior corner; anterior margin broadly sinuate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin broadly rounded. Elytra acute apically, widest at anterior third, slightly wider than pronotum, with 10 punctato-striae; intervals with many punctures. Subsutural suture

present. Prosternum small and reverse triangular. Prosternal process protruded and acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal half. Protibia as long as femur, without pubescence; protibial inner spine shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 about 1.5 times as long as 3; 3 about 1.5 times as long as 4; 5 longest, about 2.5 times as long as 4. Mesoventral process strongly protruded, subquadrate, anterior part acute in lateral view, with sparse setae. Mesofemur with pubescence on baso-dorsal part. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 about 1.5 times as long as 4; 2 about 1.8 times as long as 3; 3 slightly longer than 4; 5 about 1.5 times as long as 4. Metaventrite broadly protruded apically; apical part glabrous. Metafemur with pubescence on baso-dorsal part. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 as long as 4; 2 longest, about 2.0 times as long as 3; 3 slightly longer than 4; 5 about 1.5 times as long as 4.

*Abdomen:* Sternites III–VI with longitudinal carina on medial part. Posterior margin of sternite VII serrate. Sternite VIII with rectangular excision on apical margin; excision with oval process on medial part. Median lobe (Pl. 14F) of aedeagus slender, subparallel, apical part trifid. Paramere (Pl. 14F) broad, slightly longer than median lobe, apical margin rounded.

*Larvae:* see Minoshima and Hayashi (2015).

**SPECIMENS EXAMINED:** SOUTH KOREA: Jeju Prov.: 9 exx, Jeju-si, Hanrim-eup, Opo [= Ongpo-ri], 24 vii 1990, SH Lee; 5 exx, Jeju-si, Jocheon-eup, Seonheul-ri, Dongbaekro, 15 vi 2011, DH Lee, ex pond (2♂♂, on slides)

**DISTRIBUTION:** Korea, Afghanistan, China (Fujian, Guandong, Jiangsu, Yunnan), Iran, Nepal, Oman, Pakistan, Taiwan, Yemen.

**REGION:** Palaearctic.

**KOREA:** JJ (Lee, 2016: Fig. 8.31C).

**KOREAN RECORDS:** *Regimbartia attenuata*: Kwon and Suh, 1986: 102; Lee et al., 1988: 89; Lee et al., 1992: 57; Kim et al., 1994: 136; Hansen, 2004: 48; Park et al., 2008: 270; Cho and Park, 2010: 96. *Regimbartia profunda*: Cho, 1957: 213 [synonym of *R. attenuata*].

## Tribe Laccobiini Bertrand, 1954

### Key to the genera of Korean Laccobiini

1. Protarsi with broad sucker in male; six abdominal sternites visible..... *Laccobius*
- Protarsi without broad sucker in male; five abdominal sternites visible..... *Paracymus*

## Genus *Laccobius* Erichson, 1837

### Genus *Laccobius* Erichson, 1837

*Laccobius* Erichson, 1837: 202. Type species: *Chrysomela minuta* Linneaus, 1758.

**DIAGNOSIS:** Maxillary palpi not longer than half of width of head. Metatrochanter not completely abutted to femur, but with projecting apex. Protarsi with two broad sucker in male. Scutellar shield nearly equilateral. Six abdominal sternites visible (Gentli, 1995).

### Key to the species of Korean *Laccobius*

1. Body longer than 3.0 mm; elytra with two types of punctures.....2
  - Body shorter than 3.0 mm; elytra with one type of punctures.....3
2. Mentum with short setae on anterior part; median lobe broad at apical third .....*L. bedeli*
  - Mentum with long setae on anterior part; median lobe slender and parallel-sided .....*L. binotatus*
3. Frons 2.5 times as wide as eye; apical part of paramere broad .....*L. formosus*
  - Frons 3.5 times as wide as eye; apical part of paramere slender ..... *L. oscillans*

## Subgenus *Laccobius* Erichson, 1837

*Laccobius* Erichson, 1837: 202. Type species: *Chrysomela minuta* Linneaus, 1758.

### 25. *Laccobius (Laccobius) bedeli* Sharp, 1884 (Pls. 10A, B, 14G)

*Laccobius bedeli* Sharp, 1884: 455.

**DESCRIPTION:** Length 3.2–3.4 mm. Body broadly oval, convex dorsally, with compact punctures, with microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface mostly brown to dark brown, ventral surface mostly dark brown; Antennae, palpi, hypomera, epipleura, legs mostly yellowish brown.

**Head:** Head subtrapezoidal, widest across eyes. Anterior margin of clypeus broadly emarginate; anterior corner rounded. Eye protruded. Frons about 3.0 times as wide as eye. Anterior margin of labrum emarginate. Antennae with 8 antennomeres; 1 longest, about 2.0 times as long as 2, slightly broad apically; 2 about 2.0 times as long as 3, bulbed at basal third; 3 shortest, broad apically; 4 transverse dish-shaped, with setae on

anterior part; 6–8 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; antero-medial margin slightly acute; anterior margin bisinuate; lateral margins subparallel; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 as long as 3, broad apically; 3 broad apically; 4 elongate, slightly longer than 2, widest at apical third, apical part brown; apex truncate. Labial palpomere 1 smallest; 2 about 3.0 times as long as 1, broad apically with sparse setae on lateral part; 3 semicircular, slightly longer than 2, apical part brown, apex truncate. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 1.5 times as wide as head, about 3.0 times as wide as long, lateral one fourth yellow, widest at posterior corner; anterior margin broadly sinuate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin broadly rounded. Scutellar shield metallic green, with punctures. Elytra rounded apically, widest at middle, about 1.2 times as wide as pronotum, lateral margins rounded, with 21 punctato-striae and sparse black marking on each elytron. Subsutural suture present. Prosternum small, transverse with longitudinal carina on medial part. Prosternal process apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal third. Protibia as long as femur, without pubescence; protibial largest spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 slightly longer than 3; 3 about 1.2 times as long as 4; 5 longest, about 2.0 times as long as 4. Mesoventral process strongly acute medially, with sparse setae; process strongly protruded, semicircular in lateral view. Mesotrochanter with sparse setae. Mesofemur without pubescence. Mesotibial largest spine as long as or shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 slightly longer than 3. Metaventrite protruded medially; postero-medial part glabrous. Metafemur without pubescence. Metatibial largest spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 about 2.0 times as long as 4.

*Abdomen:* Sternites III–VI with sparse long setae. Sternite VII with pubescence, apical margin rounded. Median lobe (Pl. 14G) of aedeagus as long as paramere, widest at base, narrowest at apical fifth, bulbed at apical third, apical part acute. Paramere (Pl. 14G) slightly bulbed and protruded subapically, slender, widest at base, narrowest at apical third, apical part rounded, lateral margins straight, pallobase about 3.0 times shorter than paramere.

**TYPE MATERIAL:** Lectotype: 1♂ (NHM), with labels as follows: “LECTOTYPE, Type, Japan. G. Lewis., Sharp Coll 1905–313., LECTO-HOLOTYPUS E. Gentili 1973”.

**SPECIMENS EXAMINED:** NORTH KOREA: 3 exx, Pyeongyang-city, Sunan-airport light of entrance, 17 vii 2008, Changdo Han. SOUTH KOREA: Chungbuk Prov.: 1♀, Goisan-gun, Iin-pond, 18 viii 1990, SH Lee; Gyeonggi Prov.: 15 exx, Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, N38°06'45.13" E127°06'45.13" 104 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, ex pond; Jeju Prov.: 1 ex, Bukjeju-gun, Jocheon-eup, Seonheul-ri,

Dongbaek garden, 22 v 2006, DH Lee, ex pond; 19 exx, Seogwipo-si, Saekdal-dong, 1100 goji, 12 x 2006, DH Lee, ex mountain stream (6♂♂, on slides).

**DISTRIBUTION:** Korea, China (Heilongjiang, Liaoning, Nei Mongolia), Japan.

**REGION:** East Palaearctic.

**KOREA:** PN, CB, GG, JJ (Lee, 2016: Fig. 8.31D).

**KOREAN RECORDS:** *Laccobius bedeli*: Cho et al., 1985: 20; Kwon and Suh, 1986: 101; Lee et al., 1988: 72; Yoon, 1988: 628; Kim et al., 1994: 135; Gentli, 1995: 261; Lee, 1994: 19; Lee, 1995: 15; Kwon et al., 1996: 474; Hua, 2002: 44; Hansen, 2004: 58; Han et al., 2007: 272; Han et al., 2008: 277; Park et al., 2008: 256; Cho and Park, 2010: 96. *Laccobius* (s. str.) *bedeli*: Nitta et al., 2009: 49. *Laccofius bedeli* [sic]: Ishii, 1940: 44.

## 26. *Laccobius (Laccobius) binotatus* Orchymont, 1934 (Pls. 10C, D, 14H)

*Laccobius binotatus* Orchymont, 1934: 109.

*Laccobius czerskii* Zaitzev, 1938: 116.

**DESCRIPTION:** Length 3.5–3.8 mm. Body broadly oval, convex dorsally, with compact punctures, with microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface mostly dark brown; ventral surface mostly dark brown; Antennae, palpi, hypomera, epipleura, legs mostly yellowish brown.

**Head:** Head subtrapezoidal, brown to dark brown, widest across eyes. Anterior margin of clypeus broadly emarginate; anterior corner rounded. Eye protruded. Frons about 3.0 times as wide as eye. Anterior margin of labrum emarginate. Antennae with 8 antennomeres; 1 longest, about 2.0 times as long as 2, slightly broad apically; 2 about 2.0 times as long as 3, bulbed at basal third; 3 shortest, broad apically; 4 transverse dish-shaped, with setae on anterior part; 6–8 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; antero-medial margin slightly acute; anterior margin bisinuate; lateral margins subparallel; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 as long as 3, broad apically; 3 broad apically; 4 elongate, slightly longer than 2, widest at apical third, apical part brown; apex truncate. Labial palpomere 1 smallest; 2 about 3.0 times as long as 1, broad apically with sparse setae on lateral part; 3 semicircular, slightly longer than 2, apical part brown, apex truncate. Gula suture non-parallel.

**Thorax:** Pronotum subquadrate, 1.5 times as wide as head, about 3.0 times as wide as long, lateral one fourth yellow, widest at posterior corner; anterior margin broadly sinuate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin broadly rounded. Scutellar shield metallic green, with punctures. Elytra rounded apically, widest at middle, about 1.2 times as wide as pronotum, lateral margins rounded, with 21 punctato-striae and sparse black marking on each elytron. Subsutural

suture present. Prosternum small, transverse with longitudinal carina on medial part. Prosternal process apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal third. Protibia as long as femur, without pubescence; protibial largest spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 slightly longer than 3; 3 about 1.2 times as long as 4; 5 longest, about 2.0 times as long as 4. Mesoventral process strongly acute medially, with sparse setae; process strongly protruded, triangular in lateral view. Mesotrochanter with sparse setae. Mesofemur without pubescence. Mesotibial largest spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 slightly longer than 3. Metaventrite protruded medially; postero-medial part glabrous. Metafemur with sparse short spines. Metatibial largest spine shorter than tarsomeres 1–2 combined. *Metatarsomere* 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 about 2.0 times as long as 4.

*Abdomen:* Sternites III–VI with sparse long setae. Sternite VII with pubescence, apical margin rounded. Median lobe (Pl. 14H) of aedeagus slightly shorter than paramere, widest at base, narrowest at subapical part, apical part slightly bulbed and rounded. Paramere (Pl. 14H) broad, widest at base, apical part rounded, lateral margins straight and subparallel, pallobase about 3.0 times shorter than paramere.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 2 exx, Jincheon-gun, Baekgok-myeon, Baekgok-reservoir, 17 iv 2008, DH Lee, pond (1♂, on slide); 13 exx, Okcheon-gun, 8 vii 1991, SH Lee; Chungnam Prov.: 3 exx, Cheongyang-gun, Munmak-pond, 25 vii 1995, SH Lee; 1 ex, Daejeon-si, Yuseong-gu, Oisam-dong, 20 iv 2008, DH Lee, ex under stone beside stream (2♂♂, on slides); 1♂1♀, Taean-gun, Wonbuk-myeon, Sindu-ri, N36°50'34.37" E126°11'53.53" 20 m, 4 viii 2014, DH Lee, ex pond on dune; Gangwon Prov.: 10 exx, Chuncheon-si, Dongsan-myeon, Wonchang-ri, 23 vii 1992, SH Lee; 9 exx, Pyeongchang-gun, Baesujang, 29 vii 1994, SH Lee; 1 ex, Yanggu-gun, Yanggu-eup, Dongsu-ri, 1 viii 1991, SH Lee; 4 exx, Yeongwol-gun, Jucheon-myeon, Docheon-ri, E37°16'37.33" N128°14'23.61" 302 m, 21 v 2012, DH Lee, pond (3♂♂, on slides); Gyeongbuk Prov.: 5 exx, Gyeongju-si, Geoncheon-eup, Sinpyeong-ri, 28 v 1993, SH Lee; 2 exx, Pohang-si, Buk-gu, Jukjang-myeon, Duma-ri, 1 x 1989, SH Lee; 4 exx, Ulreung-do, 1992, SH Lee (2♂♂, on slides); Gyeonggi Prov.: 1♀, Incheon-si, Ganghwa-gun, Ganghwa-eup, Gukhwa-ri, N37°44'44.40" E126°27'57.69" 68 m, 27 v 2012, SH Lee, pond; Gyeongnam Prov.: 1♂, Gimhae-si, Jinyeong-eup, 12 viii 1995, SH Lee; 1♂, Sancheong-gun, Sangbiryang-myeon, Gagye-ri, Matgol-pond, 7 vi 2009, SH Lee; Jeonbuk Prov.: 1♀, Gimje-si, Gunyong-pond, 6 viii 1990, SH Lee.

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Guandong, Guizhou, Heilongjiang, Hubei, Jilin, Liaoning, Shaanxi, Shandong, Yunnan), Japan, Russia (Far East).

**REGION:** East Palaearctic.

**KOREA:** CB, CN, GW, GB, GG, GN, JB (Lee, 2016: Fig. 8.31D).

**KOREAN RECORDS:** *Laccobius binotatus*: Kim et al., 1994: 135; Gentli, 1995: 261; Hua, 2002: 44; Hansen, 2004: 58; Cho and Park, 2010: 96.

## Subgenus *Microlaccobius* Gentili, 1974

*Microlaccobius* Gentili, 1974: 550. Type species: *Laccobius gracilis*: Motschulsky, 1855.

### 27. *Laccobius (Microlaccobius) formosus* Gentili, 1979 (Pls. 10E, F, 14I)

*Laccobius formosus* Gentili, 1979: 48.

**DESCRIPTION:** Length 2.4–2.8 mm. Body broadly oval, convex dorsally, with compact punctures, with microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface mostly dark brown, ventral surface mostly dark brown; Antennae, palpi, hypomera, epipleura, legs mostly yellowish brown.

**Head:** Head subtrapezoidal, brown with brown to dark brown, widest across eyes. Anterior margin of clypeus broadly emarginate; anterior corner rounded. Eye protruded. Frons about 2.5 times as wide as eye. Anterior margin of labrum emarginate. Antennae with 8 antennomeres; 1 longest, about 2.0 times as long as 2, slightly broad apically; 2 about 2.0 times as long as 3, bulbed at basal third; 3 shortest, broad apically; 4 transverse dish-shaped, with setae on anterior part; 6–8 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; antero-medial margin slightly acute; anterior margin bisinuate; lateral margins subparallel; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 as long as 3, broad apically; 3 broad apically; 4 elongate, slightly longer than 2, widest at middle, apical part brown; apex truncate. Labial palpomere 1 smallest; 2 about 3.0 times as long as 1, broad apically with sparse setae on lateral part; 3 semicircular, slightly longer than 2, apical part brown, apex truncate. Gula suture non-parallel.

**Thorax:** Pronotum subquadrate, 1.5 times as wide as head, about 3.0 times as wide as long, most part brown to dark brown except lateral one fourth yellow, widest at posterior corner; anterior margin broadly sinuate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin broadly rounded. Scutellar shield metallic green, with punctures. Elytra rounded apically, widest at middle, about 1.2 times as wide as pronotum, lateral margins rounded, with 21 punctato-striae and sparse black markings on each elytron. Subsutural suture present. Prosternum small, transverse with longitudinal carina on medial part. Prosternal process apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal third. Protibia as long as femur, without pubescence; protibial largest spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 slightly longer than 3; 3 about 1.2 times as long as 4; 5 longest, about 2.5 times as long as 4. Mesoventral process strongly acute medially, with sparse setae; process weakly protruded, right triangular and posterior part weakly rounded in lateral view. Mesotrochanter with sparse setae. Mesofemur without pubescence. Mesotibial largest spine shorter than tarsomeres 1–2

combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 about 2.0 times as long as 4. Metaventricle protruded medially; postero-medial part glabrous. Metafemur without pubescence. Metatibial largest spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 about 2.0 times as long as 4.

*Abdomen:* Sternites III–VI with sparse long setae. Sternite VII with pubescence, apical margin rounded. Median lobe (Pl. 14I) of aedeagus shorter than paramere, widest at base, narrowest at apical third, subapical part bulbous, apical margin rounded. Paramere (Pl. 14I) bulbous subapically, slender, widest at base, narrowest at apical third, apical part acute, lateral margins straight, pallobase about 3.5 times shorter than paramere.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 6 exx, Chungju-si, Dalcheon-dong, Danwol-bridge, N36°56'28.06" E127°54'13.99" 73 m, 19 ix 2014, DH Lee, SG Lee, near stream; 1♂, Okcheon-gun, Donggi-myeon, Joryeong-ri, 26 ix 1996, SH Lee, river; Chungnam Prov.: Gongju-si, Sagok-myeon, Namgye-ri, 22 vii 2008, DH Lee, YH Kim, JH Song, YG Ban, at light near stream (2♂♂, on slides); 3 exx, Yeongi-gun, Geumnam-myeon, Seongdeok-ri, 17 ix 1997, US Hwang, SJ Park, ex stream (1♂, on slide); Gangwon Prov.: 12 exx, Cherwon-gun, Kimhwa-eup, Haksa-ri, Namdae-stream, 9 ix 2008, DH Lee, at light near stream; 6 exx, Cheorwon-gun, Seo-myeon, Wasu-ri, 4 ix 2008, DH Lee, YH Kim, TK Kim, at light near stream (2♂♂, on slides); 4 exx, Pyeongchang-gun, Jinbu-myeon, Mt. Odaesan, 28 vii 1994, SH Lee; Gyeongbuk Prov.: 1♂1♀, Andong-si, Seonggok-dong, 27 vii 1998, SH Lee; 15 exx, Cheongsong-gun, Cheongsong-eup, N36°26'00.53" E128°03'46.11" 195 m, 11 vii 2010, DH Lee, at light; 3♂♂1♀, Uljin-gun, Buk-myeon, Bugu-ri, 13 x 1994, SH Lee; 4♂♂6♀♀, Yeongdeok-gun, Changsu-myeon, Changsu-ri, 5 vi 1994, SH Lee; Gyeonggi Prov.: 6 exx, Pocheon-si, Idong-myeon, Jangam-ri, Idong-bridge, 18 vii 1992, SH Lee; 5 exx, Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, Dongmak 2-bridge, N38°05'25.76" E127°06'35.11" 70 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, ex under stone near steam; Gyeongnam Prov.: 2 exx, Hadong-gun, Bukcheon-myeon, Jikjeon-ri, 11 vi 2010, SH Lee; 3 exx, Ulsan-si, Ulju-gun, Duseo-myeon, Hwalcheon-ri, 14 vii 1991, SH Lee, stream; Jeonnam Prov.: 1 ex, Gokseong-gun, Ogok-myeon, 3 viii 2009, SH Lee.

**DISTRIBUTION:** Korea, China (Gansu, Liaoning, Shaanxi, Shandong), Russia (Far East), Taiwan.

**REGION:** East Palaearctic.

**KOREA:** CB, CN, GW, GB, GG, GN, JN (Lee, 2016: Fig. 8.32A).

**KOREAN RECORDS:** *Laccobius formosus*: Lee and Ahn, 2017: 41. *Laccobius fragilis*: Lee et al., 1988: 72; Kim et al., 1994: 135; Lee, 1994: 19; Gentli, 1995: 266; Lee, 1995: 15; Hansen, 2004: 58; Cho and Park, 2010: 96 (misidentification).

## 28. *Laccobius (Microlaccobius) oscillans* Sharp, 1884 (Pls. 10G, H, 14J)

*Laccobius oscillans* Sharp, 1884: 455.

*Laccobius nipponicus* Gentili, 1979: 43.

**DESCRIPTION:** Length 2.3–2.8 mm. Body broadly oval, convex dorsally, with compact punctures, with microreticulation. Ventral surface flat, with pubescence.

*Color:* Dorsal surface mostly dark brown, ventral surface mostly dark brown; Antennae, palpi, hypomera, epipleura, legs mostly yellowish brown.

*Head:* Head subtrapezoidal, dark brown to black, widest across eyes. Anterior margin of clypeus broadly emarginate; anterior corner rounded. Eye protruded. Frons about 3.5 times as wide as eye. Anterior margin of labrum emarginate. Antennae with 8 antennomeres; 1 longest, about 2.0 times as long as 2, slightly broad apically; 2 about 2.0 times as long as 3, bulbed at basal third; 3 shortest, broad apically; 4 transverse dish-shaped, with setae on anterior part; 6–8 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across posterior corner; antero-medial margin slightly acute; anterior margin bisinuate; lateral margins subparallel; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 as long as 3, broad apically; 3 broad apically; 4 elongate, slightly longer than 2, widest at apical third, apical part brown, apex truncate. Labial palpomere 1 smallest; 2 about 3.0 times as long as 1, broad apically with sparse setae on lateral part; 3 semicircular, slightly longer than 2, apical part brown, apex truncate. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 1.5 times as wide as head, about 3.0 times as wide as long, widest at posterior corner, most part dark brown except lateral one fifth yellow; anterior margin broadly sinuate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin broadly rounded. Scutellar shield brown, with punctures. Elytra rounded apically, widest at middle, about 1.2 times as wide as pronotum, lateral margins rounded, with 21 punctato-striae and sparse black markings on each elytron. Subsutural suture present. Prosternum small, transverse with longitudinal carina on medial part. Prosternal process apex acute. Procoxal cavity large and subtriangular. Profemur with pubescence on basal third. Protibia as long as femur, without pubescence; protibial largest spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 1 shortest; 2 about 1.5 times as long as 3; 3 about 1.5 times as long as 4; 5 longest, about 3.0 times as long as 4. Mesoventral process strongly acute medially, with sparse setae; process weakly protruded, triangular and posterior part rounded in lateral view. Mesotrochanter with sparse setae. Mesofemur without pubescence. Mesotibial largest spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 about 1.5 times as long as 4. Metaventrite protruded medially; postero-medial part glabrous. Metafemur without pubescence. Metatibial largest spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 about 1.2 times as long as 4; 5 about 1.5 times as long as 4.

*Abdomen:* Sternites III–VI with sparse long setae. Sternite VII with pubescence, apical margin rounded. Median lobe (Pl. 14J) of aedeagus as long as paramere, widest at middle, apical part flattened, apical margin slightly rounded. Paramere (Pl. 14J) narrowed apically, slender, widest at base, lateral margins slightly

curved, pallobase about 3.0 times shorter than paramere.

**SPECIMENS EXAMINED:** NORTH KOREA: Pyeonganbuk Prov.: 26 exx, Hyangsan-gun arounded Chongchon-Hotel Near Chongchon-River, 4 vii 2008, Changdo Han, SOUTH KOREA: Chungbuk Prov.: 6 exx, Danyang-gun, Danyang-eup, Sangjin-ri, Danyang-stream, 19 iv 2009, SH Lee, stream; 1 ex, Okcheon-gun, 8 vii 1991, SH Lee; 1 ex, Yeongdong-gun, Hwangan-myeon, Sintan-ri, 9 v 2009, SH Lee; Gangwon Prov.: 10 exx, Cherwon-gun, Kimhwa-eup, Haksa-ri, Namdae-stream, 9 ix 2008, DH Lee, at light near stream; 13 exx, Chuncheon-si, Dongsan-myeon, Wonchang-ri, 23 vii 1992, SH Lee; 1 ex, Cheoncheon-si, Mt. Yonghwasan, 26 vii 2009, SH Lee; 5 ♀♀, Inje-gun, Buk-myeon, Yongdae-ri, 12 Seonyeo-bridge, 5 vii 2013, DH Lee, ex under stone beside stream; 7 ♂♂5 ♀♀, Yangyang-gun, Seo-myoen, Bukpyeong-ri, Hu-stream, N38°04'11.16" E128°36'25.29" 3 m, 4 vii 2013, DH Lee, ex under stone beside stream; Gyeongbuk Prov.: 2 ♂♂, Euseong-gun, Doneseung-pond, 6 vi 2010, SH Lee; 1 ex, Gumi-si, Mt. Geumosan, 21 ix 1996, SH Lee; 9 exx, Gyeongju-si, Ijo-stream, 30 vi 1991, SH Lee; 13 exx, Pohang-si, Buk-gu, Gigye-myeon, Guji-ri, 3 iii 1991, SH Lee, pond; 6 ♂♂6 ♀♀, Uljin-gun, Seo-myeon, Wangpi-ri, Soksa-brige, 26 iv 2012, DH Lee, ex stream; 11 exx, Ulreung-gun, Seo-myeon, Namyang-ri, Namyang-stream, N37°28'49.08" E130°51'11.56" 137 m, 18 ix 2014, IS Yoo, JS Lee; 3 ♂♂4 ♀♀, Yeongdeok-gun, Yeonghae-myeon, Myogok-ri, Myogok-reservoir, N36°31'15.86" E129°20'36.48" 66 m, 6 vi 1994, SH Lee, reservoir; Gyeonggi Prov.: 7 exx, Pocheon-si, Soheul-myeon, Neungdae, 7 vii 1992, SH Lee; 5 exx, Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, Dongmak 2-bridge, N38°05'25.76" E127°06'35.11" 70 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, ex under stone near steam; Gyeongnam Prov.: 4 exx, Euiryeong-gun, Yongdeok-myeon, Imok-ri, Deokam-pond, 18 v 2009, SH Lee, pond; 9 ♂♂7 ♀♀, Milyang-si, Yogo-stream, 3 vii 2010, SH Lee; 2 ♂♂1 ♀, Sancheong-gun, Sangbiryang-myeon, Gagye-ri, Matgol-pond, 7 vi 2009, SH Lee; 9 exx, Ulsan-si, Ulju-gun, Duseo-myeon, Hwalcheon-ri, 14 vii 1991, SH Lee, stream; Jeonnam Prov.: 6 ♂♂7 ♀♀, Suncheon-si, Jibon-ri, Wonjibon-bridge, N35°00'23" E127°30'22" 51 m, 5 vi 2014, DH Lee, ex under stone beside stream; 2 exx, Wando-gun, Wando-eup, Daeya-ri, 5 viii 2009, SH Lee.

**DISTRIBUTION:** Korea, China (Beijing, Jilin, Liaoning), Japan, Russia (Far East).

**REGION:** East Palaearctic.

**KOREA:** PN, CB, GW, GB, GG, GN, JN (Lee, 2016: Fig. 8.32A).

**KOREAN RECORDS:** *Laccobius oscillans*: Lee et al., 1988: 72; Lee et al., 1992: 57; Kim et al., 1994: 135; Gentli, 1995: 266; Lee, 1995: 15; Kwon et al., 1996: 474; Hansen, 2004: 58; Cho and Park, 2010: 96. *Laccobius (Microlaccobius) oscillans*: Nitta et al., 2009: 49.

## Genus *Paracymus* Thomson, 1867

Genus *Paracymus* Thomson, 1867

*Paracymus* Thomson, 1867: 120. Type species: *Hydrophilus aeneus* Germar, 1824.

*Eumetacymus* Brèthes, 1922: 263. Type species: *Eumetacymus virescens* Brèthes, 1922 (= *Paracymus rufocinctus* Bruch, 1915).

*Paracymorphus* Kuwert, 1888a: 39. Type species: *Paracymorphus globuloides* Kuwert, 1888 (= *Hydrobius scutellaris* Rosenhauer, 1856).

**DIAGNOSIS:** Dorsal surface of body black. Antennae with 8 antennomeres. Maxillary palpus as long as or shorter than Antennae. Mesoventrite (Lee, 2016: Fig. 8.12C) with a projection pointed apically. Elytra with sutural stria and without rows of serial punctures. Five abdominal sternites (Lee, 2016: Fig. 8.12G) visible (Minoshima, 2014; Lee and Ahn, 2016a).

### Key to the species of Korean *Paracymus*

1. Body longer than 2.0 mm; mesofemur with pubescence on basal half; sternite VII without a row of spines on apical margin ..... *P. aeneus*
- Body shorter than 2.0 mm; mesofemur with pubescence on basal two third; sternite VII with a row of spines on apical margin ..... *P. zaitzevi*

## 29. *Paracymus aeneus* (Germar, 1824) (Pls. 10I, J, 14K)

*Hydrophilus aeneus* Germar, 1824: 96.

*Hydrobius punctulatus* Sturm, 1836: 15.

*Hydrobius salinus* Bielz, 1851: 152.

*Laccobius cupreus* Dalla Torre, 1877: 68.

**DESCRIPTION:** Length 2.5–3.0 mm. Body broadly oval, dorsum with compact punctures, ventum with pubescence.

*Color:* Dorsal surface black, ventral surface reddish brown.

*Head:* Head semicircular, widest across eyes, about 2.0 times as wide as long, microreticulation present on posterior part. Anterior margin of clypeus emarginate. Eye not protruded. Frons about 3.5 times as wide as eye. Frontoclypeal suture present. Antennae with 8 antennomeres; 1 curved and longest; 2 shorter than 1, narrowed basally, about 4.0 times as long as 3; 3 smallest; 4 cup-shaped; 5 dish-shaped; 6–8 clubbed with pubescence. Prementum with a row of setae on anterior margin. Mentum subquadrate, 1.5 times as wide as long, widest across anterior corner, with sparse punctures; anterior margin slightly rounded, anterior corner acute; lateral margins parallel; posterior corner acute; posterior margin straight. Mandibular apex trifold.

Basistipes with a row of spines on lateral margins. Maxillary palpomere 1 smallest; 2 about 4.0 times as long as 1, broad apically; 3 about 2.5 times as long as 1, broad apically; 4 elongate, as long as 2. Labial palpomere 1 smallest; 2 about 5.0 times as long as 1, swollen, with 2 long setae on medial part; 3 as long as 2, subparallel, with few long setae on subapical part.

*Thorax:* Pronotum subtrapezoidal, 1.5 times as wide as head, 3.0 times as wide as long; anterior margin bisinuate; antero-lateral parts protruded; anterior corner obtuse lateral margins broadly rounded; posterior corner rounded; posterior margin slightly bisinuate. Scutellar shield with punctures. Elytra subparallel, rounded apically, slightly wider than pronotum, with sparse setae. Subsutural suture present (except anterior part). Prosternum transverse; medial part with longitudinal carina, without pubescence. Prosternal process triangular, acute apex. Procoxal cavity with spines on dorso-lateral part. Profemur with pubescence on basal two third. Protibia as long as femur, without pubescence, with rows of spines; protibial large spine longer than tarsomeres 1–2 combined. Protarsomere 1 about 1.5 times as long as 2; 2 and 3 as long as 4; 5 about 3.0 times as long as 4. Mesoventral process falcon-shaped, protruded; carina protruded, rounded in lateral view. Mesofemur with pubescence on basal half. Mesotibial large spine longer than tarsomere 1. Mesotarsomere 1 as long as 2, about 2 times as long as 4; 3 about 1.5 times as long as 4; 5 longest 3.0 times as long as 4. Metaventrite with glabrous medially. Metafemur without pubescence and with sparse short spines. Metatibia slightly longer than femur. Metatibial large spine longer than tarsomere 1. Metatarsomere 1 about 2.0 times as long as 2; 2 as long as 3; 4 about 2.0 times as long as 3; 5 slightly shorter than 4.

*Abdomen:* Sternite VII rounded apical margin, without a row of spines. Median lobe (Pl. 14K) of aedeagus slender, gradually narrowed apically, shorter than paramere, widest at base; apical part rounded. Paramere (Pl. 14K) broad, widest at base; inner margins nearly straight; outer margins straight; apical part protruded and rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungnam Prov.: 7 exx, Taean-gun, Nam-myeon, Sinon-ri, N36°51'49.23" E126°12'23.75" 7 m, 30 vii 2013, DH Lee, pond on abandon salt farm; Gyeonggi Prov.: 8 exx, Ansan-si, Danwon-gu, Daebudong-dong, Dongju-salt farm, N37°14'05.60" E126°36'19.55" 4 m, 7 xi 2013, DH Lee, IS Yoo, SG Lee, saline pond near salt farm (1♂, on slide).

**DISTRIBUTION:** Asia: Korea, Iran, Israel, Kyrgyzstan, Kazakhstan, Mongolia, Russia (East Siberia, Far East), Tadjikistan, Turkmenistan, Turkey, Europe: Albania, Austria, Bulgaria, Croatia, Czech Republic, Denmark, France, Great Britain, Germany, Greece, Ireland, Italy, Norway, Portugal, Romania, Russia (South European Territory), Slovenia, Spain, Sweden, The Netherlands, Ukraine, North Africa: Egypt, Tunisia.

**REGION:** Palaearctic.

**KOREA:** CN, GG (Lee, 2016: Fig. 8.32B).

**KOREAN RECORDS:** *Paracymus aeneus*: Lee and Ahn, 2016a: 104.

### 30. *Paracymus zaitzevi* Shatrovskiy, 1989 (Pls. 10K, L, 14L)

*Paracymus zaitzevi* Shatrovskiy, 1989: 190.

**DESCRIPTION:** Length 1.6–1.8 mm. Body broadly oval, dorsum with compact punctures, ventum with pubescence.

*Color:* Dorsal surface black, ventral surface dark brown.

*Head:* Head semicircular, widest across eyes, about 2.0 times as wide as long, microreticulation present on posterior part. Anterior margin of clypeus emarginate. Eye not protruded. Frons about 3.0 times as wide as eye. Frontoclypeal suture present. Antennae with 8 antennomeres; 1 curved and longest; 2 shorter than 1, narrowed basally, about 4.0 times as long as 3; 3 smallest; 4 cup-shaped; 5 dish-shaped; 6–8 clubbed with pubescence. Prementum with a row of setae on anterior margin. Mentum transverse subquadrate, 2.0 times as wide as long, widest across anterior corner, with sparse punctures; anterior margin slightly rounded, anterior corner acute; lateral margins parallel; posterior corner acute; posterior margin straight. Mandibular apex bifid. Basistipes with a row of spines on lateral margins. Maxillary palpomere 1 smallest; 2 about 4.0 times as long as 1, widest at apical third; 3 about 2.5 times as long as 1, broad apically; 4 elongate, as long as 2. Labial palpomere 1 smallest; 2 about 5.0 times as long as 1, swollen, with 2 long setae on medial part; 3 as long as 2, subparallel, with few long setae on subapical part.

*Thorax:* Pronotum subtrapezoidal, 1.5 times as wide as head, 3.0 times as wide as long; anterior margin bisinuate; antero-lateral parts protruded; anterior corner obtuse, lateral margins broadly rounded; posterior corner rounded; posterior margin slightly bisinuate. Scutellar shield with punctures. Elytra subparallel, rounded apically, slightly wider than pronotum, with sparse setae. Subsutural suture present (except anterior part). Prosternum transverse; medial part with longitudinal carina, without pubescence. Prosternal process triangular, acute apex. Procoxal cavity with spines on dorso-lateral part. Profemur with pubescence on basal half. Protibia as long as femur, without pubescence, with rows of spines; protibial large spine longer than tarsomeres 1–2 combined. Protarsomere 1 about 1.5 times as long as 2; 2 and 3 as long as 4; 5 about 3.0 times as long as 4. Mesoventral process falcon-shaped, protruded; carina weakly protruded, broadly rounded in lateral view. Mesofemur with pubescence on basal two third. Mesotibial large spine longer than tarsomere 1. Mesotarsomere 1 as long as 2, about 2 times as long as 4; 3 about 1.5 times as long as 4; 5 longest 3.0 times as long as 4. Metaventrite with glabrous medially. Metafemur without pubescence and with sparse short spines. Metatibia slightly longer than femur. Metatibial large spine longer than tarsomere 1. Metatarsomere 1 about 2.0 times as long as 2; 2 as long as 3; 4 about 2.0 times as long as 3; 5 slightly shorter than 4.

*Abdomen:* Sternite VII rounded apical margin, without a row of spines. Median lobe (Pl. 14L) of aedeagus slender, broad subapical part, shorter than paramere, widest at base; apical part rounded. Paramere (Pl. 14L) slender, widest at base; slightly curved at apical third; apical part rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Gyeonggi Prov.: 12 exx. Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, N38°06'45.13" E127°06'45.13" 104 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, pond (2♂♂, on slides).

**DISTRIBUTION:** Korea, Russia (Far East).

**REGION:** East Palaearctic.

**KOREA:** GG (Lee, 2016: Fig. 8.32B).

**KOREAN RECORDS:** *Paracymus zaitzevi*: Lee and Ahn, 2016a: 104.

## Tribe Hydrobiusini Mulsant, 1844

### Key to the genera of Korean Hydrobiusini

1. Lateral margins of elytra serrated ..... *Ametor*
- Lateral margins of elytra not serrated ..... *Hydrobius*

## Genus *Ametor* Semenov, 1900

### Genus *Ametor* Semenov, 1900

*Ametor* Semenov, 1900: 616. Type species: *Ametor rudesculptus* Semenov, 1900.

**DIAGNOSIS:** Body broadly oval, outline interrupted between pronotum and elytra. Ventral surface covered with hydrofuge pubescence. Pronotal hind angle rounded. Elytral margin (Lee, 2016: Fig. 8.18E) serrated. Apical part of visible last sternite with relatively large setae. Apex of aedeagus (Lee, 2016: Fig. 8.18H) with corona (Hansen, 1991; Komarek, 2003; Lee and Ahn, 2008).

### 31. *Ametor scabrosus* (Horn, 1873) (Pls. 11A, B, 15A)

*Hydrobius scabrosus* Horn, 1873: 188.

*Ametor granulatus* Orchymount, 1942: 19.

*Ametor scabrosus*: Smetana, 1988: 74.

**DESCRIPTION:** Length 5.0–7.0 mm. Body broadly oval, convex dorsally, with compact punctures and microreticulation. Ventral surface flat.

**Color:** Dorsal surface mostly brown, ventral surface mostly dark brown; Antennae, palpi, hypomera,

epipleura, legs mostly yellowish brown to brown.

*Head:* Head subquadrate, widest across eyes. Anterior margin of clypeus emarginate; anterior corner rounded. Eye weakly protruded. Frons about 4.0 times as wide as eye. Labrum with compact setae; anterior margin bisinuate. Antennae with 9 antennomeres; 1 longest, slightly longer than 2; 2 about 2.0 times as long as 3, subparallel; 3 and 4 broad apically; 5 broad at middle; 6 transverse dish-shaped, with setae on anterior part; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, with sparse setae, widest across anterior fifth; antero-medial margin emarginate; anterior corner acute; lateral margins straight; posterior corner rectangular; posterior margin straight. Maxillary palpomere 1 smallest; 2 elongate, about 1.3 times as long as 3, broad apically; 3 broad apically; 4 longest, 1.5 times as long as 3, widest at middle, apex truncate. Labial palpomere 1 smallest; 2 about 2.0 times as long as 1, broad at middle, with few long setae on anterior part; 3 slightly longer than 2, apex truncate. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 2.0 times as wide as head, about 2.0 times as wide as long, widest at middle, with compact large and small punctures; anterior margin emarginate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin broadly rounded. Elytra rounded apically, widest at anterior three fifth, wider than pronotum, with 10 punctato-striae; interval with coarse punctures. Subsutural suture present. Prosternum transverse, slightly convex, with acute process on antero-medial part, posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal third. Protibia as long as femur, without pubescence; protibial inner spine curved and longer than tarsomeres 1–2 combined. Protarsomere 5 longest, as long as 2–4 combined, about 3.0 times as long as 4. Mesoventral process with short process on postero-medial part. Mesofemur with pubescence on basal third. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 slightly longer than 4; 5 slightly shorter than 2. Metaventrite convex medially. Metafemur with pubescence on basal fourth. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 2.0 times as long as 3; 3 slightly longer than 4; 5 slightly shorter than 2.

*Abdomen:* Sternite VII with a row of spines on apical part. Median lobe (Pl. 15A) of aedeagus gradually narrowed apically, apical margin sinuate. Paramere (Pl. 15A) widest at base, apical margin rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Gangwon Prov.: 3♂♂4♀♀, Pyeongchang-gun, Jinbu-myoen, Dongsan-ri, Mt. Odaesan, 8 v 2004, DH Lee, ex mountain stream (2♂♂, on slides); 3♂♂2♀♀, same data as former except for, 25 v 2004 (2♂♂, on slides); 1♂1♀, same data as former except for 15 v 2006.

**DISTRIBUTION:** Asia: Korea, China (Jilin), Russia (Far East), North America: Canada, United states of America.

**REGION:** Palaearctic, Nearctic.

**KOREA:** GW (Lee, 2016: Fig. 8.33B).

**KOREAN RECORDS:** *Ametor scabrosus*: Lee and Ahn, 2008: 237.

## Genus *Hydrobius* Leach, 1815

### Genus *Hydrobius* Leach, 1815

*Hydrobius* Leach, 1815: 96. Type species: *Dytiscus fuscipes* Linnaeus, 1758.

*Limnohydrobius* Reitter, 1909: 357. Type species: *Hydrobius convex* Brullé, 1835.

**DIAGNOSIS:** Maxillary palpomere 4 longer than 3. Prosternum weakly raised medially. Elytra with rows of serial punctures or stria. Metaventrite raised medially. Sternite VII with emargination with stiff setae on apical margin (Smetana, 1988; Komarek, 2003).

### 32. *Hydrobius fuscipes* (Linnaeus, 1758)

*Dytiscus fuscipes* Linnaeus, 1758: 411.

*Dytiscus scarabaeoides* Linnaeus, 1758: 413.

*Scarabaeus aquaticus* Linnaeus, 1760: 139.

*Hydrophilus fuscipes* Müller, 1776: 69.

*Hydrophilus fuscipes* Steven, 1808: 8.

*Hydrobius chalconotus* Stephens, 1829: 128.

*Hydrobius subrotundus* Stephens, 1829: 128.

*Hydrobius aeneus* Solier, 1834: 314.

*Hydrobius levigatus* Laporte, 1840: 55.

*Hydrobius aestivus* Rey, 1885: 246.

**DISTRIBUTION:** Asia: Korea, China (Nei Mongol, Xinjiang), Cyprus, Iran, Iraq, Israel, Japan, Kazakhstan, Russia (East Siberia, Far East, West Siberia), Syria, Turkey, Europe: Albania, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Poland, Portugal, Romania, Russia (Central European Territory, South European Territory) Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The Netherlands, Ukraine, Yugoslavia.

**REGION:** Palearctic.

**KOREAN RECORDS:** *Hydrobius fuscipes*: Kwon and Suh, 1986: 101; Kim et al., 1994: 135; Cho and Park, 2010: 96.

**REMARKS:** This species has been recorded in Korea by Kwon and Suh (1986), Kim et al. (1994) and Cho and Park (2010), only in their checklists without any taxonomic comments. We could not find any Korean specimen and the occurrence of this species in Korea is suspicious. However, its occurrence in Korea is

probable because it is known from neighbouring countries [China, Japan and Russia (Far East)]. Therefore, we cite this species here based on the previous records until we will find clear evidence.

## Tribe Hydrophilini Latreille, 1802

### Key to the genera of Korean Hydrophilini

1. Body longer than 20 mm; antennomeres 8–9, with long setae ..... *Hydrophilus*  
– Body shorter than 20 mm; antennomeres 8–9, without long setae ..... 2
2. Body longer than 10.0 mm; maxillary palpomere 4 shorter than 3 ..... *Hydrochara*  
– Body shorter than 10.0 mm; maxillary palpomere 4 longer than 3 ..... *Sternolophus*

## Genus *Hydrochara* Berthold, 1827

### Genus *Hydrochara* Berthold, 1827

*Hydrochara* Berthold, 1827: 355. Type species: *Dytiscus caraboides* Linneaus, 1758.

*Hydrocharis* Hope, 1838: 125. Type species: *Dytiscus caraboides* Linneaus, 1758.

*Hydraechus* Stephens, 1839: 88. Type species: *Dytiscus caraboides* Linneaus, 1758.

*Hydrochares* Sharp, 1873: 58. Type species: *Dytiscus caraboides* Linneaus, 1758.

**DIAGNOSIS:** Apical margin of clypeus truncate. Antennomere 7 lunulate. Maxillary palpomere 4 not longer than 3. Prosternum tectiform medially, anterior projection without setae (Smetana, 1980; Komarek, 2003).

### Key to the species of Korean *Hydrochara*

1. Ventral surface of body reddish brown; apical part of paramere rounded ..... *H. affinis*  
– Ventral surface of body black; apical part of paramere bent ..... *H. libera*

### 33. *Hydrochara affinis* (Sharp, 1873) (Pls. 11C, D, 15B)

*Hydrochares affinis* Sharp, 1873: 58.

*Hydrochara affinis*: Leech, 1955: 81.

**DESCRIPTION:** Length 16.0–19.0 mm. Body long oval, convex dorsally, with microreticulation. Ventral sur-

face slightly convex, with pubescence.

*Color:* Dorsal surface mostly black, ventral surface mostly reddish brown; Antennae, palpi, legs yellowish brown.

*Head:* Head subtrapezoidal, widest across eyes, with punctures on around eyes and lateral parts of clypeus. Anterior margin of clypeus rounded; anterior corner rounded. Eye strongly protruded. Frons about 2.0 times as wide as eye. Labrum with a row of setae on posterior part; anterior margin emarginate. Antennae with 9 antennomeres; 1 longest, about 2.0 times as long as 2; 2 about 2.0 times as long as 3, widest at middle; 3–5 broad apically; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, widest across posterior corner; anterior margin rounded; anterior corner rounded; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Maxillary palpomere 1 smallest; 2 longest, slightly longer than 3, broad apically; 3 about 2.0 times as long as 4, broad apically; 4 elongate, widest at apical third, apex truncate, apical part dark brown. Labial palpomere 1 smallest; 2 longest, about 1.2 times as long as 3, broad apically, with many long setae on inner lateral part; 3 semicircular, apex truncate, with a long seta on lateral part. Gula suture non-parallel.

*Thorax:* Pronotum subtrapezoidal, 2.0 times as wide as head, about 2.5 times as wide as long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin bisinuate. Elytra rounded apically, widest at anterior two third, slightly wider than pronotum. Subsutural suture absent. Prosternum with carina on medial part; anterior part of carina rounded in lateral view. Procoxal cavity large and subtriangular. Profemur with pubescence on basal margin. Protibia as long as femur, without pubescence; protibial inner spine shorter than tarsomeres 1–2 combined. Protarsomere 2 about 2.0 times as long as 3; 3 about slightly longer than 4; 4 shortest; 5 longest, about 3.0 times as long as 4. Mesoventrite protruded medially. Meso- and metaventral keel long, slender, widest at posterior fifth, acute both ends. Mesofemur without pubescence. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4. Metaventrite protruded medially. Metafemur without pubescence. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4.

*Abdomen:* Sternite VII without emargination, apical part glabrous. Median lobe (Pl. 15B) of aedeagus broad, subparallel, widest at base; apical part rounded. Paramere (Pl. 15B) slender, slightly longer than median lobe, apical part bent.

**TYPE MATERIAL:** Lectotype: 1♂ (NHM), with labels as follows: “LECTOTYPE, Japan. Lewis., Sharp Coll 1905–313., Japan, *Hydrochares affinis* Type D.S., LECTOTYPE. *Hydrochares affinis* Sharp A. Smetana des. 1978”.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 2 exx, Cheongju-si, Heungdek-gu, Jidong-dong, 3 v 2005, DH Lee, ex temporary pool; 2 exx, Chungju-si, Chilgeun-dong, Tangeumdae, 30 vii 1994, SH Lee;

4 exx, Eumseong-gun, Gamgok-myeon, Jucheon-ri, Jucheon-reservoir, N37°04'31.37" E127°37'49.94", 98 m, 16 viii 1989, SH Lee, reservoir; 6 exx, Goisan-gun, Iin-pond, 18 viii 1990, SH Lee; Chungnam Prov.: 6 exx, Taean-gun, Iwon-myeon, Gwan-ri, Iwon-seawall, N36°53'902" E126°16'219" 3 m, 5 viii 2015, DH Lee, SH Lee, at light near reclaimed land; 1♂1♀, Taean-gun, Nam-myeon, Sinon-ri, N36°51'49.23", E126°12'23.75" 7 m, 30 vii 2013, DH Lee, pond on abandon salt farm; Gangwon Prov.: 7 exx, Hwacheon-gun, Gandong-myeon, Yuchon-ri, 30 vii 1987, SH Lee; 10 exx, Pyeongchang-gun, Baesujang, 29 vii 1994, SH Lee; Gyeongbuk Prov.: 1 ex, Cheongsong-gun, Budong-ri, Sangeui-ri, Mt. Juwangsan, 19 vii 1989, SH Lee; 10 exx, Gyeongju-si, Geoncheon-eup, Sinpyeong-ri, 28 v 1993, SH Lee; Gyeonggi Prov.: 3 exx, Gwangju-si, Jungdae-dong, Jungang-reservoir, 20 viii 1989; 5 exx, Icheon-si, Seolseong-myeon, 19 viii 1988; 16 exx, Incheon-si, Ongjin-gun, Baekryeong-myeon, 28 vii 2011, HM Lim, at light; 18 exx, Suwon-si, Paldal-gu, Hwaseo-dong, Seoho-reservoir, 4 ix 1990, SH Lee; Gyeongnam Prov.: 1 ex, Geochang-gun, Gasi-pond, 10 viii 1989, SH Lee; 1 ex, Gimhae-si, Jinyeong-eup, 12 viii 1995, SH Lee; 1 ex, Haman-gun, Beobsu-myeon, Daesong-ri, Daepyeong-swamp, N35°20'22.14", E128°20'15.08" 19 m, 22 v 1988, SH Lee, swamp; Jeju Prov.: 1 ex, Bukjeju-gun, Jocheon-eup, Seonheul-ri, Dongbaek-pond, 25 ix 2008, DH Lee, ex pond; 5 exx, Jeju-si, Hanrim-eup, Opo [= Ongpo-ri], 24 vii 1990, SH Lee.

**DISTRIBUTION:** Korea, China (Anhui, Beijing, Fujian, Gansu, Heilongjiang, Henan, Hubei, Jiangxi, Nei Mongol, Qinghai, Sichuan, Shanghai, Shangdong, Zhejiang), Japan, Kazakhstan, Mongolia, Russia (East Siberia, Far East), Tadzhikistan, Uzbekistan.

**REGION:** Palaearctic.

**KOREA:** CB, CN, GW, GB, GG, GN, JJ (Lee, 2016: Fig. 8.32C).

**KOREAN RECORDS:** *Hydrochara affinis*: Kwon and Suh, 1986: 101; Lee et al., 1988: 85; Yoon, 1988: 633; Kim and Lee, 1991: 65; Lee et al., 1992: 56; Kim et al., 1994: 135; Lee, 1994: 18; Hansen, 2004c: 53; Han et al., 2007: 272; Han et al., 2008: 271; Park et al., 2008: 259; Cho and Park, 2010: 96. *Hydrophilus affinis*: Mochizuki and Matsui, 1939: 55; Kamiya, 1940: 130; Cho, 1957: 212; 1963: 46; 1969: 255; Kim and Nam, 1982: 28; Lee et al., 1985: 405. *Hydrochares affinis*: Okamoto, 1924: 167 [misspelling of *Hydrochara affinis*]. *Hydrophilus affing* [misspelling of *Hydrochara affinis*]: Ishii, 1940: 44.

### 34. *Hydrochara libera* (Sharp, 1884) (Pls. 11E, F, 15C)

*Hydrocharis libera* Sharp, 1884: 450.

*Hydrochara libera*: Smetana, 1980: 43.

**DESCRIPTION:** Length 17.0–19.0 mm. Body long oval, convex dorsally, with microreticulation. Ventral surface slightly convex, with pubescence.

**Color:** Dorsal and ventral surface mostly black; Antennae, palpi, legs reddish brown.

*Head:* Head subtrapezoidal, widest across eyes, with punctures on around eyes and lateral parts of clypeus. Anterior margin of clypeus rounded; anterior corner rounded. Eye strongly protruded. Frons about 2.2 times as wide as eye. Labrum with a row of setae on posterior part; anterior margin emarginate. Antennae with 9 antennomeres; 1 longest, about 2.0 times as long as 2; 2 about 2.0 times as long as 3, widest at middle; 3–5 broad apically; 6 transverse dish-shaped; 7–9 clubbed, with pubescence; 7 and 8 subquadrate; 9 oval. Prementum with compact long setae on anterior part. Mentum subquadrate, widest across posterior corner; anterior margin rounded; anterior corner rounded; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Maxillary palpomere 1 smallest; 2 longest, slightly longer than 3, broad apically; 3 about 2.0 times as long as 4, broad apically; 4 elongate, widest at apical third, apex truncate, apical part dark brown. Labial palpomere 1 smallest; 2 longest, about 1.2 times as long as 3, broad apically, with many long setae on inner lateral part; 3 semicircular, apex truncate, with a long seta on lateral part. Gula suture non-parallel.

*Thorax:* Pronotum subtrapezoidal, 2.2 times as wide as head, about 2.5 times as wide as long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin bisinuate. Elytra rounded apically, widest at anterior two third, slightly wider than pronotum. Subsutural suture absent. Prosternum with carina on medial part; anterior part of carina slightly acute in lateral view. Procoxal cavity large and subtriangular. Profemur with pubescence on basal margin. Protibia as long as femur, without pubescence; protibial inner spine shorter than tarsomeres 1–2 combined. Protarsomere 2 about 2.0 times as long as 3; 3 about slightly longer than 4; 4 shortest; 5 longest, about 3.0 times as long as 4. Mesoventrite protruded medially. Meso- and metaventral keel long, slender, widest at posterior fifth, acute both ends. Mesofemur without pubescence. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4. Metaventrite protruded medially. Metafemur without pubescence. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4.

*Abdomen:* Sternite VII without emargination, apical part glabrous. Median lobe (Pl. 15C) of aedeagus subparallel, widest at base; apical margin emarginate. Paramere (Pl. 15C) longer than median lobe, widest at base, narrowed at apical third, apical part rounded.

*Larvae:* see Minoshima et al. (2012).

**TYPE MATERIAL:** 1♂ (NHM), with labels as follows: “LECTOTYPE, Hako, Sharp Coll 1905–313., *Hydrocharis libera* Type D.S. Hakodate Jap., Japan. Lewis., LECTOTYPE *Hydrocharis libera* Sharp A. Smetana des. 1978”.

**SPECIMENS EXAMINED:** SOUTH KOREA: Gangwon Prov.: 2♂♂2♀♀, Chuncheon-si, Chiljeong, 3 viii 1988, SH Lee; 1♂, Inje-gun, Namjeon-ri, 1 viii 1991, SH Lee; 3♂♂1♀, Wonju-si, 3 viii 1988, SH Lee;

Gyeongbuk Prov.: 1 ex, Mungyeong-si, Seodui-pond, 13 vi 2009, SH Lee; Gyeonggi Prov.: 1♂, Gwangju-si, Hwajeong-pond, 20 viii 1989, SH Lee; 2 exx, Incheon-si, Jung-gu, Yeongjong-island, 1 ix 2010, SJ Park, HM Lim, at light; 1♂1♀, Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, N38°06'45.13" E127°06'45.13" 104 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, ex pond.

**DISTRIBUTION:** Korea, China (Beijing, Heilongjiang, Jiangsu, Liaoning), Japan, Russia (Far East).

**REGION:** East Palaearctic.

**KOREA:** GW, GB, GG (Lee, 2016: Fig. 8.32C).

**KOREAN RECORDS:** *Hydrochara libera*: Kwon and Suh, 1986: 101; Lee et al., 1988: 86; Yoon, 1988: 633; Kim et al., 1994: 135; Hansen, 2004: 54 (North Korea); Han et al., 2007: 272; Han et al., 2008: 282; Park et al., 2008: 259; Cho and Park, 2010: 96.

### 35. *Hydrochara vicina* Bameul, 1996

*Hydrochara vicina* Bameul, 1996: 5.

**DISTRIBUTION:** Korea (North).

**REGION:** East Palaearctic.

**KOREA:** North.

**KOREAN RECORDS:** Bameul, 1996: 5; Kim, 2002a: 240; Kim, 2002b: 275; Hansen, 2004: 54 (North Korea).

**REMARKS:** This species has been recorded only in North Korea by Bameul (1996). We could not find any South Korean specimen but cited this species based on the previous records.

## Genus *Hydrophilus* Geoffroy, 1762

### Genus *Hydrophilus* Geoffroy, 1762

*Hydrophilus* Geoffroy, 1762: 180. Type species: *Dytiscus piceus* Linneaus, 1758.

*Stethoxus* Solier, 1834: 302. Type species: *Hydrophilus ater* Gmelin, 1790 (= *Hydrophilus ensifer* Brullé, 1837).

*Hydrosoma* Laporte, 1840: 50. Type species: *Hydrophilus latipalpus* Laporte, 1840.

*Hydrodema* Laporte, 1840: 51. Type species: *Hydrophilus albipes* Laporte, 1840.

*Pagipherus* Kuwert, 1893: 82. Type species: *Hydrophilus triangularis* Say, 1823.

**DIAGNOSIS:** Prosternum with a conspicuous process antero-medially, deeply sulcate posteriorly. Anterior

angle of elytron obtuse, without spine. Meso- and metaventral keel (Lee, 2016: Fig. 8.15A) without notch and setae, posteriorly extending in a long spine (Smetana, 1980; Komarek, 2003).

### Key to the species of Korean *Hydrophilus*

1. Body longer than 40.0 mm; meso- and metaventral keel widest anterior two third..... *H. acuminatus*
- Body shorter than 40.0 mm; meso- and metaventral keel widest anterior third.....  
..... *H. bilineatus cashimirensis*

## 36. *Hydrophilus acuminatus* Motschulsky, 1854 (Pls. 11G, H, 15D)

*Hydrophilus acuminatus* Motschulsky, 1854: 44.

*Hydrous pallidipalpis* MacLeay, 1825: 35.

*Hydrous sumatrae* Kuwert, 1893: 85.

**DESCRIPTION:** Length 45.0–50.0 mm. Body long oval, convex dorsally, with microreticulation. Ventral surface convex.

**Color:** Body mostly black; Antennae, palpi reddish brown.

**Head:** Head subtrapezoidal, widest across eyes, with punctures on around eyes. Anterior margin of clypeus bisinuate; anterior corner rounded. Eye strongly protruded. Frons about 3.0 times as wide as eye. Labrum with a row of setae on postero-lateral parts; anterior margin rounded. Antennae with 9 antennomeres; 1 longest, about 2.0 times as long as 2; 2 about 2.0 times as long as 3, widest at middle; 3–5 broad apically; 6 transverse dish-shaped; 7–9 clubbed, with pubescence; 7 and 8 V-shaped, with long setae on inner-lateral part; 9 oval. Prementum with compact long setae on anterior part. Mentum subquadrate, widest across posterior corner; anterior margin rounded; anterior corner obtuse; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Maxillary palpomere 1 smallest; 2 longest, slightly longer than 3, curved, broad apically; 3 about 1.5 times as long as 4, curved, broad apically; 4 elongate, widest apical fourth, apex truncate. Labial palpomere 1 smallest; 2 longest, about 1.5 times as long as 3, broad apically, with few long setae on anterior part; 3 elongate, apex truncate. Gula suture non-parallel.

**Thorax:** Pronotum subtrapezoidal, 2.5 times as wide as head, about 2.5 times as wide as long, widest across posterior corner; anterior margin emarginate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin bisinuate. Elytra widest at middle, slightly wider than pronotum; emarginate apically, with small apical tooth. Subsutural suture absent. Prosternum with acute process on medial part. Procoxal cavity large and subtriangular. Profemur with pubescence on basal margin. Protibia as long as femur, without pubescence; protibial inner spine longer than tarsomeres 1–2 combined. Protar-

somere 2 slightly longer than 3; 3 slightly longer than 4; 4 shortest; 5 longest, about 2.5 times as long as 4, shorter than 2–4 combined. Mesoventrite protruded medially. Meso- and metaventral keel long, slender, widest at anterior two third, narrowed at middle, acute both ends; posterior end reached sternite IV. Mesofemur without pubescence. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4. Metaventricle protruded medially. Metafemur without pubescence. Metatibial inner spine longer than tarsomeres 1–2 combined. Metatarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4.

*Abdomen*: Sternites IV–V without pubescence except for lateral margins. Sternite VII without emargination and glabrous part. Median lobe (Pl. 15D) of aedeagus subparallel, widest at base; apical part slightly protruded. Paramere (Pl. 15D) longer than median lobe, widest at base; apical part protruded laterally.

*Larvae*: see Minoshima and Hayashi (2011).

**SPECIMENS EXAMINED**: SOUTH KOREA: Chungnam Prov.: 1 ex, Daejeon-si, Seongbuk-dong, Bandong-reservoir, 5 viii 2000, HJ Kim, at light; 3 exx, Gongju-si, Mt. Gyeryongsan, 3 x 1978, La; 2 exx, Nonsan-si, Noseong-myoen, 1 viii 1990, SH Lee; Gangwon Prov.: 2 exx, Cheorwon-gun, Dongsong-eup, Odeok-ri, Hakji-reservoir, N38°13'56.69" E127°13'29.68" 190 m, 15 ix 1990, SH Lee, reservoir; 2♂♂1♀, Gangneung-si, Hasi-dong, 4 viii 1988, SH Lee; 1♂1♀, Wonju-si, Dongmak-pond, 3 viii 1988, SH Lee; Gyeongbuk Prov.: 1♂1♀, Andong-si, Oihwa, 19 vi 1988, SH Lee; 1♂1♀, Gimcheon-si, 10 viii 1988, SH Lee; 2 exx, Pohang-si, Buk-gu, Gibuk-myeon, Seongbeob-ri, 15 ix 1991, SH Lee; 1♂1♀, Yeongju-si, Hwayeon-pond, 2 viii 1988, SH Lee; Gyeonggi Prov.: 3♂♂1♀, Gwangneung, 4 viii 1986, Park; 1♂, Yangju-si, Hwang-pond, 7 viii 1988, SH Lee; Gyeongnam Prov.: 1♂2♀♀, Haman-gun, Daepyeong-swamp, 24 v 1988, SH Lee; 1 ex, Milyang-si, Danjang-myeon, Beobheung-ri, 17 vi 1990, SH Lee; 2♂♂1♀, Yangsan-si, Daeseok-pond, 2 x 1988, SH Lee; Jeju Prov.: 1 ex, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 12 vi 2005, DH Lee, ex pond; Jeonbuk Prov.: 1♂1♀, Wanju-si, Mt. Naejangsan, 15 ix 1985, YB Cho; Jeonnam Prov.: 3♂♂1♀, Gurye-gun, Hwaem-temple, 25 vii 1981; 2♂♂1♀, Yeongam-gun, Taegan-pond, 22 vii 1988, SH Lee.

**DISTRIBUTION**: Korea, China (Beijing, Guandong, Hebei, Hongkong, Jiangxi, Nei Mongol, Sichuan, Shanghai, Xinjiang, Yunnan), Japan, Russia (Far East), Taiwan.

**REGION**: Palaearctic.

**KOREA**: CN, GW, GB, GG, GN, JJ, JB, JN (Lee, 2016: Fig. 8.32D).

**KOREAN RECORDS**: *Hydrophilus acuminatus*: Kim et al., 1974: 221; Kwon and Suh, 1986: 102; Lee et al., 1988: 83; Yoon, 1988: 631; Kim and Lee, 1991: 65; Park and Kim, 1993: 110; Kim et al., 1994: 135; Lee, 1994: 18; Kim, 1995: 132; Kim and Kim, 1996a: 48; Kim and Kim, 1996b: 126; Kim, 2000: 131; Hua, 2002: 44; Hansen, 2004: 54; Han et al., 2007: 272; Han et al., 2008: 285; Park et al., 2008: 261; Cho and Park, 2010: 96. *Hydrous acuminatus*: Ishii, 1940: 44; Kamiya, 1940: 136; Cho, 1957: 212; 1969: 256; Kim and Nam, 1982: 28 [genus synonym of *Hydrophilus*].

**37. *Hydrophilus bilineatus cashimirensis* Kolla and Redtenbacher, 1844**  
(Pls. 11I, J, 15E)

*Hydrophilus bilineatus cashimirensis* Kolla and Redtenbacher, 1844: 513.

*Hydrophilus japonicus* Sharp, 1873: 57.

*Stethoxus birmanicus* Régimbart, 1902: 202.

**DESCRIPTION:** Length 25.0–30.0 mm. Body long oval, convex dorsally, with microreticulation. Ventral surface slightly convex, with pubescence.

**Color:** Body mostly black; Antennae, palpi, protarsi, femur reddish brown.

**Head:** Head subtrapezoidal, widest across eyes, with punctures on around eyes. Anterior margin of clypeus bisinuate; anterior corner rounded. Eye strongly protruded. Frons about 2.0 times as wide as eye. Labrum with a row of setae on postero-lateral parts; anterior margin rounded. Antennae with 9 antennomeres; 1 longest, about 2.0 times as long as 2; 2 about 2.0 times as long as 3, widest at middle; 3–5 broad apically; 6 transverse dish-shaped; 7–9 clubbed, with pubescence; 7 and 8 V-shaped, with long setae on inner-lateral part; 9 oval. Prementum with compact long setae on anterior part. Mentum subquadrate, widest across posterior corner; anterior margin rounded; anterior corner obtuse; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Maxillary palpomere 1 smallest; 2 longest, 1.2 times as long as 3, curved, broad apically; 3 about 1.5 times as long as 4, curved, broad apically; 4 elongate, widest apical fourth, apex truncate, apical part dark brown. Labial palpomere 1 smallest; 2 longest, about 1.2 times as long as 3, broad apically; 3 elongate, apex truncate, with a long seta on anterior part. Gula suture non-parallel.

**Thorax:** Pronotum subtrapezoidal, 2.5 times as wide as head, about 2.5 times as wide as long, widest across posterior corner; anterior margin emarginate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin bisinuate. Elytra widest at anterior two third, slightly wider than pronotum; emarginate apically, with small apical tooth. Subsutural suture absent. Prosternum protruded medially, with deep pit. Procoxal cavity large and subtriangular. Profemur with pubescence on basal margin. Protibia as long as femur, without pubescence; protibial inner spine shorter than tarsomeres 1–2 combined. Protarsomere 2 about 2.5 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 longest, about 3.0 times as long as 4. Mesoventrite protruded medially. Meso- and metaventral keel long, slender, widest at anterior third, narrowed at middle, acute both ends; posterior end reached sternite V. Mesofemur without pubescence. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4. Metaventrite protruded medially. Metafemur without pubescence. Metatibial inner spine longer than tarsomeres 1–2 combined. Metatarsomere 2 longest, 2.0 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 1.5 times as long as 4.

**Abdomen:** Sternite VII without emargination and glabrous part. Median lobe (Pl. 15E) of aedeagus grad-

usually slender apically, widest at base; apical margin rounded. Paramere (Pl. 15E) about 1.2 times as long as median lobe, widest at base, slightly curved at middle; apical part protruded laterally.

**TYPE MATERIAL:** Syntype: 1♂ (NHM), with labels as follows: “Type, Japan. Lewis., Sharp Coll 1905–313., Japan, *Hydrophilus japonicus* ♂ Type D.S.”.

**SPECIMENS EXAMINED:** NORTH KOREA: 5 exx, Pyongyang-city, arounded Pyongyang-Hotel near Dae-dong-river, 8 vii 2008, Changdo Han; 1 ex, same as date former except for, 15 vii 2008; SOUTH KOREA: Chungbuk Prov.: 1♂, Okcheon-gun, Iwon-myeon, Yongbang-ri, 29 x 1989, SH Lee; Gyeonggi Prov.: 2 exx, Incheon-si, Ganghwa-gun, Seodo-myeon, Boleum-island, 17 x 2008, SG Lee, at light; 4 exx, Incheon-si, Jung-gu, Yeongjong-island, 7 ix 2010, SJ Park, HM Lim, at light; Jeju Prov.: 3♀♀, Jeju-si, Boseong, 9 vii 1985, YB Cho; Jeonnam Prov.: 2 exx, Jindo-gun, Gunnae-myeon, Dunjeon-ri, Geuseong-reservoir, 28 vii 2010, SH Lee.

**DISTRIBUTION:** Korea, Bhutan, China (Hubei, Jiangxi, Sichuan, Yunnan), Japan, Sikkim, Taiwan.

**REGION:** Palaearctic.

**KOREA:** PN, CB, GG, JJ, JN (Lee, 2016: Fig. 8.32D).

**KOREAN RECORDS:** *Hydrophilus bilineatus cashimirensis*: Lee et al., 1988: 84; Lee et al., 1992: 56; Kim et al., 1994: 135; Hansen, 2004: 54; Park et al., 2008: 263; Nitta et al., 2009: 50; Cho and Park, 2010: 96.

## Genus *Sternolophus* Solier, 1834

### Genus *Sternolophus* Solier, 1834

*Sternolophus* Solier, 1834: 302. Type species: *Sternolophus rufipes* Solier, 1834.

**DIAGNOSIS:** Apical margin of clypeus truncate, not exposing articulation membrane of labrum. Antennomere 7 not lunulate. Maxillary palpomere 4 not shorter than 3. Prosternum with antero-medial projection with one or few long setae (Smetana, 1980; Komarek, 2003).

### 38. *Sternolophus rufipes* (Fabricius, 1792) (Pls. 11K, L, 15F)

*Hydrophilus rufipes* Fabricius, 1792, 183.

*Tropisternus mergus* Kolla and Redtenbacher, 1844: 514.

*Sternolophus fulvipes* Motschulsky, 1854: 45.

**DESCRIPTION:** Length 12.0–13.0 mm. Body long oval, convex dorsally, with microreticulation. Ventral sur-

face slightly convex, with pubescence.

*Color:* Body mostly black; Antennae, palpi, mesoventrite, hypomera, epipleura, legs yellowish brown to reddish brown.

*Head:* Head subtrapezoidal, widest across eyes, with punctures on around eyes and lateral parts of clypeus. Anterior margin of clypeus straight; anterior corner rounded. Eye strongly protruded. Frons about 1.8 times as wide as eye. Labrum with sparse setae; anterior margin emarginate. Antennae with 9 antennomeres; 1 longest, about 2.0 times as long as 2; 2 about 2.0 times as long as 3, widest at middle; 3–5 broad apically; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subpentagonal, widest across posterior corner; anterior margin bisinuate; antero-medial margin deeply emarginate; anterior corner obtuse; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Maxillary palpomere 1 smallest; 2 longest, about 1.5 times as long as 3, broad apically; 3 broad apically; 4 elongate, slightly longer than 3, widest apical third, apex truncate, apical part dark brown. Labial palpomere 1 shortest; 2 longest, slightly longer than 3, broad apically with few long setae on anterior part; 3 semicircular, apex truncate, with a long seta on lateral part. Gula suture non-parallel.

*Thorax:* Pronotum subtrapezoidal, 2.0 times as wide as head, about 2.5 times as wide as long, widest across posterior corner; anterior margin emarginate; anterior corner rounded; lateral margins broadly rounded; posterior corner rounded; posterior margin broadly rounded. Elytra rounded apically, widest at middle, slightly wider than pronotum. Subsutural suture absent. Prosternum with carina on medial part; anterior part of carina acute, with compact setae. Procoxal cavity large and subtriangular. Profemur with pubescence on basal sixth. Protibia as long as profemur, without pubescence; protibial inner spine shorter than tarsomeres 1–2 combined. Protarsomere 2 about 1.5 times as long as 3; 3 about 1.2 times as long as 4; 4 shortest; 5 longest, about 3.0 times as long as 4. Mesoventrite protruded medially. Meso- and metaventral keel long, slender, widest at middle, acute both ends. Mesofemur with pubescence on basal sixth. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 2 longest, 2.5 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 2.0 times as long as 4. Metaventrite protruded medially. Metafemur with pubescence on basal fifth. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 2 longest, 2.5 times as long as 3; 3 slightly longer than 4; 4 shortest; 5 about 2.0 times as long as 4.

*Abdomen:* Lateral parts of sternites III–VII reddish brown. Sternite VII without emargination on apical margin. Median lobe (Pl. 15F) of aedeagus broad, subparallel, widest at base; apical part acute. Paramere (Pl. 15F) slender, as long as median lobe, apical margin rounded.

*Larvae:* see Minoshima and Hayashi (2011).

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 1 ex, Cheongju-si, Heungdeok-gu, Gansgeodong, Hanagagol-pond, 22 x 2005, DH Lee, ex pond; 4 exx, Eumseong-gun, Gamgok-myeon, Jucheon-ri, Jucheon-reservoir, N37°04'31.37" E127°37'49.94" 98 m, 16 viii 1989, SH Lee, reservoir; Chungnam

Prov.: 4 exx, Boryeong-si, Juppo-myeon, Boryeong-ri, Boryeong-reservoir, N36°24'44.94" E126°35'47.58" 83 m, 2 x 2011, SH Lee, reservoir; 1 ex, Buyeo-gun, Buyeo-eup, Yongjeong-ri, 3 x 2011, SH Lee; 5 exx, Cheonan-si, Choengsu-dong, Cheongsu-pond, 14 ix 1990, SH Lee; 1 ex, Taean-gun, Nam-myeon, Sinon-ri, N36°51'49.23" E126°12'23.75" 7 m, 30 vii 2013, DH Lee, pond on abandon salt farm; 1 ex, Taean-gun, Nam-myeon, Hwangchon-ri, N36°51'49.23" E126°12'23.75" 7 m, 31 vii 2013, DH Lee, ex pond on abandon salt farm; Gyeongbuk Prov.: 1 ex, Cheongsong-gun, Cheongsong-eup, N36°26'00.53" E128°03'46.11" 195 m, 11 vii 2010, DH Lee, at light; 3 exx, Gyeongsan-si, Jinryang-eup, 11 viii 1989, SH Lee; Gyeonggi Prov.: 2 exx, Gwangju-si, Jungdae-dong, Jungang-reservoir, 20 viii 1989; 10 exx, Icheon-si, Seolseong-myeon, 19 viii 1988; Gyeongnam Prov.: 2♂♂, Gimhae-si, Jinyeong-eup, 12 viii 1995, SH Lee; 1 ex, Sacheon-si, Gomyeong-myeon, Yongsan-ri, Dasol-temple, N35°04'57.68" E127°55'11.37" 155 m, 14 viii 1995, SH Lee, pond; 1 ex, Sancheong-gun, Geumseo-myeon, Maechon-ri, Sinpung-pond, 10 viii 1989, SH Lee; Jeju Prov.: 1 ex, Bukjeju-gun, Jocheon-eup, Seonheul-ri, Dongbaek garden pond, 2 iii 2007, DH Lee, ex pond; Jeonbuk Prov.: 6 exx, Imsil-gun, Samgyeo-myeon, 14 viii 1989, SH Lee; 1 ex, Iksan-si, Samgi-myeon, Yeondong-ri, 26 iv 2009, SH Lee; 1 ex, Jangsu-gun, Myeonggeum-pond, 14 viii 1989, SH Lee; 2 exx, Namwon-si, Sandong-myeon, Sikryeon-ri, 26 iv 2009, SH Lee; 1 ex, Sunchang-gun, Ingye-myeon, Tab-ri, Tabri-reservoir, N35°27'20.55" E127°08'56.13" 192 m, 1 viii 2009, SH Lee, reservoir; 1 ex, Wanju-gun, Samrye-myeon, Ha-ri, 3 x 2005, DH Lee, ex pond; Jeonnam Prov.: 1 ex, Gangjin-gun, Maryang-myeon, Suin-ri, 17 iv 2004, DH Lee, ex rice field.

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Guandong, Hunan, Jiangsu, Xizang, Yunnan, Zhejiang), Japan, Kashmir, Nepal, Sikkim, Taiwan.

**REGION:** Palaearctic.

**KOREA:** CB, CN, GB, GG, GN, JJ, JB, JN (Lee, 2016: Fig. 8.33A).

**KOREAN RECORDS:** *Sternolophus rufipes*: Okamoto, 1924: 167; Mochizuki and Matsui, 1939: 55; Ishii, 1940: 44; Cho, 1957: 212; 1963: 46; 1969: 255; Kim et al., 1974: 221; Kim and Nam, 1982: 28; Lee et al., 1985: 405; Kwon and Suh, 1986: 101; Lee et al., 1988: 86; Yoon, 1988: 634; Kim and Lee, 1991: 65; Lee et al., 1992: 57; Kim et al., 1994: 135; Lee, 1994: 18; Hua, 2002: 45; Hansen, 2004: 55; Han et al., 2007: 272; Han et al., 2008: 2871; Park et al., 2008: 264; Cho and Park, 2010: 96.

## Subfamily Chaetarhriinae Bedel, 1881

**DIAGNOSIS:** Scutellary stria of elytra absent or reduced. Anapleural sutures of mesoventrite present. Mesofurca without long dorsal arms. Apical margin of sternite VII without emargination (Short and Fikáček, 2013).

## Tribe Anacaenini Thomson, 1859

### Genus *Crenitis* Bedel, 1881

#### Genus *Crenitis* Bedel, 1881

*Crenitis* Bedel, 1881: 306. Type species: *Hydrobius punctatostratus* Latzner, 1840.

*Creniphilus* Horn, 1890: 267. Type species: *Hydrobius ruviventris* Horn, 1873.

*Noxonus* Orchymont, 1925a: 164. Type species: *Crenitis zimmermanni* Knisch, 1924.

*Aparachymus* Matsui and Nakane, 1985: 91. Type species: *Anacaena japonica* Nakane, 1963.

**DIAGNOSIS:** Eyes protruded. Antennae with 8–9 antennomeres. Maxillary palpomere 2 swollen, 4 longer than 3. Posterior margin of pronotum bisinuate. Prosternum not carinate. Elytra with rows of serial punctures and sutural stria. Metafemur with pubescence on basal part. Metatarsomere 1 shorter than 2 (Smetana, 1988; Hebauer, 1994; Komarek, 2003).

#### Key to the species of Korean *Crenitis*

1. Body oval; Antennae with 9 antennomeres; Pro- and mesofemur with pubescence on basal two third .....  
..... *C. apicalis*
- Body long oval; Antennae with 8 antennomeres; Pro- and mesofemur with pubescence on basal half .....  
..... *C. primorica*

### Subgenus *Acrenitis* Matsui and Nakane, 1985

*Acrenitis* Matsui and Nakane, 1985: 91. Type species: *Crenitis osawai* Nakane, 1966.

#### 39. *Crenitis (Acrenitis) formosana* Hebauer, 1994

*Crenitis formosana* Hebauer, 1994: 20.

**DISTRIBUTION:** Korea, Taiwan.

**REGION:** East Palaearctic.

**KOREAN RECORDS:** *Crenitis formosana*: Hebauer, 1994: 20.

**REMARKS:** This species has been recorded only in Korea by Hebauer (1994). We could not find any South

Korean specimen but cited this species based on the previous records.

#### 40. *Crenitis (Acrenitis) primorica* Hebauer, 1994 (Pls. 12A, B, 15G)

*Crenitis primorica* Hebauer, 1994: 27; Ji and Komarek, 2003: 405; Hansen, 2004: 45.

**DESCRIPTION:** Length 1.6–1.8 mm. Body long oval, slightly convex dorsally, subparallel, with compact punctures, without microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface mostly black, ventral surface mostly dark brown to black; Antennae, palpi, hypomera, epipleura, legs yellowish brown to brown.

**Head:** Head subtrapezoidal, widest across eyes. Frontoclypeal suture distinct. Anterior margin of clypeus slightly emarginate; anterior corner rounded. Eye weakly protruded. Frons about 4.0 times as wide as eye. Labrum with compact setae; antero-medial margin emarginate. Antennae with 8 antennomeres; 1 longest, about 2.5 times as long as 2; 2 about 1.2 times as long as 3, widest at middle; 3 subparallel; 4 transverse; 5 transverse dish-shaped; 6–8 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum quadrate, with sparse setae; anterior margin bisinuate; anterior corner rectangular; lateral margins parallel; posterior corner rectangular. Apex of mandible bifid; left mandible with a subapical tooth. Maxillary palpomere 1 smallest; 2 longest, about 2.0 times as long as 3, broad apically; 3 broad apically; 4 long oval, slightly longer than 2, widest at middle, apex truncate. Labial palpomere 1 smallest; 2 as long as 3, broad apically with a long seta on anterior part; 3 oval, apex truncate, with a long setae on anterior part. Gula suture non-parallel.

**Thorax:** Pronotum subquadrate, 1.3 times as wide as head, about 2.2 times as wide as long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin broadly rounded. Elytra rounded apically, widest at anterior two third, slightly wider than pronotum. Subsutural suture present. Prosternum transverse, posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal half. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 5 longest, shorter than 2–4 combined, about 2.5 times as long as 4. Mesoventrite without process, postero-medial part convex. Mesofemur with pubescence on basal half. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 1.2 times as long as 3; 3 about 1.2 times as long as 4; 5 about 2.0 times as long as 4. Metaventrite protruded medially; postero-medial part glabrous. Metafemur with coarse setae, with pubescence on baso-dorsal part. Metatibial inner spine as long as tarsomeres 1. Metatarsomere 1 shortest; 2 longest, about 1.2 times as long as 3; 3 about 1.2 times as long as 4; 5 longest 2.0 times as long as 4.

**Abdomen:** Sternite VII without small spines on apical margin. Median lobe (Pl. 15G) of aedeagus nar-

rowed apically, apical part rounded, widest at base. Paramere (Pl. 15G) slender, slightly shorter than median lobe, lateral margins bisinuate, apical margin rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Gangwon Prov.: 22 exx, Pyeongchang-gun, Jinbu-myeon, Mt. Odaesan, Seop-bridge, N37°44'57.60" E128°34'40.92" 691 m, 22 v 2012, DH Lee, ex beside mountain stream (2♂♂1♀, on slide); 33 exx, Yeongwol-gun, Kimsatkat-myeon, Nae-ri, Naeri-stream, N37°6'00.39" E128°40'57.83" 299 m, 20 vi 2012, DH Lee, under stone beside stream (3♂♂2♀♀, on slide); 1 ex, Sokcho-si, Daepo-dong, Ssang-stream, N38°09'37.74" E128°36'28.17" 3 m, 28 vii 2014, DH Lee, ex under stone near blackish water zone; 1 ex, Yangyang-gun, Seo-myoen, Bukpyeong-ri, Hu-stream, N38°04'11.16" E128°36'25.29" 3 m, 4 vii 2013, DH Lee, ex under stone beside stream; Gyeongbuk Prov.: 1♀, Cheongsong-gun, Budong-myeon, Sangeui-ri, Mt. Juwangsan, 13 vi 2006, DH Lee, ex under stone beside stream; 9 exx, Gyeongju-si, Naenam-myeon, Nogok-ri, 7 vii 1995, SH Lee; 10 exx, Mungyeong-si, Maseong-myeon, Ocheon-ri, Joreong-stream, 13 vi 2009, SH Lee (1♂, on slide); 18 exx, Pohang-si, Buk-gu, Songra-myeon, Jungsan-ri, 1 vii 1995 (1♀, on slide); 4 exx, Uljin-gun, Seo-myoen, Bugu-ri, Bugu-stream, 7 vi 1995, SH Lee; 24 exx, Uljin-gun, Seo-myeon, Wangpi-ri, Wangpi-stream, 27 vi 1995 (1♂, on slide); 23 exx, Uljin-gun, Wonnam-myeon, Maehwa-ri, 6 vi 1995, SH Lee, ex stream (1♂, on slide); 16 exx, Yeongdeok-gun, Changsu-myeon, Changsu-ri, 5 vi 1994, SH Lee.

**DISTRIBUTION:** Korea, China (Liaoning), Japan, Russia (Far East).

**REGION:** Eastern Palaearctic.

**KOREA:** GW, GB (Lee, 2016: Fig. 8.33C).

**KOREAN RECORDS:** *Crenitis primorica*: Lee and Ahn, 2017: 40.

## Subgenus *Crenitis* Bedel, 1881

### 41. *Crenitis (Crenitis) apicalis* (Reitter, 1896) (Pls. 12C, D, 15H)

*Paracymus apicalis* Reitter, 1896: 285; Gentili et al., 1995: 210.

*Crenitis apicalis*: Hebauer, 1994: 16; Ji and Komarek, 2003: 397; Hansen, 2004: 45.

*Crenitis protuberans* Jia, 1996: 96.

**DESCRIPTION:** Length 3.0–3.5 mm. Body oval, convex dorsally, with compact punctures, without microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface mostly black, ventral surface mostly dark brown to black; Antennae, palpi,

hypomera, epipleura, legs reddish brown.

*Head:* Head subtrapezoidal, widest across eyes. Frontoclypeal suture indistinct. Anterior margin of clypeus slightly emarginate; anterior corner rounded. Eye weakly protruded. Frons about 4.0 times as wide as eye. Labrum with compact setae; antero-medial margin emarginate. Antennae with 9 antennomeres; 1 longest, about 3.0 times as long as 2; 2 as long as 3, slightly narrowed apically; 3 subparallel; 4 and 5 transverse; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum quadrate, with sparse setae; anterior margin straight; anterior corner rectangular; lateral margins parallel; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 longest, about 2.0 times as long as 3, widest at apical third; 3 broad apically; 4 elongate, slightly longer than 2, widest at apical third, apex truncate. Labial palpomere 1 smallest; 2 as long as 3, broad apically with few long setae on anterior part; 3 oval, apex truncate, with short setae on anterior part. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 1.3 times as wide as head, about 3.0 times as wide as long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded. Elytra rounded apically, widest at anterior third, slightly wider than pronotum. Subsutural suture present. Prosternum transverse, posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal two third. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 5 longest, shorter than 2–4 combined, about 3.0 times as long as 4. Mesoventrite without process, postero-medial part convex. Mesofemur with pubescence on basal two third. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 1.5 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly longer than 2, 2.5 times as long as 4. Metaventrite protruded medially; postero-medial part glabrous. Metafemur with compact setae, with pubescence on baso-dorsal part. Metatibial inner spine as long as tarsomeres 1. Metatarsomere 1 shortest; 2 longest, about 1.5 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly shorter than 2, about 2.0 times as long as 4.

*Abdomen:* Sternite VII without small spines on apical margin. Median lobe (Pl. 15H) of aedeagus narrowed apically, apical part rounded, widest at base. Paramere (Pl. 15H) broad, slightly shorter than median lobe, lateral margins rounded, apical margin rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Gangwon Prov.: 4 exx, Hongcheon-gun, Nam-myeon, Mt. Gye-bangsan, 15 v 2007, DH Lee, ex spring (2♂♂, on slides); 5 exx, Inje-gun, Girin-myeon, Bangdong-ri, 18 ix 2008, ex beside mountain stream; 5 exx, Pyeongchang-gun, Jinbu-myeon, Dongsan-ri, Mt. Odaesan, 30 iv–4 vi 2004, KJ. Ahn, SJ Park, MS Kim, MJ Jeon, FIT (1♂, on slide); 2 exx, same data as fomer except for, 8 v 2004, DH Lee, ex stream; 5 exx, same data as fomer except for, 24 v 2004, DH Lee, ex near stream (2♂♂, on slides); 1 ex, same data as fomer except for, SJ Park; 5 exx, same data as fomer except for, 15 v 2006,

ex beside stream; 1 ex, same data as former except for, TK Kim, HW Kim, ex near stream; 1 ex, same data as former except for, 19 iv–10 v 2007, TK Kim, YH Kim, FIT; 6 exx, same data as former except for, 10 v 2007, TK Kim, ex under stone near stream; same data as former except for, 15 IV 2008, YH Kim, flood debris.

**DISTRIBUTION:** Korea, China (Heilongjiang, Jilin, Liaoning, Sichuan), Japan, Russia (East Siberia, Far East).

**REGION:** Eastern Palaearctic.

**KOREA:** GW (Lee, 2016: Fig. 8.33C).

**KOREAN RECORDS:** *Crenitis apicalis*: Lee and Ahn, 2009: 318; Cho and Park, 2010: 96.

## Subfamily Enochrinae Short and Fikáček, 2013

**DIAGNOSIS:** Maxillary palpomere 2 curved outward, 3 sharply elbowed basally. Sternite VII with apical emargination and truncation (Short and Fikáček, 2013).

### Genus *Enochrus* Thomson, 1859

#### Genus *Enochrus* Thomson, 1859

*Enochrus* Thomson, 1859: 18. Type species: *Hydrophilus bicolor* sensu Gyllenhal, 1808.

**DIAGNOSIS:** Maxillary palpomere 2 curved outward. Elytra with sutural stria. Mesoventrite with a longitudinal and acute process. Meso- and metatarsus with 5 tarsomeres. Meso- and metatarsomere 1 shortest. Metafemur with hydrofuge pubescence on ventral part (Komarek, 2003; Lee and Ahn, 2016b).

#### Key to the species of Korean *Enochrus*

1. Apical margin of sternite VII rounded.....2
  - Apical margin of sternite VII emarginate.....4
2. Elytron with 10 longitudinal striae ..... *E. simulans*
  - Elytron without longitudinal striae except subsutural line.....3
3. Body longer than 6.0 mm; body convex dorsally..... *E. bicolor*
  - Body shorter than 4.0 mm; body strongly convex dorsally..... *E. subsignatus*
4. Apical part of maxillary palpomere 4 dark brown..... *E. esuriens*
  - Maxillary palpomere 4 yellowish brown..... *E. uniformis*

## Subgenus *Holcophilydrus* Knisch, 1912

*Holcophilydrus* Knisch, 1912: 168. Type species: *Holcophilydrus ussuriensis* Knisch, 1912.

### 42. *Enochrus (Holcophilydrus) simulans* (Sharp, 1873) (Pls. 12E, F, 15I)

*Philhydrus simulans* Sharp, 1873: 59.

*Philhydrus umbratus* Sharp, 1884: 454.

*Philhydrus crenostriatus* Kolbe, 1886: 176.

*Enochrus (Lumetus) simulans*: Zaitzev, 1908: 389.

*Enochrus ussuriensis* Kniž, 1912: 168.

*Enochrus (Holcophilydrus) simulans*: Kniž, 1924: 201.

*Enochrus kishidai* Kamiya, 1935: 4.

*Enochrus simulans umbratus* Satō, 1961b: 14.

**DESCRIPTION:** Length 4.8–6.0 mm. Body broadly oval, dorsal surface convex, with compact punctures but most parts without microreticulation; ventral surface with pubescence.

**Color:** Dorsal surface yellowish brown to reddish brown, ventral surface dark brown.

**Head:** Head black, preocular part yellow, trapezoidal, widest across eyes, about 2.0 times as wide as long, reticulation present on posterior part. Anterior margin of clypeus broadly emarginate. Eye slightly protruded. Frons about 4.0 times as wide as eye. Frontoclypeal suture present. Labrum with sparse long setae; anterior margin broadly emarginate. Antennae with 9 antennomeres; 1 longest, 2.0 times as long as 2, with many setae; 2 about 1.5 times as long as 3, subparallel; 3 about 2.0 times as long as 4, subparallel; 4 slightly longer than 5, bulbed apically; 5 smallest, wider than 4; 6 dish-shaped, wider than 5; 7–9 clubbed with pubescence. Prementum with long setae on anterior part. Mentum subpentagonal, with compact long setae on anterior part, widest across anterior corner; antero-median margin rounded; antero-median part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandibular apex bifid. Maxillary palpomere 1 smallest; 2 longest, about 2.5 times as long as 4, subparallel, with setae; 3 about 1.7 times as long as 4, slightly bulbed apically; 4 elongate, dark brown at apical third, apex truncate. Labial palpomere 1 smallest; 2 about 6.0 times as long as 1, elongate, slightly bulbed apically, with many setae on lateral part; 3 about 5.0 times as long as 1, elongate, subparallel, apex truncate and with a long seta. Postocular setae compact. Gula with sparse punctures. Gula suture nearly parallel.

**Thorax:** Pronotum subtrapezoidal, 3.0 times as wide as head, 4.0 times as wide as long, widest across posterior corner, with small and large punctures, with large black marking and 4 spots on median part; anterior

margin bisinuate; antero-lateral parts protruded; anterior corner obtuse, lateral margins broadly rounded; posterior corner rounded; posterior margin straight. Prosternum transverse; median part convex, with transverse groove on anterior part; anterior margin obtuse, with compact setae. Prosternal process triangular, apex acute. Procoxal cavity and protochanter with pubescence on ventral part. Profemur without pubescence on apical fifth. Protibia as long as femur, without pubescence; protibial large spine shorter than tarsomeres 1–2 combined, serrated lateral parts, apex rounded. Protarsomere 1 shortest; 2 about 1.2 times as long as 1; 3 as long as 2; 4 slightly shorter than 3; 5 longest, about 2.5 times as long as 4. Scutellar shield with punctures, with a row of setae on anterior part. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, with 10 rows of striae on elytron and sparsely setose; 3, 5, 7 intervals with two types punctures. Sutural stria present (except anterior part). Mesoventral process protruded posteriorly, beak-shaped, with long setae. Mesofemur without pubescence on apical fifth. Mesotibial large spines longer than tarsomeres 1–2 combined, serrate. Mesotarsomere 1 as long as 4; 2 longest, about 2.5 times as long as 1; 3 about 1.2 times as long as 4; 5 about 2.0 times as long as 4. Metaventrite convex medially; postero-medial part glabrous. Metacoxal cavity with serrated plate on posterior margin. Metafemur without pubescence on apical fifth. Metatibia slightly longer than femur. Metatibial large spines longer than tarsomeres 1–2 combined. Metatarsomere 1 as long as 4; 2 longest, about 2.5 times as long as 1; 3 about 1.2 times as long as 1; 5 about 2.0 times as long as 4.

*Abdomen*: Sternite VII with apical margin rounded, without emargination. Median lobe (Pl. 15I) of aedeagus long quadrate, with corona transverse and thin; dorsal strut short, rounded apically. Paramere (Pl. 15I) about 1.2 times as long as median lobe (include dorsal sturt), widest anterior two third; lateral margins rounded; from anterior fifth to apex slender and subparallel; subapical part curved inwards; apex rounded.

*Larvae*: see Minoshima and Hayashi (2011).

**TYPE MATERIAL**: Holotype: 1♂ (NHM), with labels as follows: “Type, Japan., G. Lewis. 1910–320., *Philhydrus simulans* Type D. S., Holotype. *Philhydrus simulans* Sharp, 1873 Rec. Schödl, 1996”.

**SPECIMENS EXAMINED**: NORTH KOREA: 1 ex, Pyongyang-city, Sunan-airport, light of entrance, 17 vii 2008, Changdo Han; SOUTH KOREA: Chungbuk Prov.: 1 ex, Boeun-gun, Maro-myeon, Imgok-ri, Mt. Cheontaesan, 6 viii 2000, MH Kim, mushroom; 3 exx, Cheongju-si, Heungdeok-gu, Gangseo-dong, Hanggagol-pond, N36°37'35.91" E127°24'46.85" 73 m, 4 v 2005, DH Lee, pond; 2 exx, Cheongju-si, Heungdeok-gu, Hyuam-dong, N36°37'14.08" E127°23'51.75" 62 m, 23 x 2005, DH Lee, pond; 5 exx, Cheongwon-gun, 17 viii 1989, SH Lee; 7 exx, Chungju-si, Chilgeum-dong, Tangeumdae, 30 vii 1994, SH Lee; 2 exx, Danyang-gun, Maepo-eup, Yeoeuigok-ri, 27 vii 2009, SH Lee; 4 exx, Eumseong-gun, Gamgok-myeon, Jucheon-ri, Jucheon-reservoir, N37°04'31.37" E127°37'49.94" 98 m, 16 viii 1989, SH Lee, reservoir; 19 exx, Goisan-gun, Iin-pond, 18 viii 1988, SH Lee; 1 ex, Jecheon-si, Yangminwon, 30 vii 1994, SH Lee; 3 exx, Jincheon-gun, Chopyeong-myeon, Hwasan-ri, Chopyeong-reservoir, N36°49'00.87" E127°30'58.96" 64

m, 31 vii 1994, SH Lee, reservoir; 9 exx, Okcheon-gun, Gunbuk-myeon, sojeong-ri, 9 viii 2009, SH Lee, pond; 2 exx, Okcheon-gun, Mt. Jangryog-san, 27 vii 2003, JS Park; 7 exx, Yeongdong-gun, Haksan-myeon, Bongso-ri, Honghwang-reservoir; 5 exx, Yeongdong-gun, Hwanggan-myeon, Sintan-ri, 9 v 2009, SH Lee, pond; N36°03'56.72" E127°39'30.90" 188 m, 31 vii 1990, SH Lee, reservoir; 1 ex, Yeongdong-gun, Simcheon-myeon, Gugang-ri, 15 vi 2004, DH Lee, JI Yeon, stream; 1 ex, same data as former except for, Sinjeong2-ri, pond; Chungnam Prov.: 5 exx, Asan-si, Onyang3-dong, 31 vii 1994, SH Lee; 24 exx, Boryeong-si, Jupo-myeon, Boryeong-ri, Boryeong-reservoir, N36°24'44.94" E126°35'47.58" 83 m, 2 x 2011, SH Lee, reservoir; 1 ex, Buyeo-gun, Buyeo-eup, Yongjeong-ri, 3 x 2011, SH Lee; 8 exx, Buyeo-gun, Mt. Mansusan, 19 vii 1999, HJ Kim, at light; 18 exx, same data as former except for, at mercury lamp; 9 exx, same data as former except for, KJ Ahn; 18 exx, same data as former except for, US Hwang, ex under street light; 3 exx, Cheonan-si, Ibjang-myeon, 3 viii 2006, SJ Park, SI Lee, YH Kim, at light; 2 exx, Cheongyang-gun, Munmak-pond, 25 vii 1995, SH Lee; 30 exx, Daejeon-si, Yuseong-gu, Bangdong-reservoir, 5 viii 2000, HJ Kim, at light; 2 exx, Daejeon-si, Yuseong-gu, Chungnam National University, 15 vi 2002, JS Park, at light; 1 ex, same data as former except for, 12 xi 2003, DH Lee, SM Lee, CR Hwang, HS Kim, YH Lim; 1 ex, Daejeon-si, Yuseong-gu, Juk-dong, 17 v 2004, DH Lee, rice field; 2 exx, same data as former except for, 18 v 2004; Daejeon-si, Yuseong-gu, sutonggol, 6 ix 2003, DH Lee, SM Lee, CR Hwang, HS Kim, YH Lim; 1 ex, Geumsan-gun, Jewon-myeon, Daesan-ri, 18 vi 2004, DH Lee, JI Yeon, stream; 1 ex, same data as former except for, DH Lee, casual water; 1 ex, Gongju-si, Banpo-myeon, Gongam-ri, 6 ix 2003, DH Lee, SM Lee, CR Hwang, HS Kim, YH Lim; 1 ex, Gongju-si, Banpo-myeon, Sangsin-ri, 10 vi 2004, SM Choi, rice field (1♂, on slide); 3 exx, Gongju-si, Gongju-gun, Kum-river, 6 vii 1999, HJ Kim, river; 5 exx, Hongseong-gun, Gyeolseong-myeon, Eubnae-ri, 2 x 2011, SH Lee, pond; 6 exx, Nonsan-si, 25 vii 1995, SH Lee; 1 ex, Nonsan-si, Noseong-myeon, 1 viii 1990, SH Lee; 2 exx, Taean-gun, Anmyeon-eup, Seungeon-ri, 27 vii 1995, SH Lee; 3 exx, Taean-gun, Gonam-myeon, Janggok-ri, Jipo-reservoir, N36°27'02.18" E126°23'06.31" 7 m, 1 x 2011, SH Lee, reservoir; 8 exx, Taean-gun, Nam-myeon, Sinon-ri, Mageompo-beach, N36°35'47.11" E126°17'21.98" 10 m, 30 vii 2013, DH Lee, pond; 2 exx, Taean-gun, Nam-myeon, Sinon-ri, N36°51'49.23" E126°12'23.75" 7 m, 30 vii 2013, DH Lee, pond on abandon salt farm; 4 exx, Yesan-gun, Sinam-myeon, Bobyol-ri, Sabgyocheon, 26 vii 1995, SH Lee; 3 exx, Yeongi-gun, Geumnae-myeon, Daepyeong-ri, 17 ix 1997, US Hwang, MS Kim, SJ Park; Gangwon Prov.: 4 exx, Cheorwon-gun, Dongsong-eup, Odeok-ri, Hakji-reservoir, N38°13'56.69" E127°13'29.68" 190 m, 15 ix 1990, SH Lee, reservoir; 1 ex, Chuncheon-si, Dongsan-myeon, Wonchang-ri, Gangwon National University research forest, 21 vii 1992, SH Lee; 1 ex, Ganeung-si, Hasi-dong, 4 viii 1988, SH Lee; 1 ex, Hoingseong-gun, Hoingseong-eup, Gaejeon-ri, 29 vii 1991, SH Lee; 1 ex, Hwacheon-gun, Yuchon-ri, 30 vii 1990, SH Lee; 13 exx, Inje-gun, Inje-eup, 31 vii 1991, SH Lee, beside stream; 3 exx, Inje-gun, Nam-myeon, Namjeon-ri, 1 viii 1991, SH Lee; 11 exx, Pyeongchang-gun, Baesujang, 29 vii 1994, SH Lee, pond; 2 exx, Pyeongchang-gun, Jinbu-myeon, Mt. Odaesan, 28 vii 1994, SH Lee; 3 exx, Samcheok-si, Geundeok-myeon, Hamaengbang-ri, Chodang-reservoir, N37°23'16.83"

E129°12'19.24" 19 m, 7 ix 1990, SH Lee, reservoir; 1 ex, Sokcho-si, Geumho-dong, Yeongrang-lake, 21 v 1990, SH Lee, lagoon; 5 exx, Sokcho-si, Joyang-dong, 21 v 1990, SH Lee; 1 ex, Yanggu-gun, Dongsu-ri, 1 viii 1991, SH Lee; Gyeongbuk Prov.: 5 exx, Andong-si, Seonggok-dong, 27 vii 1998, SH Lee, pond; 3 exx, Cheongsong-gun, Cheongsong-eup, N36°26'00.53" E128°03'46.11" 195 m, 11 vii 2010, DH Lee, HJ Jang, at light; 6 exx, Daegu-si, Dalseong-gun, Yuga-myeon, Bonbal-ri, N35°38'26.96" E128°28'31.77" 70 m, 17 vi 1990, SH Lee, reservoir; 1 ex, Daegu-si, Dong-gu, Goijeon-dong, Ganam-reservoir, 10 ix 1988, SH Lee, reservoir; 2 exx, Euseong-gun, Dongseung-pond, 6 vi 2010, SH Lee, pond; 4 exx, Euseong-gun, Yongyeon-pond, 19 vi 1988, SH Lee, pond; 2 exx, Gimcheon-si, Buhang-myeon, Daeya-ri, 27 iv 2011, DH Lee, SW Jung, seepage pond; 32 exx, Goryeong-gun, Goryeong-eup, Junghwa-ri, 3 vi 1990, SH Lee, pond; 2 exx, Gumi-si, Haepyeong-myeon, Songgok-ri, Mt. Dorisan, 5 viii 1994, SH Lee, pond; 27 exx, Gumi-si, Mt. Geumosan, 19 vii 2001, KJ Ahn, SJ Park, CW Shin, at light; 8 exx, Gunwi-gun, Hyoryeong-myeon, Janggi-ri, Janggi-reservoir, N36°06'57.80" E128°35'40.40" 181 m, 18 vi 1990, SH Lee, reservoir; 4 exx, Gyeongju-si, Geoncheon-eup, 6 vi 1991, SH Lee; 1 ex, Gyeongju-si, Geoncheon-eup, Sinpyeong-ri, 28 v 1993, SH Lee; 2 exx, Gyeongju-si, Jeonhyeon-dong, Bulguk-temple, N35°47'20.78" E129°19'55.02" 238 m, 23 vi 1991, SH Lee; 2 exx, Gyeongju-si, Namsan-dong, 21 iii 1993, SH Lee; 3 exx, Gyeongju-si, Seo-myeon, Simgok-ri, Simgok-pond, N35°54'53.37" E129°03'30.40" 212 m, 16 v 1993, SH Lee, pond; 2 exx, Gyeongsan-si, Gyeyang-dong, Nammae-reservoir, N35°49'41.37" E128°44'40.37" 58 m, 25 vii 1986, SH Lee, reservoir; 11 exx, Gyeongsan-si, Jinnyang-eup, 11 viii 1989, SH Lee, pond; 1♂, Mungyeong-si, Seodui-pond, 13 vi 2009, SH Lee, pond; 5 exx, Pohang-si, Buk-gu, Gigye-myeon, Gigye-stream, 22 viii 1992, SH Lee; 3 exx, Pohang-si, Buk-gu, Gigye-myeon, Hwabong-ri, N36°05'36.64" E128°13'08.17" 83 m, 5 iv 1993, SH Lee, pond; 6 exx, Pohang-si, Nam-gu, Daejam-dong, Daejam-reservoir, N36°00'55.79" E129°20'07.38" 38 m, 18 ix 1988, SH Lee, reservoir; 2 exx, Pohang-si, Nam-gu, Donghae-myeon, Jungsan-ri, 28 iv 1989, SH Lee, brackish water zone; 5 exx, Pohang-si, Nam-gu, Guryongpo-eup, 6 vii 1990, SH Lee; 4 exx, Pohang-si, Nam-gu, Jigok-dong, 26 iv 1992, SH Lee; 13 exx, Sangju-si, Gaeun-dong, 9 viii 1990, SH Lee, pond; 13 exx, Seongju-gun, Makgol-pond, 3 viii 1991, SH Lee, pond; 1 ex, Seongju-gun, Wolhang-myeon, 25 v 1994, SH Lee; 1 ex, Uljin-gun, Giseong-myeon, Dacheon-ri, Oseong-stream, 5 iv 1994, SH Lee, stream; 4 exx, Uljin-gun, Hupo-myeon, Hupo-ri, 25 ix 1994, SH Lee; 1 ex, Uljin-gun, Seo-myeon, Wangpi-ri, Wangpi-stream, 23 iv 1994, SH Lee, stream; 1 ex, Uljin-gun, Pyeonghae-eup, Ocheok-ri, 26 vi 1995, SH Lee, pond; 3 exx, Yecheon-gun, Yongsung-myeon, Mui-ri, Wondang-reservoir, N36°35'43.36" E128°17'36.32" 68 m, 6 vi 1988, SH Lee, reservoir; 7 exx, Yeongcheon-si, Jayang-myeon, Chunghyo-ri, Jayang-dam, N36°06'19.32" E128°04'06.86" 164 m, 1 ix 1990, SH Lee, stream; 4 exx, Yeongdeok-gun, Chuksan-myeon, 3 x 1994, SH Lee; 1 ex, Yeongdeok-gun, Dalsan-myeon, Okgye-ri, 9 vii 1995, SH Lee; 2 exx, Yeongdeok-gun, Yeonghae-myeon, Myogok-ri, Myogok-reservoir, N36°31'15.86" E129°20'36.48" 66 m, 6 vi 1994, SH Lee, reservoir; Gyeonggi Prov.: 74 exx, Gwangju-si, Jungdae-dong, Jungang-reservoir, N37°23'59.52" E127°13'15.81" 70 m, 20 viii 1989, SH Lee, reservoir; 2 exx, Icheon-si, Bubal-eup, Gobaek-ri, Hoji-reservoir, N37°18'13.60"

E127°31'52.38" 52 m, 17 viii 1989, SH Lee, reservoir; 1 ex, Incheon-si, Ganghwa-eup, Gukhwa-ri, Gukhwa-reservoir, N37°44'44.40" E126°27'57.69" 68 m, 27 v 2012, SH Lee, reservoir; 3 exx, Incheon-si, Ganghwa-gun, Gilsang-myeon, Jaheung-ri, Gilsang-reservoir, N37°37'26.80" E126°30'04.82" 15 m, 26 v 2012, SH Lee, reservoir; 10 exx, Incheon-si, Ganghwa-gun, Gilsang-myeon, Seondu-ri, 27 v 2012, SH Lee, stream; 3 exx, Incheon-si, Ganghwa-gun, Hwado-myeon, Nae-ri, 9 ix 2005, DH Lee, rice field; 5 exx, Incheon-si, Ganghwa-gun, Hwado-myeon, Sagi-ri, Buno-reservoir, N35°35'53.77" E126°27'55.52" 0 m, 26 v 2012, SH Lee, reservoir; 2 exx, Incheon-si, Ganghwa-gun, Naega-myeon, Gocheon-ri, Naega-reservoir, N37°44'44.62" E126°27'56.18" 34 m, 16 ix 1990, SH Lee, reservoir; 3 exx, Incheon-si, Ganghwa-gun, Songhae-myeon, Sungroi-ri, 27 v 2012, SH Lee, reservoir; 6 exx, Icheon-si, Seolseong-myeon, 19 viii 1988, SH Lee, pond; 5 exx, Pocheon-si, Idong-myeon, Jangam-ri, Idong-bridge, N38°01'57.66" E127°21'58.73" 147 m, 18 vii 1992, SH Lee, stream; 1 ex, Pocheon-si, Idong-myeon, Jangam 4-ri, Dopyeong-stream, 10 ix 2008, DH Lee, beside stream; 5 exx, Pocheon-si, Soheul-myeon, Gomun-pond, 17 vii 1988, SH Lee, at light near pond; 12 exx, Pocheon-si, Soheul-myeon, Neungdae, 7 vii 1992, SH Lee; 6 exx, Yangpyeong-si, 20 viii 1989, SH Lee, reservoir; 3 exx, Siheung-si, Tochang-ri, 18 vi 1990, YB Cho; 1 ex, Yeosu-si, Hoji-pond, 19 viii 1989, SH Lee; Gyeongnam Prov.: 22 exx, Busan-si, Gijang-gun, Ilgwang-myeon, Mundong-ri, 28 vii 2009, SH Lee, pond; 3 exx, Busan-si, Seo-gu, Ulmang-dong, 24 vii 1991, SH Lee; 5 exx, Euiryeong-gun, Daeui-myeon, Haengjeong-ri, Haengjeong-reservoir, N35°23'08.73" E128°10'22.33" 200 m, 8 v 2009, SH Lee, reservoir; 4 exx, Euiryeong-gun, Yongdeok-myeon, Imok-ri, 18 v 2009, SH Lee, pond; 1 ex, Geochang-gun, Gasi-pond, 10 viii 1989, SH Lee, pond; 1 ex, Geoje-si, Gabae-ri, 29 vii 1999, HJ Kim, at light; 6 exx, same data as former except for, 1 vii 2000; 1 ex, same data as former except for, MJ Jeon; 1 ex, Geoje-si, Geoje-myeon, Oksan-ri, Oksan-reservoir, N34°52'19.60" E128°35'35.50" 85 m, 17 vii 2008, SH Lee, reservoir; 1 ex, Gimhae-si, Jinyeong-eup, 12 viii 1995, SH Lee; 1 ex, Hadong-gun, Bukcheon-myeon, Jikjeon-ri, 11 vi 2006, SH Lee, pond; 12 exx, Hapcheon-gun, Yaro-myeon, Jeongdae-ri, Myeonggok-reservoir, N35°42'12.74" E128°09'58.88" 113 m, 7 v 2009, SH Lee, reservoir; 4 exx, Milyang-si, Bubuk-myeon, Uiyang-ri, Uiyang-reservoir, N35°32'46.60" E128°42'58.68" 71 m, 14 ix 1996, SH Lee, reservoir; 1 ex, Sacheon-si, Saamp-pond, 13 viii 1995, SH Lee, pond; 29 exx, Sacheon-si, Yonghyeon-myeon, Onjeong-ri, Seotaek-reservoir, N35°01'57.73" E128°03'08.50" 4 m, 11 viii 1989, SH Lee, reservoir; 13 exx, Sancheong-gun, Geumseo-myeon, Maechon-ri, Sanpung-reservoir, N35°25'17.27" E127°52'00.69" 115 m, 10 viii 1989, SH Lee, reservoir; 21 exx, Sancheong-gun, Maetgol-pond, 7 vi 2009, SH Lee, pond; 6 exx, Sancheong-gun, Sancheong-eup, Jeonggok-ri, Jimpum-church, N35°23'59.78" E127°54'09.53" 110 m, 8 v 2009, SH Lee, pond; 1 ex, Ulsan-si, Jung-gu, Taehwa-river, 16, vii 1995, SH Lee, river; Jeju Prov.: 6 exx, Jeju-si, Gujwa-eup, Jongdal-ri, 27 vii 1990, SH Lee, pond; 20 exx, Jeju-si, Hangyeong-myeon, Dumo-ri, 22 vii 1990, SH Lee, pond; 6 exx, same data as former except for, Yongsu-ri, 23 vii 1990; 13 exx, Jeju-si, Hanrim-eup, Ongpo-ri, 24 vii 1990, SH Lee, pond; 4 exx, Jeju-si, Samdo 2-dong, 23 vii 1990, SH Lee, pond; 1 ex, Seogwipo-si, Songsan-eup, Siheung-ri, 27 vii 1990, SH Lee, pond; 1 ex, Seogwipo-si, Andeok-myeon, Sagye-ri, 25 v 2006, DH Lee, pond; Jeonbuk

Prov.: 2 exx, Buan-gun, 9 iv 2005, DH Lee, SM Choi, rice field (1♂, on slide); 2 exx, Gimje-si, Gungyong-pond, 6 viii 1990, SH Lee, pond; 17 exx, Gunsan-si, Miryong-dong, Mije-reservoir, N35°57'06.45" E126°41'41.97" 15 m, 1 viii 2010, SH Lee, reservoir; 10 exx, Gunsan-si, Naeheung-dong, Naeheung-reservoir, N36°00'13.78" E126°45'47.53" 13 m, 3 x 2011, SH Lee, reservoir; 22 exx, Gunsan-si, Okgu-myeon, 6 viii 2010, SH Lee; 3 exx, Iksan-si, Samgi-myeon, Yeondong-ri, 26 iv 2009, SH Lee, pond; 38 exx, Im-sil-gun, Samgye-myeon, Samgye-ri, N35°30'36.71" E127°16'17.68" 143 m, 14 viii 1989, SH Lee, reservoir; 1 ex, Jangsu-gun, Myeonggeum-reservoir, 14 viii 1988, SH Lee; 2 exx, Muju-gun, Muju-eup, Naedo-ri, 18 iv 2004, DH Lee, JI Yeon, pond; 6 exx, Namwon-si, Sandong-myeon, Sikryeon-ri, Yeonhwa-reservoir, N35°29'12.91" E127°27'21.32" 219 m, 26 iv 2009, SH Lee, reservoir; 12 exx, Namwon-si, Unbong-eup, Maeyo-ri, Maeyo-reservoir, N35°27'53.70" E127°32'27.28" 457 m, 9 v 2009, SH Lee, reservoir; 1 ex, Wanju-gun, 24 vii 1995, SH Lee; 1 ♀, Wanju-gun, Samrye-myeon, Ha-ri, 5 ix 2005, DH Lee, stream; Jeonnam Prov.: 1 ex, Boseong-gun, Hoichun-myeon, Dongryul-ri, Yulpo-beach, KJ Ahn, HJ Kim, MJ Jeon, under dry seaweed; 5 exx, Boseong-gun, Joseong-myeon, Deoksan-ri, Supung-reservoir, N34°47'30.18" E127°12'46.63" 32 m, 12 vi 2010, SH Lee, reservoir; 5 exx, Gangjin-gun, Gangjin-eup, Imcheon-ri, Imchen-reservoir, N34°36'45.08" E126°44'49.59" 30 m, 13 vi 2010, SH Lee, reservoir; 6 exx, Gangjin-gun, Gangjin-eup, Yongpa-ri, 18 iv 2004, DH Lee, pond; 14 exx, Gangjin-gun, Maryang-myeon, Maryang-ri, 27 vii 2004, SW Choi, at light; 8 exx, Gangjin-gun, Maryang-myeon, Suin-ri, 17 iv 2004, DH Lee, rice field; 5 exx, Gokseong-gun, Ogok-myeon, Gokseong-campgrounded, N35°13'44.02" E127°22'10.02" 40 m, 3 viii 2009, SH Lee, stream; 6 exx, Gwangju-si, Buk-gu, Deokeui-dong, 1 viii 2009, SH Lee, pond; 1 ex, Haenam-gun, Hwangsan-myeon, Geumpung-ri, 27 viii 2004, SJ Park, SM Choi, sweeping; 4 exx, Haenam-gun, Hwangsan-myeon, Seongman-ri, 18 iv 2004, DH Lee, stream; 17 exx, Jangseong-gun, Buki-myeon, Owol-ri, Songsan-reservoir, N35°25'13.28" E126°49'01.60" 100 m, 1 viii 2009, SH Lee, reservoir; 3 exx, Muan-gun, Muan-eup, Seongam-ri, Seongam-reservoir, N34°58'29.68" E126°29'13.56" 64 m, 2 viii 1990, SH Lee, reservoir; 2 exx, Yeonggwang-gun, Baeksu-eup, Baekam-ri, N35°19'5" E126°22'53" 22 iv 2006, TK Kim, near stream; 9 exx, Yeonggwang-gun, Seoho-myeon, Jangcheon-ri, Jangdong-reservoir, N34°45'20.27" E126°34'01.41" 103 m, 3 viii 2009, SH Lee, reservoir; 1 ex, Yeosu-si, Sora-myeon, 11 vi 2010, SH Lee, stream.

**DISTRIBUTION:** Korea, China (Beijing, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanghai, Tianjin), Japan, Russia (Far East).

**REGION:** Palaearctic.

**KOREA:** PN, CB, CN, GW, GB, GG, GN, JB, JN, JJ (Lee, 2016: Fig. 8.33D).

**KOREAN RECORDS:** *Enochrus simulans*: Kwon and Suh, 1986: 101; Kim et al., 1994: 135; Lee, 1995: 15; Kim and Kim, 1996b: 126; Hua, 2002: 44; Hansen, 2004: 49; Kim et al., 2004: 116; Park et al., 2008: 252; Nitta et al., 2009: 50; Cho and Park, 2010: 96; Lee and Ahn, 2016b: 336. *Enochrus umbratus*: Kamiya, 1940: 135; Lee et al., 1992: 57; Kim et al., 1994: 135; Lee, 1994: 19; Hansen, 2004: 46; Cho and Park, 2010: 96

[synonym of *E. simulans*]. *Enochrus simulans umbratus*: Lee et al., 1988: 74; Yoon, 1988: 629 [synonym of *E. simulans*].

### Subgenus *Lumetus* Zaitzev, 1908

*Lumetus* Zaitzev, 1908: 385 [Replacement name]. Type species: *Hydrophilus melanocephalus* sensu Fabricius, 1801 (= *Philhydrus fuscipennis* Thomson, 1853).

*Philhydrus* Solier, 1834: 302 [Homonym]. Type species: *Hydrophilus melanocephalus* sensu Fabricius, 1801 (= *Philhydrus fuscipennis* Thomson, 1853).

*Pseudenochnrus* Lomnicki, 1911: 266. Type species: *Hydrobius frontalis* Erichson, 1837 (= *Hydrophilus ochropterus* Marsham, 1802).

#### 43. *Enochrus (Lumetus) bicolor* (Fabricius, 1792) (Pls. 12G, H, 15J)

*Hydrophilus bicolor* Fabricius, 1792: 184.

*Hydrophilus grisescens* Gyllenhal, 1827: 267.

*Philhydrus maritimus* Thomson, 1853: 51.

*Philhydrus labiatus* Rey, 1885: 258.

*Philhydrus rubicundus* Kuwert, 1888c: 275.

*Philhydrus atricornis* Kuwert, 1888c: 286.

*Philhydrus unguidebilis* Kuwert, 1888c: 287.

*Philhydrus sternospina* Kuwert, 1888c: 288.

*Philhydrus flavus* Kuwert, 1890:43.

*Philhydrus bicolor*: Brullé, 1835: 277.

*Enochrus (Lumetus) bicolor*: Zaitzev, 1908: 385.

*Philhydrus mediterraneus* Sahlberg, 1900: 185.

*Philhydrus yukinoae* Matsui, 1994: 218.

**DESCRIPTION:** Length 4.8–6.0 mm. Body broadly oval, dorsal surface convex, with compact punctures but most parts without microreticulation; ventral surface with pubescence.

**Color:** Dorsal surface yellowish brown to reddish brown, ventral surface dark brown.

**Head:** Head trapezoidal, widest across eyes, about 2.0 times as wide as long, reticulation present on posterior part. Anterior margin of clypeus emarginate. Eye slightly protruded. Frons about 4.0 times as wide

as eye. Frontoclypeal suture present. Labrum with sparse long setae; anterior margin broadly emarginate. Antennae with 9 antennomeres; 1 longest, 1.5 times as long as 2, with many setae; 2 longer than 3, slightly bulbed basally; 3 about 1.5 times as long as 4, subparallel; 4 slightly longer than 5, bulbed apically; 5 smallest, wider than 4; 6 dish-shaped, wider than 5; 7–9 clubbed with pubescence. Prementum with long setae on anterior part. Mentum subpentagonal, with sparse setae, widest across anterior corner; antero-median margin rounded; antero-median part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandibular apex bifid. Maxillary palpomere 1 smallest; 2 longest, about 1.5 times as long as 4, subparallel, with setae; 3 about 1.2 times as long as 4; 4 elongate, apex truncate. Labial palpomere 1 smallest; 2 about 5.0 times as long as 1, elongate, slightly bulbed apically with many setae on lateral part; 3 slightly shorter than 2, elongate, apex truncate and with a long seta. Postocular setae compact. Gula with sparse punctures and long setae. Gula suture non-parallel.

*Thorax:* Pronotum subtrapezoidal, 3.0 times as wide as head, 2.5 times as wide as long, with four black spots on median part; anterior margin bisinuate; antero-lateral parts protruded; anterior corner obtuse, lateral margins broadly rounded; posterior corner rounded; posterior margin straight. Prosternum transverse; median part convex, with transverse groove on anterior part; anterior margin obtuse, with compact setae. Prosternal process triangular, apex acute. Procoxal cavity and protrochanter with pubescence on ventral part. Profemur without pubescence on apical fourth. Protibia as long as femur, without pubescence; protibial large spine longer than tarsomeres 1–2 combined, serrated lateral parts, apex acute. Protarsomere 1 shortest; 2 about 1.2 times as long as 1; 3 as long as 2; 4 slightly shorter than 3; 5 longest, about 2.0 times as long as 4. Scutellar shield with punctures, with a row of setae on anterior part. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, with sparse setae, without striae. Sutural stria present (except anterior part). Mesoventral process protruded, beak-shaped, with long setae. Mesofemur without pubescence on apical fifth. Mesotibial large spines longer than tarsomeres 1–2 combined, serrate. Mesotarsomere 1 as long as 4; 2 longest, about 2.0 times as long as 1; 3 about 1.2 times as long as 4; 5 about 2.0 times as long as 4. Metaventrite convex medially; postero-median part glabrous; Metacoxal cavity with serrated plate on posterior margin. Metafemur without pubescence on apical fifth. Metatibia slightly longer than femur. Metatibial large spines longer than tarsomeres 1–2 combined. Metatarsomere 1 as long as 4; 2 longest, about 2.0 times as long as 1; 3 about 1.2 times as long as 1; 5 about 1.5 times as long as 4.

*Abdomen:* Sternite VII with apical margin rounded, without emargination. Median lobe (Pl. 15J) of aedeagus long quadrate, with corona transverse and thin; dorsal strut elongate, rounded apically. Paramere (Pl. 15J) slightly longer than median lobe (include dorsal sturt), widest anterior three fourth; lateral margins slightly rounded; from anterior sixth to apex slender and subparallel; apex rounded, slightly bulbed and dark brown.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungnam Prov.: 10 exx, Seosan-si, Buseok-myeon, Seosan-re-

claimed land, 27 vii 1995, SH Lee, pond (2♂♂, on slides); 7 exx, Taean-gun, Wonbuk-myeon, Hwangchon-ri, N36°51'41.0" E126°11'59.9" 13 m, 4 vii 2014, DH Lee, at light nearby abandon salt farm; Gyeonggi Prov.: 3 exx, Ansan-si, Danwon-gu, Daebudong-dong, Dongju-salt farm, N37°14'05.60" E126°36'19.55" 4 m, 3 xi 2014, DH Lee, IS Yoo, SG Lee, saline pond near salt farm; 1 ex, Hwaseong-si, Bibong-myeon, Sanhak-ri, Mt. Taehwasan, N37°14'26.2" E126°53'33.9", DS Kim, YB Cho, at light; 2 exx, Hwaseong-si, Ujeong-eup, Unpyeong-ri, Hwaong-seawall, N36°35'45.00" E126°17'30.55" 3 m, 7 ix 2013, DH Lee, SG Lee, saline pond on salt marsh; 1 ex, Incheon-si, Ganghwa-gun, Gyodong-myeon, 6 x 2009, HM Lim, at light; 4 exx, Incheon-si, Jung-gu, Eulwang-dong, Neulmok-salt farm, N37°27'04.48" E126°23'46.81" 7 m, 3 ix 2014, DH Lee, pool near salt farm; Jeju Prov.: 4 exx, Seoqwipo-si, Andeok-myeon, Sagye-ri, 25 v 2006, DH Lee, pond (1♂, on slide); Jeonnam Prov.: 7 exx, Boseong-gun, Beolgyo-eup, Jangam-ri, N34°48'31.53" E127°25'00.81" 9 m, 5 vi 2014, DH Lee, pond near salt farm.

**DISTRIBUTION:** Asia: Korea, China, Japan, Kazakhstan, Mongolia, Nepal, Russia (East Siberia, Far East), Tadzhikistan, Turkmenistan, Turkey, Uzbekistan; Europe: Azerbaijan, Armenia, Austria, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, The Netherlands, Norway, Poland, Portugal, Romania, Russia (Central European Territory, North European Territory, South European Territory), Slovakia, Spain, Sweden, Ukraine; North Africa: Algeria, Canary Islands, Egypt, Morocco, Tunisia.

**REGION:** Palaearctic.

**KOREA:** CN, GG, JN, JJ (Lee, 2016: Fig. 8.34A).

**KOREAN RECORDS:** *Enochrus bicolor*: Lee and Ahn, 2016b: 337.

#### 44. *Enochrus (Lumetus) subsignatus* (Harold, 1877) (Pls. 12I, J, 15K)

*Philhydrus subsignatus* Harold, 1877: 342.

*Enochrus (Lumetus) subsignatus*: Zaitzev, 1908: 389.

**DESCRIPTION:** Length 4.0–4.5 mm. Body broadly oval, dorsal surface strongly convex, with compact punctures but most parts without microreticulation, ventral surface with pubescence.

**Color:** Head brown, preocular part yellow

**Head:** Head trapezoidal trapezoidal, widest across eyes, about 2.0 times as wide as long, reticulation present on posterior part. Anterior margin of clypeus broadly emarginate. Eye slightly protruded. Frons about 3.5 times as wide as eye. Frontoclypeal suture present. Labrum with sparse long setae; anterior margin broadly emarginate. Antennae with 9 antennomeres; 1 longest, 1.5 times as long as 2, with setae on baso-lateral part; 2 about 2.0 times as long as 3, bulbed basally; 3 about 2.0 times as long as 4, subparallel;

4 slightly longer than 5, bulbed apically; 5 smallest, wider than 4; 6 dish-shaped, wider than 5; 7–9 clubbed with pubescence. Prementum with long setae on anterior part. Mentum subpentagonal, with compact long setae on anterior part, widest across anterior corner; antero-median margin rounded; antero-median part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandibular apex bifid. Maxillary palpomere 1 shortest; 2 longest, about 1.2 times as long as 3, subparallel, with setae; 3 slightly longer than 4, slightly bulbed apically; 4 elongate, dark brown at apical fifth, apex truncate. Labial palpomere 1 smallest; 2 as long as 3, elongate, slightly bulbed apically with many setae on lateral part; 3 elongate, subparallel, apex truncate and with a long seta. Postocular setae compact. Gula with sparse punctures. Gula suture non-parallel.

*Thorax:* Pronotum subtrapezoidal, 3.0 times as wide as head, 3.0 times as wide as long, widest across posterior corner, with small and large punctures, with large black marking and 4 spots on median part; anterior margin bisinuate; antero-lateral parts protruded; anterior corner obtuse, lateral margins broadly rounded, with setae; posterior corner rounded; posterior margin straight. Prosternum transverse; median part strongly convex, carina absent, with transverse groove on anterior part; anterior margin obtuse, with compact setae. Prosternal process triangular, apex acute. Procoxal cavity and protrochanter with pubescence on ventral part. Profemur without pubescence on apical fifth. Protibia as long as femur, without pubescence; protibial large spine slightly shorter than tarsomeres 1–2 combined, serrated lateral parts, apex rounded. Protarsomere 1 shortest; 2 slightly longer than 3; 3 about 2.0 times as long as 4; 4 slightly longer than 1; 5 longest, about 2.5 times as long as 4. Scutellar shield with punctures, with a row of setae on anterior part. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, without striae. Sutural stria present (except anterior part). Mesoventral process protruded posteriorly, beak-shaped, with long setae. Mesofemur without pubescence on apical fifth. Mesotibial large spines longer than tarsomeres 1–2 combined, serrate. Mesotarsomere 1 as long as 4; 2 about 2.0 times as long as 3; 3 about 2.0 times as long as 4; 5 about 2.5 times as long as 4. Metaventrite convex medially; postero-medial part glabrous. Metacoxal cavity with serrated plate on posterior margin. Metafemur without pubescence on apical fifth. Metatibia slightly longer than femur. Metatibial large spines longer than tarsomeres 1–2 combined. Metatarsomere 1 as long as 4; 2 longest, about 2.0 times as long as 3; 3 about 2.0 times as long as 4; 5 about 2.0 times as long as 4.

*Abdomen:* Sternite VII with apical margin rounded, without emargination. Median lobe (Pl. 15K) of aedeagus long quadrate, with corona reversed V-shaped and thin; dorsal strut short, slightly acute apically. Paramere (Pl. 15K) about 1.25 times as long as median lobe (include dorsal sturt), widest anterior three fifth; lateral margins slightly rounded; from anterior third to apex slender, parallel; apex rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungnam Prov.: 1 ex, Seocheon-gun, Maseo-myeon, Deokam-ri, Yonghwasil-reservoir, N36°02'27.08" E126°43'07.66" 8 m, 5 viii 1990, SH Lee; 1 ex, Seocheon-gun, Osok-ri, 5 viii 1990, SH Lee; Gyeongbuk Prov.: 1 ex, Daegu-si, Ganam-pond, 12 ix 1988, SH Lee, pond; 2

exx, Euiseong-gun, Dongseong-pond, 6 vi 2010, SH Lee, pond; 1 ♀, same data as former except for, Hwa-jeon-pond; 1 ex, Gyeongsan-si, Gyeyang-dong, Nammae-reservoir, N35°49'41.37" E128°44'40.37", 58 m, 12 ix 1984, R. Pinger, reservoir; 3 exx, same data as former except for, 18 iv 1985; 2 exx, same data as former except for, 21 iv 1988, SH Lee; 2 exx, same data as former except for, 13 v 1988; 3 exx, same data as former except for, 10 ix 1988; 1 ex, Pohang-si, Nam-gu, Daejam-dong, Daejam-reservoir, N36°00'55.79" E129°20'07.38" 38 m, 18 viii 1991, SH Lee, reservoir; Gyeongnam Prov.: 6 exx, Changnyeong-gun, Yudeung-pond, 11 vi 2010, SH Lee, pond (1 ♂ 3 ♀ ♀, on slides); 12 exx, Hapcheon-gun, Yaro-myeon, Jeongdae-ri, Myeonggok-reservoir, N35°42'12.74" E128°09'58.88" 113 m, 7 v 2009, SH Lee, reservoir (1 ♂, on slide).

**DISTRIBUTION:** Korea, China (Beijing, Fujian, Jiangsu), Japan, Taiwan.

**REGION:** East Palaearctic.

**KOREA:** CN, GB, GN (Lee, 2016: Fig. 8.34A).

**KOREAN RECORDS:** *Enochrus subsignatus*: Lee et al., 1988: 74; Lee et al., 1992: 57; Kim et al., 1994: 135; Hua, 2002: 44; Hansen, 2004: 51; Cho and Park, 2010: 96; Lee and Ahn, 2016b: 338.

### Subgenus *Methydrus* Rey, 1885

*Methydrus* Rey, 1885: 253. Type species: *Hydrophilus affinis* Thunberg, 1794.

*Agraphilydrus* Kuwert, 1888c: 280. Type species: *Hydrophilus affinis* Thunberg, 1794.

#### 45. *Enochrus (Methydrus) esuriens* (Walker, 1858) (Pls. 12K, L, 15L)

*Philhydrus esuriens* Walker, 1858: 209.

*Pylophilus nigriceps* Motschulsky, 1859: 46.

*Philhydrus pullus* Fauvel, 1883: 354.

*Philhydrus ornaticeps* Sharp, 1884: 454.

*Enochrus esuriens*: Kniž, 1924: 208.

**DESCRIPTION:** Length 2.4–2.8 mm. Body oval, dorsal surface convex, with compact punctures but most parts without microreticulation, ventral surface with pubescence.

**Color:** Dorsal surface yellowish brown, head black, preocular part yellow. Ventral surface black.

**Head:** Head trapezoidal, widest across eyes, about 2.0 times as wide as long, reticulation present on posterior part. Anterior margin of clypeus broadly emarginate. Eye slightly protruded. Frons about 3.0 times as wide as eye. Frontoclypeal suture present. Labrum with sparse long setae; anterior margin broadly emarginate.

Antennae with 9 antennomeres; 1 longest, 1.5 times as long as 2, with setae on baso-lateral part; 2 about 2.0 times as long as 3, bulbed basally; 3 about 2.0 times as long as 4, slightly bulbed apically; 4 slightly longer than 5, bulbed apically; 5 smallest, wider than 4; 6 dish-shaped, wider than 5; 7–9 clubbed with pubescence. Prementum with long setae on anterior part. Mentum subpentagonal, with compact long setae on anterior part, widest across anterior corner; antero-median margin rounded; antero-median part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandibular apex bifid. Maxillary palpomere 1 smallest; 2 longest, slightly longer than 3, weakly curved inward, with setae; 3 about 1.2 times as long as 4, slightly bulbed apically; 4 elongate, apex truncate. Labial palpomere 1 smallest; 2 as long as 3, elongate, with many setae on lateral part; 3 elongate, apex truncate. Postocular setae compact. Gula with sparse punctures. Gula suture non-parallel.

*Thorax:* Pronotum subtrapezoidal, 2.0 times as wide as head, 2.5 times as wide as long, widest across posterior corner, with small and large punctures, with or without transverse black marking on antero-median part, with 4 spots on median part; anterior margin bisinuate; antero-lateral parts protruded; anterior corner obtuse, lateral margins broadly rounded, with setae; posterior corner rounded; posterior margin straight. Prosternum transverse; median part strongly convex, carina absent, with transverse groove on anterior part; anterior margin obtuse, with compact setae. Prosternal process triangular, apex acute. Procoxal cavity and protrochanter with pubescence on ventral part. Profemur without pubescence on apical fifth. Protibia as long as femur, without pubescence; protibial large spine longer than tarsomeres 1–2 combined, serrated lateral parts, apex acute. Protarsomere 1 shortest; 2 about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 4 slightly longer than 1; 5 as long as 2. Scutellar shield with punctures, with two setae on anterior part. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, without striae. Sutural stria present (except anterior part). Mesoventral process protruded posteriorly, beak-shaped, with sparse setae. Mesofemur without pubescence on apical fifth. Mesotibial large spines longer than tarsomeres 1–2 combined, serrate. Mesotarsomere 1 as long as 4; 2 longest, about 2.5 times as long as 1; 3 about 1.2 times as long as 4; 5 about 2.0 times as long as 4. Metaventrite convex medially; postero-medial part glabrous. Metacoxal cavity with serrated plate on posterior margin. Metafemur without pubescence on apical fifth. Metatibia slightly longer than femur. Metatibial large spines longer than tarsomeres 1–2 combined. Metatarsomere 1 as long as 4; 2 longest, about 3.0 times as long as 3; 3 about 1.5 times as long as 4; 5 about 2.0 times as long as 4.

*Abdomen:* Sternite VII with apical margin rounded, with emargination. Median lobe (Pl. 15L) of aedeagus long triangular, with corona reversed U-shaped and relatively thick; dorsal strut very long, bulbed subapically, acute apically. Paramere (Pl. 15L) about 1.2 times as long as median lobe (include dorsal strut), widest posterior part; lateral margins straight; from anterior fifth to apex slender and subparallel; sub-apical part slightly curved outwards; apex rounded.

**SPECIMENS EXAMINED:** SOUTH KOREA: Jeju Prov.: 1 ex, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 11 vi 2005, DH Lee, pond; 1 ex, same data as former except for, 27 vii 2005, SH Lee; 1 ex, same data as former except for, 26 ix 2008, DH Lee, pond; 2 exx, Bukjeju-gun, Jocheon-eup, Seonheul-ri, Dongbaek-park marsh, 25 ix 2008, DH Lee, pond (1♂, on slide); 2 exx, same data as former except for, Dongbaek-ro, N33°31'01.31" E126°42'30.34", 87 m, 15 vi 2011; 2 exx, Bukjeju-gun, Mosani-pond, 27 vii 2005, SH Lee, pond; 1 ex, Bukjeju-gun, Sobu-pond, 23 vii 1990, SH Lee.

**DISTRIBUTION:** Korea, Bhutan, China (Fujian, Guangdong, Hainan, Hubei, Jiangsu, Jiangxi), Iran, Iraq, Japan, Nepal, Pakistan, Saudi Arabia.

**REGION:** Palaearctic.

**KOREA:** JJ (Lee, 2016: Fig. 8.33D).

**KOREAN RECORDS:** *Enochrus esuriens*: Lee et al., 1988: 75; Lee et al., 1992: 57; Kim et al., 1994: 135; Lee, 1994: 19; Hansen, 2004: 51; Park et al., 2008: 253; Cho and Park, 2010: 96; Lee and Ahn, 2016b: 340.

#### 46. *Enochrus (Methyrus) uniformis* (Sharp, 1884) (Pls. 13A, B, 16A)

*Philhydrus uniformis* Sharp, 1884: 453.

**DESCRIPTION:** Length 3.2–3.8 mm. Body oval, dorsal surface convex, with compact punctures but most parts without microreticulation, ventral surface with pubescence.

**Color:** Dorsal surface yellowish brown, head black, preocular part yellow. Ventral surface black.

**Head:** Head trapezoidal, widest across eyes, about 2.0 times as wide as long, reticulation present on posterior part. Anterior margin of clypeus broadly emarginate. Eye slightly protruded. Frons about 3.0 times as wide as eye. Frontoclypeal suture present. Labrum with sparse long setae; anterior margin broadly emarginate. Antennae with 9 antennomeres; 1 longest, 1.5 times as long as 2, with setae on baso-lateral part; 2 about 2.0 times as long as 3, slightly bulbed basally; 3 about 2.0 times as long as 4, subparallel; 4 slightly longer than 5, bulbed apically; 5 smallest, wider than 4; 6 dish-shaped, wider than 5; 7–9 clubbed with pubescence. Prementum with long setae on anterior part. Mentum subpentagonal, with compact long setae on anterior part, widest across anterior corner; antero-median margin rounded; antero-median part concave; lateral margins straight; posterior corner rectangular; posterior margin straight. Mandibular apex bifid. Maxillary palpomere 1 smallest; 2 longest, about 1.2 times as long as 3, subparallel, with setae; 3 about 1.2 times as long as 4, slightly bulbed apically; 4 elongate, apex truncate. Labial palpomere 1 smallest; 2 as long as 3, elongate, with many setae on lateral part; 3 elongate, apex truncate. Postocular setae compact. Gula with sparse punctures. Gula suture non-parallel.

**Thorax:** Pronotum subtrapezoidal, 2.0 times as wide as head, 2.5 times as wide as long, widest across pos-

terior corner, with small and large punctures, with large black marking and 4 spots on median part; anterior margin bisinuate; antero-lateral parts protruded; anterior corner obtuse, lateral margins broadly rounded, with setae; posterior corner rounded; posterior margin straight. Prosternum transverse; median part strongly convex, carina absent, with transverse groove on anterior part; anterior margin obtuse, with compact setae. Prosternal process triangular, apex acute. Procoxal cavity and protrochanter with pubescence on ventral part. Profemur without pubescence on apical fifth. Protibia as long as femur, without pubescence; protibial large spine shorter than tarsomeres 1–2 combined, serrated lateral parts, apex acute. Protarsomere 1 shortest; 2 about slightly longer than 3; 3 slightly longer than 4; 4 slightly longer than 1; 5 longest, about 2.5 times as long as 4. Scutellar shield with punctures, with a row of setae on anterior part. Elytra subparallel, rounded apically, widest at middle, slightly wider than pronotum, without striae. Sutural stria present (except anterior part). Mesoventral process protruded posteriorly, beak-shaped, with sparse setae. Mesofemur without pubescence on apical fifth. Mesotibial large spines longer than tarsomeres 1–2 combined, serrate. Mesotarsomere 1 as long as 4; 2 longest, about 2.5 times as long as 1; 3 about 1.2 times as long as 4; 5 about 2.0 times as long as 4. Metaventricle convex medially; postero-medial part glabrous. Metacoxal cavity with serrated plate on posterior margin. Metafemur without pubescence on apical fifth. Metatibia slightly longer than femur. Metatibial large spines longer than tarsomeres 1–2 combined. Metatarsomere 1 as long as 4; 2 longest, about 3.0 times as long as 1; 3 about 1.2 times as long as 4; 5 about 2.0 times as long as 4.

*Abdomen:* Sternite VII with apical margin rounded, with emargination. Median lobe (Pl. 16A) of aedeagus long oval, with corona reversed U-shaped and relatively large; dorsal strut long, bulbed and rounded apically. Paramere (Pl. 16A) about 1.5 times as long as median lobe (include dorsal strut), widest anterior four fifth; lateral margins slightly rounded; from anterior third to apex slender and subparallel; anterior third part slightly curved inwards; apex rounded.

**TYPE MATERIAL:** Lectotype: 1♂ (NHM), with labels as follows: “Cotype, Yokohama, Japan., G. Lewis. 1910–320., Lectotypus. *Philhydrus uniformis* Sharp, dec. Schödl, 1997”; Paralectotype: 1♀ (NHM), with labels as follows: “*Philhydrus uniformis* Type D. S. Japan. Lewis., Type, Japan., G. Lewis. 1915–313., Paralectotypus. *Philhydrus uniformis* Sharp, dec. Schödl, 1997”.

**SPECIMENS EXAMINED:** NORTH KOREA: 2 exx, Pyongyang-city, Sunan-airport, light of entrance, 17 vii 2008, Changdo Han; SOUTH KOREA: Chungbuk Prov.: 1 ex, Choengwon-gun, Jisil-pond, 16 viii 1988, SH Lee, pond; 2 exx, Danyang-gun, Maepo-eup, Yoeuigok-ri, 27 vii 2009, SH Lee; 1 ex, Eumseong-gun, Jucheon-pond, 18 viii 1989, SH Lee, pond; 6 exx, Jincheon-gun, Baekgok-myeon, Baekgok-reservoir, 17 iv 2008, DH Lee, pond (1♂1♀, on slides); 1 ex, Okcheon-gun, Yongam-pond, 29 x 1989, SH Lee; Chungnam Prov.: 1 ex, Daejeon-si, Yuseong-gu, Juk-dong, 28 x 2005, DH Lee, springfed pool (1♂, on slide); 4 exx, Taean-gun, Nam-myeon, Sinon-ri, Mageompo-beach, N36°35'47.11" E126°17'21.98" 10 m, 30 vii 2013, DH Lee, pond; 1♂1♀, Taean-gun, Wonbuk-myeon, Sindu-ri, N36°50'34.37" E126°11'53.53" 20 m, 4 viii 2014,

DH Lee, ex pond on dune; Gangwon Prov.: 1 ex, Cheorwon-gun, Dongsong-eup, Odeok-ri, Hakji-reservoir, N38°13'56.69" E127°13'29.68" 190 m, 15 ix 1990, SH Lee, reservoir; 1 ex, Chuncheon-si, Dongsan-myeon, Wonchang-ri, Gangwon National University research forest, 21 vii 1992, SH Lee; 3 exx, Inje-gun, Nam-myeon, Namjeon-ri, 1 viii 1991, SH Lee; Gyeongbuk Prov.: 2 exx, Chilgok-gun, Yakmok-myeon, 22 iv 1985, YB Cho; 1 ex, Daegu-si, Dalseong-gun, Yuga-myeon, Bonbal-ri, N35°38'26.96" E128°28'31.77" 70 m, 17 vi 1990, SH Lee, reservoir; 1 ex, Daegu-si, Gyeongbuk National University, 15 vii 1974, JH Kang; 2 exx, Gimcheon-si, Buhang-myeon, Daeya-ri, 27 iv 2011, DH Lee, SW Jung, seepage pond (1♂, on slide); 3 exx, Goryeong-gun, Goryeong-eup, Junghwa-ri, 3 vi 1990, SH Lee, pond; 7 exx, Gumi-si, Okgye-dong, 18 vi 1990, SH Lee, pond; 1 ex, Gunwi-gun, Hyoryeong-myeon, Janggi-ri, Janggi-reservoir, N36°06'57.80" E128°35'40.40" 181 m, 18 vi 1990, SH Lee, reservoir; 2 exx, Gyeongju-si, Angang-eup, 29 ix 1991, SH Lee, pond; 1 ex, Gyeongsan-si, Gyeyang-dong, Nammae-reservoir, N35°49'41.37" E128°44'40.37" 58 m, 12 ix 1984, R. Pinger, reservoir; 3 exx, same data as former except for, 21 iv 1988, JH Kang; 1 ex, Pohang-si, Buk-gu, Gigye-myeon, Gigye-stream, 22 viii 1992, SH Lee; 4 exx, Pohang-si, Nam-gu, Jigok-dong, 26 iv 1992, SH Lee; 1 ex, Uljin-gun, Yonghwa-pond, 22 viii 1987, SH Lee, pond; 1 ex, Yeongcheon-gun, Yongdo-dong, 8 x 1988, SH Lee; Gyeonggi Prov.: 1 ex, Gwangju-si, Hongjung-pond, 20 viii 1989, SH Lee; 10 exx, Gwangju-si, Jungdae-dong, Jungang-reservoir, N37°23'59.52" E127°13'15.81" 70 m, 20 viii 1989, SH Lee, reservoir (1♂1♀, on slides); 3♂♂5♀♀, Hwaseong-si, Songsan-myeon, Dokji-ri, N37°15'21.13" E126°41'03.83" 19 m, 6 xi 2013, DH Lee, pond near brackish zone; 1 ex, Pocheon-si, Soheul-myeon, 17 vii 1988, SH Lee, at light; Jeju Prov.: 1 ex, Jeju-si, Jocheon-eup, Seonheul-ri, Dongbaek-ro, N33°31'01.31" E126°42'30.34" 87 m, 15 vi 2011, DH Lee, pond; 1 ex, Seogwipo-si, Namwon-eup, Sinrye-ri, Dongsu-bridge, 29 v 2007, DH Lee, stream pool; Jeonbuk Prov.: 1 ex, Jinan-gun, Jeongok-pond, 31 vii 2009, SH Lee, pond ; 3 exx, Wanju-gun, Samrye-myeon, Ha-ri, 5 ix 2005, DH Lee, stream.

**DISTRIBUTION:** Korea, Japan.

**REGION:** East Palaearctic.

**KOREA:** PN, CB, CN, GW, GB, GG, GN, JB, JJ (Lee, 2016: Fig. 8.34A).

**KOREAN RECORDS:** *Enochrus uniformis*: Lee et al., 1988: 75; Kim et al., 1994: 135; Lee, 1994: 19; Lee, 1995: 15; Hansen, 2004: 51; Cho and Park, 2010: 96; Lee and Ahn, 2016b: 341.

## Subfamily Acidocerinae Zaitzev, 1908

**DIAGNOSIS:** Maxillary palpi longer than head. Sternite VII with emargination or truncation on apical margin. Median lobe of aedeagus shorter than parameres (Short and Fikáček, 2013).

### Key to the genera of Korean Acidocerinae

1. Maxillary palpomere 2 weakly curved inward; elytra without stria ..... *Agraphydrus*  
 – Maxillary palpomere 2 strongly curved inward; elytra with stria ..... *Helochares*

## Genus *Agraphydrus* Régimbart, 1903

### Genus *Agraphydrus* Régimbart, 1903

*Agraphydrus* Régimbart, 1903: 33. Type species: *Agraphydrus punctatellus* Régimbart, 1903.

*Gymnhelochares* Orchymont, 1932: 692. Type species: *Helochares geminus* d'Orchymont, 1932.

*Pseudohelochares* Satô, 1960: 76. Type species: *Pseudohelochares narusei* Satô, 1960.

*Pseudopelthydrus* Jia, 1998: 225. Type species: *Pseudopelthydrus longipalpis* Jia, 1998.

*Megagraphydrus* Hansen, 1999: 137. Type species: *Megagraphydrus siamensis* Hansen, 1999.

**DIAGNOSIS:** Body oblong oval. Head and pronotum with compact punctures and without granulation. Antennae (Lee, 2016: Fig. 8.27A) with 8 or 9 antennomeres. Meso- and metatarsus with long swimming hairs. Abdomen with six visible sternites with hydrofuse pubescence on lateral parts. Sternite VII (Lee, 2016: Fig. 8.27F) with emargination on apical margin (Hansen, 1991; Komarek, 2003).

### Key to the species of Korean *Agraphydrus*

1. Pronotum and elytra yellowish brown; maxillary palpomere 2 about 1.2 times as long as 3; apical part of maxillary palpomere 4 brown; apical margin of sternite VII with a row of small spines ..... *A. ishiharai*  
 – Pronotum and elytra dark brown; maxillary palpomere 2 about 1.5 times as long as 3; apical part of maxillary palpomere 4 yellowish brown; apical margin of sternite VII without a row of spines ..... *A. narusei*

## Subgenus *Agraphydrus* Régimbart, 1903

*Agraphydrus* Régimbart, 1903: 33. Type species: *Agraphydrus punctatellus* Régimbart, 1903.

*Pseudohelochares* Satô, 1960: 76. Type species: *Pseudohelochares narusei* Satô, 1960.

### 47. *Agraphydrus (Agraphydrus) ishiharai* (Matsui, 1994) (Pls. 13C, D, 16B)

*Enochrus ishiharai* Matsui, 1994: 215.

*Agraphydrus ishiharai* Hansen, 2004: 49; Minoshima, 2016: 353.

**DESCRIPTION:** Length 2.0–2.3 mm. Body oblong oval, convex dorsally, subparallel, with compact punctures, without microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface yellowish brown, antero-lateral parts of head yellow. Ventral surface brown to dark brown; Antennae, mouthparts, prosternum, hypomera, epipleura, legs mostly yellowish brown.

**Head:** Head subtrapezoidal, widest across eyes. Frontoclypeal suture distinct, with few long setae. Anterior margin of clypeus slightly emarginate; anterior corner rounded. Eye weakly protruded. Frons about 3.0 times as wide as eye. Labrum with compact setae; antero-medial margin emarginate. Antennae with 9 antennomeres; 1 longest, about 1.5 times as long as 2, slightly broad apically; 2 about 3.0 times as long as 3, slightly narrowed apically; 3 slightly broad apically; 4 and 5 transverse; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, with sparse setae, widest at middle; antero-medial margin emarginate; anterior corner rectangular; lateral margins slightly straight; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 longest, about 1.2 times as long as 3, broad apically; 3 broad apically; 4 elongate, slightly longer than 3, widest at apical third, apex truncate. Labial palpomere 1 smallest; 2 about 1.5 times as long as 3, broad apically with few long setae on anterior part; 3 slightly curved, apex truncate, with long setae on anterior part. Gula suture non-parallel.

**Thorax:** Pronotum subquadrate, 1.5 times as wide as head, about 3.0 times as wide as long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin broadly rounded. Elytra subparallel, rounded apically, widest at anterior two third, slightly wider than pronotum. Subsutural suture present. Prosternum transverse, with long setae on medial part, posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal two third. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 5 longest, shorter than 2–4 combined, about 2.5 times as long as 4. Mesoventrite without process, postero-medial part convex. Mesofemur with pubescence on basal two third. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 1.5 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly shorter than 2. Metaventrite protruded medially; postero-medial part glabrous. Metafemur with pubescence on basal three fourth. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 1.5 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly shorter than 2.

**Abdomen:** Sternite VII with small emargination and a row of small spines on apical margin. Median lobe (Pl. 16B) of aedeagus narrowed apically, apical part rounded, widest at base. Paramere (Pl. 16B) broad, slightly shorter than median lobe, subapical part narrowed, apical part T-shaped.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 1 ex, Okcheon-gun, Gunseo-myeon, Geum-

san-ri, N36°15'22" E127°33'2" 150 m, 23 v 2014, IS Yoo, JS Lee, ex under stone near stream; Gangwon Prov.: 9 exx, Sokcho-si, Daepo-dong, Ssang-stream, N38°09'37.74" E128°36'28.17" 3 m, 28 vii 2014, DH Lee, ex under stone near blackish water zone; 1♀, Yangyang-gun, Seo-myoen, Bukpyeong-ri, Hu-stream, N38°04'11.16" E128°36'25.29" 3 m, 4 vii 2013, DH Lee, ex under stone beside stream; Gyeongbuk Prov.: 2♀♀, Gyeongju-si, Naenam-myeon, Nogok-ri, 30 vi 1991, SH Lee, beside mountain stream; 2♂♂2♀♀, Pohang-si, Buk-gu, Songra-myeon, Jungsan-ri, 1 vii 1995, SH Lee (2♂♂, on slide); 1♂2♀♀, Uljin-gun, Giseong-myeon, Dancheon-ri, Giseong-stream, 17 vii 1995, SH Lee, ex stream; Gyeonggi Prov.: 1 ex, Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, Dongmak 2-bridge, N38°05'25.76" E127°06'35.11" 70 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, ex under stone near steam; Jeonnam Prov.: 11 exx, Suncheon-si, Jibon-ri, Wonjibon-bridge, N35°00'23" E127°30'22" 51 m, 5 vi 2014, DH Lee, ex under stone beside stream.

**DISTRIBUTION:** Korea, Japan.

**REGION:** East Palaearctic.

**KOREA:** CB, GW, GB, GG, JN (Lee, 2016: Fig. 8.34B).

**KOREAN RECORDS:** *Agraphydrus ishiharai*: Lee and Ahn, 2017: 39.

#### 48. *Agraphydrus (Agraphydrus) narusei* (Satô, 1960) (Pls. 13E, F, 16C)

*Pseudohelochares narusei* Satô, 1960: 77.

*Agraphydrus narusei* Nakane et al., 1963: 66; Satô, 1965: 128; Satô, 1984b: 213; Hayashi, 2006: 56; Minoshima, 2016: 356.

**DESCRIPTION:** Length 2.2–2.5 mm. Body oblong oval, convex dorsally, subparallel, with compact punctures, without microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface dark brown. Ventral surface brown to dark brown; Antennae, mouthparts, prosternum, hypomera, epipleura, legs mostly yellowish brown.

**Head:** Head subtrapezoidal, widest across eyes, black. Frontoclypeal suture distinct. Anterior margin of clypeus emarginate; anterior corner rounded. Eye weakly protruded. Frons about 5.0 times as wide as eye. Labrum with compact setae; antero-medial margin emarginate. Antennae with 9 antennomeres; 1 longest, about 1.5 times as long as 2, slightly narrowed apically; 2 about 3.0 times as long as 3, subparallel; 3 slightly broad apically; 4 and 5 transverse; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, with sparse setae, widest across posterior corner; antero-medial margin emarginate; anterior corner rectangular; lateral margins straight; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 longest, about 1.5 times as long as 3, broad apically; 3 broad apically; 4 elongate, slightly shorter than 2, widest at

apical third, apex truncate. Labial palpomere 1 smallest; 2 about 1.5 times as long as 3, broad apically with few long setae on anterior part; 3 slightly curved, apex truncate, with long setae on anterior part. Gula suture non-parallel.

*Thorax*: Pronotum subquadrate, 2.2 times as wide as head, about 3.0 times as wide as long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin broadly rounded. Elytra subparallel, rounded apically, widest at anterior two third, slightly wider than pronotum. Subsutural suture present. Prosternum transverse, without process, posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal two third. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 5 longest, shorter than 2–4 combined, about 3.0 times as long as 4. Mesoventrite without process, postero-medial part convex. Mesofemur with pubescence on basal four fifth. Mesotibial inner spine shorter than tarsomeres 1–2 combined. Mesotarsomere 1 shortest; 2 longest, about 1.5 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly shorter than 2. Metaventrite protruded medially; postero-medial part glabrous. Metafemur with pubescence on basal four fifth. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 longest, about 1.5 times as long as 3; 3 about 1.2 times as long as 4; 5 slightly shorter than 2.

*Abdomen*: Sternite VII with small emargination on apical margin. Median lobe (Pl. 16C) of aedeagus broad apically, apical part rounded, widest apical third. Paramere (Pl. 16C) broad, shorter than median lobe, subapical part narrowed, apical margin rounded.

*Larvae*: see Minoshima and Hayashi (2011).

**TYPE MATERIAL**: Paratype: 1♂ (NHM), with labels as follows: “Paratype, SHIKOKU Kuroson VII 14. 1956 M. SATO, PARATYPE *Pseudohelochares narusei* M. SATÔ sp et gen. nov. Det. M. Satô 1959, PATA-TYPUS *Agraphydrus narusei* Satô det. HEBAUER”.

**SPECIMENS EXAMINED**: Chungbuk Prov.: 1 ex, Okcheon-gun, Gunseo-myeon, Geumsan-ri, N36°15'22" E127°33'2" 150 m, 23 v 2014, IS Yoo, JS Lee, ex under stone near stream; Gangwon Prov: 9 exx, Yangyang-gun, Seo-myoen, Bukpyeong-ri, Hu-stream, N38°04'11.16" E128°36'25.29" 3 m, 4 vii 2013, DH Lee, ex under stone beside stream; Gyeongbuk Prov.: 19 exx, Cheongsong-gun, Budong-myeon, Sangeui-ri, Mt. Juwangsang, 14 viii 2008, DH Lee, ex under stone beside mountain stream (3♂♂, on slides); 3 exx, Uljin-gun, Mt. Eungbongsan, 6 vi 1995, SH Lee (1♂1♀, on slides); 3 exx, Ulsan-si, Hwal-stream, 14 vii 1991, SH Lee (1♂, on slide); Gyeonggi Prov.: 9 exx, Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, Dongmak 2-bridge, N38°05'25.76" E127°06'35.11" 70 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, ex under stone near steam; Jeonbuk Prov.: 4 exx, Buan-gun, Jinseo-myeon, Seokpo-ri, N35°37'30.18" E126°34'08.57" 142 m, 16 vii 2013, DH Lee, ex under stone beside mountain stream (1♂1♀, on slides).

**DISTRIBUTION**: Korea, Japan.

**REGION**: East Palaearctic.

**KOREA:** CB, GW, GB, GG, JB (Lee, 2016: Fig. 8.34B).

**KOREAN RECORDS:** *Agraphydrus narusei*: Lee and Ahn, 2008: 317; Cho and Park, 2010: 96; Minoshima, 2016: 356.

## Genus *Helochares* Mulsant, 1844

### Genus *Helochares* Mulsant, 1844

*Helochares* Mulsant, 1844: 197. Type species: *Dytiscus lividus* Forster, 1771.

**DIAGNOSIS:** Body pale brown to black. Maxillary palpomere 2 curved outward. Elytra with punctato-striae, without sutural stria. Tarsal formula 5-5-5 (Fikáček et al., 2010).

### Key to the species of Korean *Helochares*

1. Body shorter than 4.0 mm; body yellowish brown; punctato-stria of elytron with black spots... *H. pallens*
- Body longer than 4.0 mm; body reddish brown; punctato-stria of elytron with deep punctures .....  
..... *H. nipponicus*

## Subgenus *Helochares* Mulsant, 1844

*Helochares* Mulsant, 1844: 197. Type species: *Dytiscus lividus* Forster, 1771.

*Pylophilus* Motschulsky, 1845: 32. Type species: *Hydrophilus griseus* Fabricius, 1787 (= *Dytiscus lividus* Forster, 1771).

*Peloxenus* Motschulsky, 1845: 549 [Replacement name]. Type species: *Hydrophilus griseus* Fabricius, 1787 (= *Dytiscus lividus* Forster, 1771).

*Stagnicola* Montrouzier, 1860: 246 [Homonym]. Type species: *Stagnicola foveicollis* Montrouzier, 1860.

### 49. *Helochares (Helochares) pallens* (MacLeay, 1825) (Pls. 13G, H, 16D)

*Enhydrus pallens* MacLeay, 1825: 35.

*Helochares lewisius* Sharp, 1873: 60.

*Helochares laeviusculus* Régimbart, 1906: 261.

**DESCRIPTION:** Length 3.0–3.5 mm. Body oblong oval, convex dorsally, outline discontinuous between pro-

notum and elytra, with compact punctures, without microreticulation. Ventral surface flat, with pubescence.

*Color:* Dorsal surface yellowish brown. Ventral surface brown to dark brown; Antennae, palpi, hypomera, epipleura, legs mostly reddish brown.

*Head:* Head subtrapezoidal, widest across eyes, mostly brown. Frontoclypeal suture distinct, without few long setae. Anterior margin of clypeus slightly emarginate; anterior corner rounded. Eye weakly protruded. Frons about 3.0 times as wide as eye. Labrum transverse, dark brown; antero-medial margin emarginate. Antennae with 9 antennomeres; 1 longest, about 1.2 times as long as 2, slightly broad apically; 2 about 3.0 times as long as 3, slightly narrowed apically; 3 slightly broad apically; 4 and 5 transverse; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, with sparse setae, widest across anterior corner; antero-medial margin emarginate; anterior corner rectangular; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 longest, slightly longer than 3, broad apically; 3 slightly longer than 4, broad apically, slightly curved inward; 4 elongate, widest at apical third, apex truncate. Labial palpomere 1 smallest; 2 about 1.5 times as long as 3, broad apically with few long setae on anterior part; 3 slightly curved, apex truncate, with long setae on anterior part. Gula suture non-parallel.

*Thorax:* Pronotum subquadrate, 2.0 times wider than head, about 2.5 times wider than long, widest at anterior two third; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin broadly rounded. Elytra rounded apically, widest at anterior two third, slightly wider than pronotum; punctato-stria indistinct. Prosternum transverse, convex medially, posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal five sixth. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 5 longest, longer than 2–4 combined, about 3.5 times as long as 4. Mesoventrite without process, postero-medial part convex. Mesofemur with pubescence on basal five sixth. Mesotibial inner spine curved, shorter than tarsomeres 1–2 combined. Mesotarsomere 1 as long as 3; 2 about 1.2 times as long as 3; 4 shortest; 5 longest, 3.0 times as long as 4. Metaventrite convex medially without glabrous part. Metafemur with pubescence on basal five sixth. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 longest, 3.0 times as long as 4.

*Abdomen:* Sternite VII with small emargination and a row of slender spines on apical margin. Median lobe (Pl. 16D) of aedeagus slender, widest at middle, apical margin protruded and acute. Paramere (Pl. 16D) small, fused anterior part of median lobe, apical margin rounded.

*Larvae:* see Minoshima and Hayashi (2011).

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 4 exx, Jincheon-gun, Chopyeong-myeon, Hwasan-ri, Chopyeong-reservoir, 31 vii 1994, SH Lee; Gyeongnam Prov.: 1 ex, Euiryeong-gun, Haengjeong-pond, 8 v 2009, SH Lee; Jeju Prov.: 4 exx, Bukjeju-gun, Jocheon-eup, Seonheul-ri, Dongbaek garden

pond, 22 v 2006, DH Lee, ex pond; 2 exx, Bukjeju-gun, Yongsu-ri, 20 viii 1994, SH Lee; Jeonnam Prov.: 3 exx, Mokpo-si, Hadang-dong, 10 x 1990, SH Lee (1♂1♀, on slides).

**DISTRIBUTION:** Korea, China (Fujian, Guandong, Hubei, Jiangxi, Yunnan), Iran, Israel, Japan, Lebanon, Nepal, Saudi Arabia, Yemen.

**REGION:** Palaearctic.

**KOREA:** CB, GN, JN, JJ (Lee, 2016: Fig. 8.34C).

**KOREAN RECORDS:** *Helochares pallens*: Kim et al., 1994: 135; Park et al., 2008: 254; Cho and Park, 2010: 96.

### Subgenus *Hydrobaticus* MacLeay, 1871

*Hydrobaticus* MacLeay, 1871: 131. Type species: *Hydrobaticus tistis* MacLeay, 1871.

*Graphelochares* Kuwert, 1890: 38. Type species: *Helophilus melanophthalmus* Mulsant, 1844.

#### 50. *Helochares (Hydrobaticus) nipponicus* Hebauer, 1995 (Pls. 13I, J, 16E)

*Helochares nipponicus* Hebauer, 1995: 6.

*Helochares striatus* Sharp, 1873: 60.

**DESCRIPTION:** Length 4.0–4.5 mm. Body broadly oval, convex dorsally, outline discontinuous between pronotum and elytra, with compact punctures, without microreticulation. Ventral surface flat, with pubescence.

**Color:** Dorsal surface reddish brown. Ventral surface dark brown; Antennae, mouthparts, hypomera, epipleura, legs mostly reddish brown.

**Head:** Head subtrapezoidal, widest across eyes, mostly brown, antero-lateral parts yellow. Frontoclypeal suture distinct, with few long setae. Anterior margin of clypeus slightly emarginate; anterior corner rounded. Eye weakly protruded. Frons about 3.0 times as wide as eye. Labrum transverse; antero-medial margin emarginate. Antennae with 9 antennomeres; 1 longest, about 1.2 times as long as 2, slightly broad apically; 2 about 3.0 times as long as 3, slightly narrowed apically; 3 slightly broad apically; 4 and 5 transverse; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, with sparse setae, widest across anterior corner; antero-medial margin emarginate; anterior corner rectangular; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 longest, slightly longer than 3, broad apically; 3 slightly longer than 4, broad apically, slightly curved inward; 4 elongate, widest at apical third,

apex truncate. Labial palpomere 1 smallest; 2 about 1.5 times as long as 3, broad apically with few long setae on anterior part; 3 slightly curved, apex truncate, with long setae on anterior part. Gula suture non-parallel.

*Thorax*: Pronotum subquadrate, 2.0 times wider than head, about 2.5 times wider than long, widest at middle; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin broadly rounded. Elytra rounded apically, widest at anterior two third, slightly wider than pronotum; punctato-stria distinct. Prosternum transverse, convex medially, posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal five sixth. Protibia as long as femur, without pubescence; protibial inner spine curved and shorter than tarsomeres 1–2 combined. Protarsomere 5 longest, longer than 2–4 combined, about 3.5 times as long as 4. Mesoventrite without process, postero-medial part convex. Mesofemur with pubescence on basal five sixth. Mesotibial inner spine curved, shorter than tarsomeres 1–2 combined. Mesotarsomere 1 as long as 3; 2 about 1.2 times as long as 3; 4 shortest; 5 longest, 3.5 times as long as 4. Metaventrite convex medially without glabrous part. Metafemur with pubescence on basal five sixth. Metatibial inner spine shorter than tarsomeres 1–2 combined. Metatarsomere 1 shortest; 2 about 2.0 times as long as 3; 3 about 1.5 times as long as 4; 5 longest, 3.5 times as long as 4.

*Abdomen*: Sternite VII with small emargination and a row of thick spines on apical margin. Median lobe (Pl. 16E) of aedeagus broad, widest at middle, internal sac flame-shaped. Paramere (Pl. 16E) small, shorter than median lobe, apical margin rounded.

*Larvae*: see Minoshima and Hayashi (2011).

**SPECIMENS EXAMINED**: SOUTH KOREA: Chungbuk Prov.: 3 exx, Boeun-gun, Boeun-eup, Jisan-ri, 17 viii 1989; 2 exx, Cheongju-si, Heungdeok-gu, Hyuam-dong, 7 v 2005, DH Lee, ex pond; 12 exx, Jincheon-gun, Chopyeong-myeon, Hwasan-ri, Chopyeong-reservoir, 31 vii 1994, SH Lee; 1 ex, Okcheon-gun, 8 vii 1991, SH Lee; Chungnam Prov.: 11 exx, Cheonan-si, Choengsu-dong, Cheongsu-pond, 14 ix 1990, SH Lee (3♂♂ 1♀, on slides); 7 exx, Cheongyang-gun, Munmak-pond, 25 vii 1995, SH Lee; 1 ex, Nonsan-si, Noseong-myeon, 1 viii 1990, SH Lee; Gangwon Prov.: 6 exx, Inje-gun, Nam-myeon, Namjeon-ri, 1 viii 1991, SH Lee; 1 ex, Hoingseong-gun, Hoingseong-eup, Gaejeon-ri, 29 vii 1991, SH Lee; Gyeongbuk Prov.: 1 ex, Cheongdo-gun, Songeub-ri, 17 ix 1989, SH Lee; 1 ex, Seongju-gun, Chadong, 3 viii 1991, SH Lee; 1 ex, Gunwi-gun, Changgi-ri, 18 vi 1990, SH Lee; Gyeonggi Prov.: 5 exx, Yeoncheon-si, Yeoncheon-eup, Dongmak-ri, N38°06'45.13" E127°06'45.13" 104 m, 26 ix 2014, DH Lee, SG Lee, JS Lee, ex pond; Gyeongnam Prov.: 1 ex, Changnyeong-gun, Chilgyo-pond, 2 ix 1988, SH Lee; Jeonbuk Prov.: 1 ex, Jeongeub-si, Naejaong-dong, Mt. Naejangsan, 4 viii 1990, SH Lee.

**DISTRIBUTION**: Korea, Japan.

**REGION**: East Palaearctic.

**KOREA**: CB, CN, GW, GB, GG, GN, JB (Lee, 2016: Fig. 8.34C).

**KOREAN RECORDS**: *Helochares nipponicus*: Hansen, 2004: 52. *Helochares striatus*: Okamoto, 1924: 167;

Cho, 1957: 213; Cho, 1963: 46; 1969: 257; Lee et al., 1985: 405; Kwon and Suh, 1986: 101; Yoon, 1988: 630; Lee et al., 1988: 76; Kim et al., 1994: 135; Lee, 1994: 19; Park et al., 2008: 255; Cho and Park, 2010: 96 [synonym of *H. nipponicus*].

## Subfamily Sphaeridiinae Latreille, 1802

**DIAGNOSIS:** Mesoventrite fused with mesanepisterna. Medial part of mesoventrite elevated into a plate. Metatarsomere 1 longer than 2. Abdominal ventrite I carinate medially (Short and Fikáček, 2013).

## Tribe Coelostomatini L. Heyden, 1891

### Genus *Coelostoma* Brullé, 1835

#### Genus *Coelostoma* Brullé, 1835

*Coelostoma* Brullé, 1835: 293. Type species: *Hydrophilus orbicularis* Fabricius, 1775.

**DIAGNOSIS:** Body spherical, distinctly convex dorsally. Labrum weakly sclerotized, retracted under clypeus, and fringed with setae. Maxillary palpomere 2 swollen and thick (Lee, 2016: Fig. 8.30C). Elytra without striae or serial punctures except for sutural striae in posterior half. Metatarsomere 5 longer than 2 (Komarek, 2003).

### Subgenus *Holocoelostoma* Mouchamps, 1958

*Holocoelostoma* Mouchamps, 1958: 3. Type species: *Hydrobius stultus* Walker, 1858.

#### 51. *Coelostoma* (*Holocoelostoma*) *stultum* (Walker, 1858) (Pls. 13K, L, 16F)

*Hydrobius stultus* Walker, 1858: 209.

*Cyclonotum simplex* Sharp, 1874: 419.

**DESCRIPTION:** Length 3.8–4.2 mm. Body spherical, distinctly convex dorsally, outline discontinuous between pronotum and elytra, with compact punctures, without microreticulation. Ventral surface flat, with pubescence.

*Color:* Dorsal surface black. Ventral surface mostly black; Antennae, mouthparts, hypomera, epipleura, legs mostly reddish brown.

*Head:* Head subhexagonal, widest across eyes. Frontoclypeal suture indistinct. Anterior margin of clypeus broadly rounded; anterior corner rounded. Eye protruded. Frons about 4.0 times as wide as eye. Labrum transverse with compact setae on anterior part; antero-medial margin emarginate. Antennae with 9 antennomeres; 1 longest, about 3.0 times as long as 2, slightly broad apically; 2 as long as 3, narrowed apically; 3 slightly broad apically; 4 and 5 transverse; 6 transverse dish-shaped; 7–9 clubbed, with pubescence. Prementum with compact long setae on anterior part. Mentum subquadrate, concave antero-medially, with sparse setae, widest across anterior corner; antero-medial margin emarginate; anterior corner obtuse; lateral margins subparallel, straight; posterior corner rectangular; posterior margin straight. Apex of mandible bifid. Maxillary palpomere 1 smallest; 2 longest, 1.2 times as long as 3, widest at middle; 3 shorter than 4, broad apically; 4 elongate, widest at middle, apex truncate. Labial palpomere 1 shortest; 2 about 1.5 times as long as 3, broad apically with few long setae on anterior part; 3 oval, apex truncate, with a long setae on apical margin. Gula suture non-parallel.

*Thorax:* Pronotum subtrapezoidal, 2.0 times wider than head, about 3.0 times wider than long, widest across posterior corner; anterior margin bisinuate; anterior corner rounded; lateral margins rounded; posterior corner rounded; posterior margin broadly rounded, reddish brown. Elytra rounded apically, parallel laterally, as wide as pronotum. Prosternum slightly convex, with small acute process on antero-medial margin; posterior margin acute. Procoxal cavity large and semicircular. Profemur with pubescence on basal four fifth. Protibia as long as femur, without pubescence; protibial inner spine curved and as long as tarsomeres 1–2 combined. Protarsomere 5 longest, shorter than 2–4 combined, about 2.5 times as long as 4. Mesoventrite with longitudinal carina on medial part; posterior part of carina protruded and acute. Mesofemur with pubescence on basal four fifth. Mesotibial inner spine curved and as long as tarsomere 1. Mesotarsomere 1 longest, 2.5 as long as 2; 2 slightly shorter than 3; 3 slightly longer than 4; 4 shortest; 5 about 2.5 times as long as 4. Metaventrite convex medially; postero-medial part glabrous. Metafemur without pubescence, with sparse setae. Metatibial inner spine as long as tarsomere 1. Metatarsomere 1 longest, 2.5 as long as 2; 2 slightly shorter than 3; 3 slightly longer than 4; 4 shortest; 5 about 2.5 times as long as 4.

*Abdomen:* Sternite VII without small emargination. Median lobe (Pl. 16F) of aedeagus narrowed apically, widest at base, apical margin acute. Paramere (Pl. 16F) broad, longer than median lobe, widest at base, apical margin acute.

**SPECIMENS EXAMINED:** SOUTH KOREA: Chungbuk Prov.: 4 exx, Cheongju-si, Heungdeok-gu, Hyuam-dong, 7 v 2005, DH Lee, ex pond (1♂, on slide); Gangwon Prov.: 4 exx, Gangneung-si, Gyeongpo-lake, 4 viii 1988, SH Lee; Gyeongbuk Prov.: 1 ex, Gumi-si, Mt. Geumosan, 19 vii 2001, KJ Ahn, SJ Park, CW Shin, at light; Gyeonggi Prov.: 1 ex, Ganghwa-gun, Hwado-myeon, Nae-ri, 19 ix 2005, DH Lee, ex rice

field; 1 ex, Suwon-si, Seo-lake, 14 ix 1990, SH Lee; Jeju Prov.: 1 ex, Jeju-si, Jocheon-eup, Seonheul-ri, 22 v 2006, SJ Park, SI Lee, YH Kim, ex under stone near stream; 1 ex, Namjeju-gun [= Seogwipo-si], Seongsan-eup, Siheung-ri, 27 vii 1990, SH Lee.

**DISTRIBUTION:** Korea, Afghanistan, China, Japan, Nepal, Oman, Saudi Arabia, Taiwan.

**REGION:** Palaearctic.

**KOREA:** CB, GW, GB, GG, JJ (Lee, 2016: Fig. 8.34D).

**KOREAN RECORDS:** *Coelostoma stultum*: Cho, 1957: 212; Kwon and Suh, 1986: 99; Lee et al., 1988: 81; Lee et al., 1992: 55; Kim et al., 1994: 135; Hua, 2002: 43; Han et al., 2007: 271; Han et al., 2008: 268; Cho and Park, 2010: 96.

**REMARKS:** *Coelostoma orbiculare* (Fabricius) was first recorded by Kwon and Suh (1986). However, after studying the specimens, we found that previous Korean record was incorrect and they are actually *C. stultum* (Walker). *Coelostoma orbiculare* can be distinguished from *C. stultum* by posterior margin of pronotum black and apical margin of median lobe rounded.

## **Subgenus *Lachno-coelostoma* Mouchamps, 1958**

*Lachno-coelostoma* Mouchamps, 1958. Type species: *Cyclonotum horni* Régimbart, 1902.

### **52. *Coelostoma (Lachno-coelostoma) wui* Orchymont, 1940**

*Coelostoma wui* Orchymont, 1940: 160.

**DISTRIBUTION:** Korea, China.

**REGION:** East Palaearctic.

**KOREAN RECORDS:** *Coelostoma wui*: Orchymont, 1940: 160 (Corée); Hua, 2002: 43; Hansen, 2004: 61.

**REMARKS:** This species has been recorded only in Korea by Orchymont (1940). We could not find any Korean specimen but cited this species based on the previous records.

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## PLATES

## PLATES

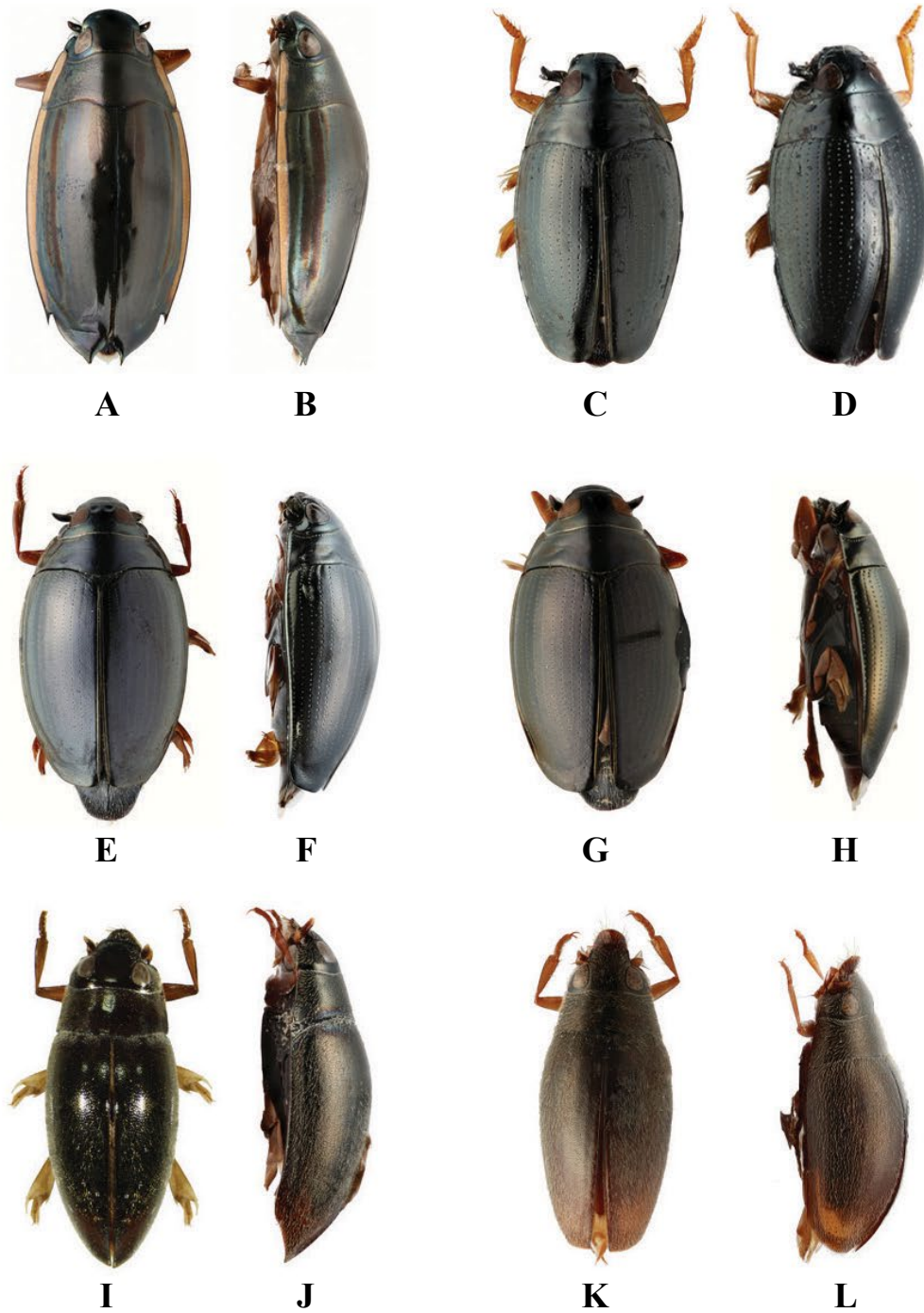


Plate 1. Habitus. A, B. *Dineutus orientalis*, 9.0 mm; C, D. *Gyrinus gestroi*, 4.8 mm; E, F; *G. japonicus*, 7.0 mm; G, H; *G. pullatus*, 6.0 mm; I, J. *Orectochilus punctipennis*, 6.5 mm; K, L. *O. villosus*, 5.7 mm.

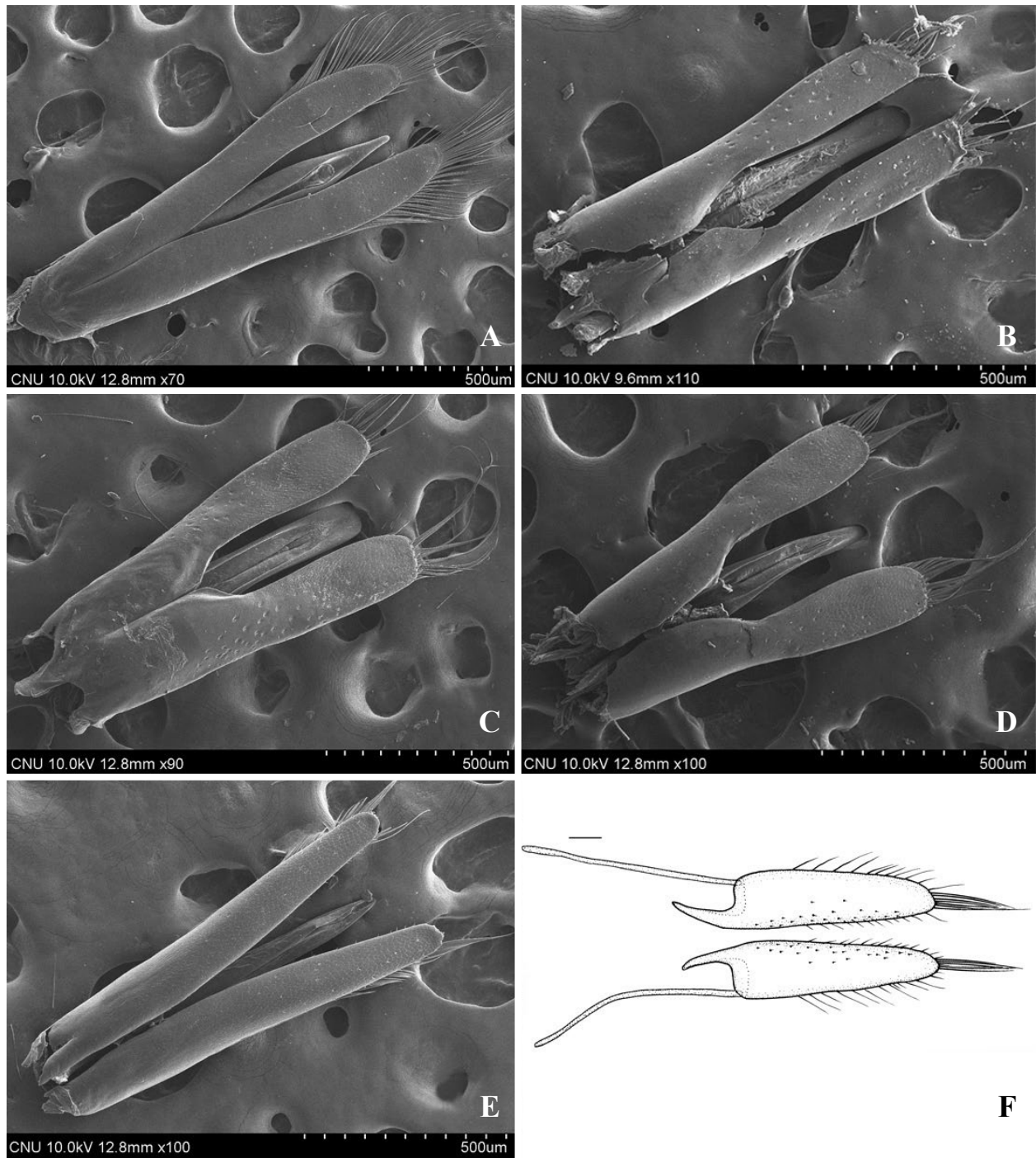


Plate 2. Aedeagus A–E (dorsal aspect), gonocoxa F (dorsal aspect). A. *Dineutus orientalis*; B. *Gyrinus gestroi*; C. *G. japonicus*; D. *G. pullatus*; E. *Orectochilus villosus*; F. *O. punctipennis*. Scales = 0.1 mm.

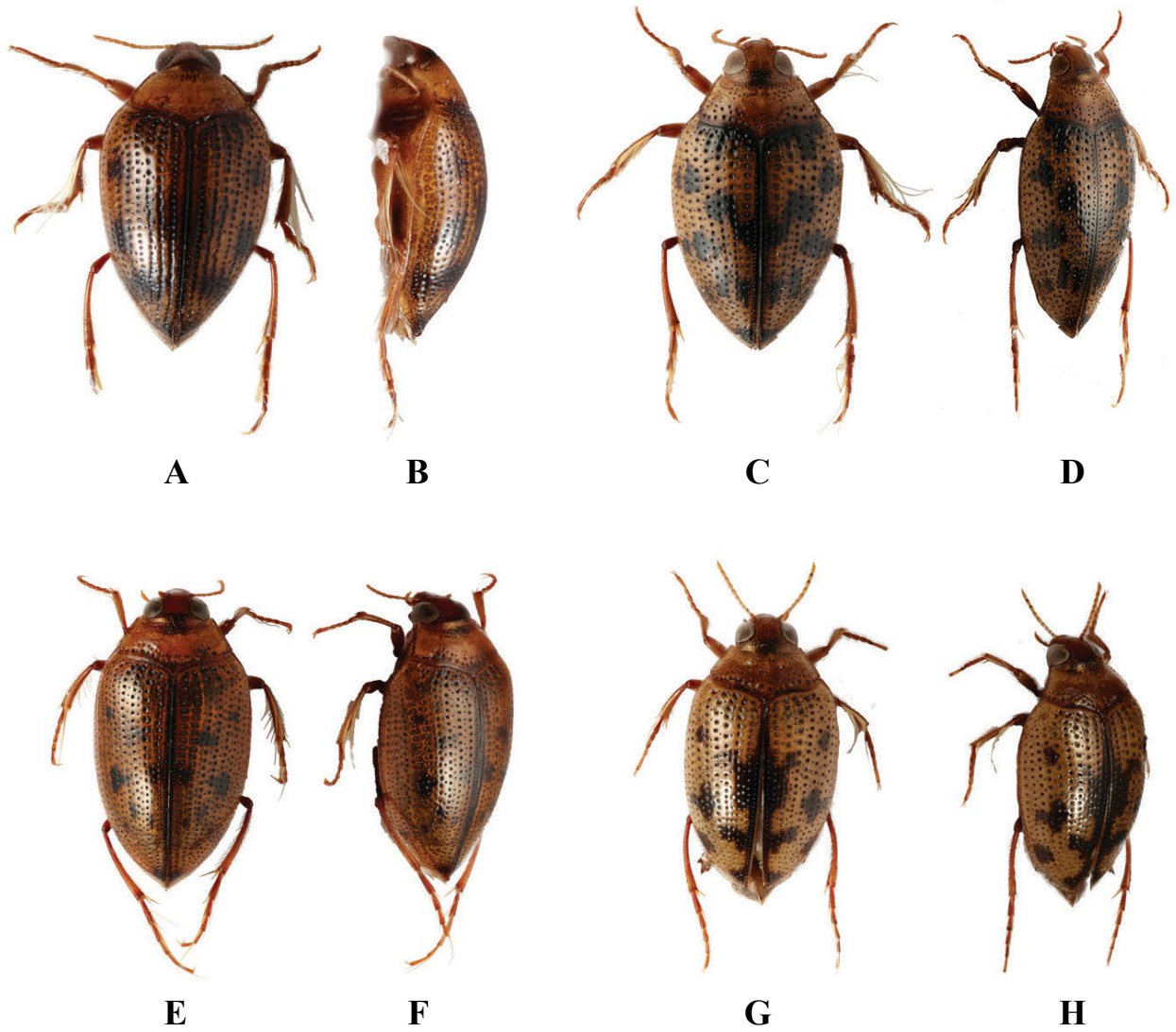


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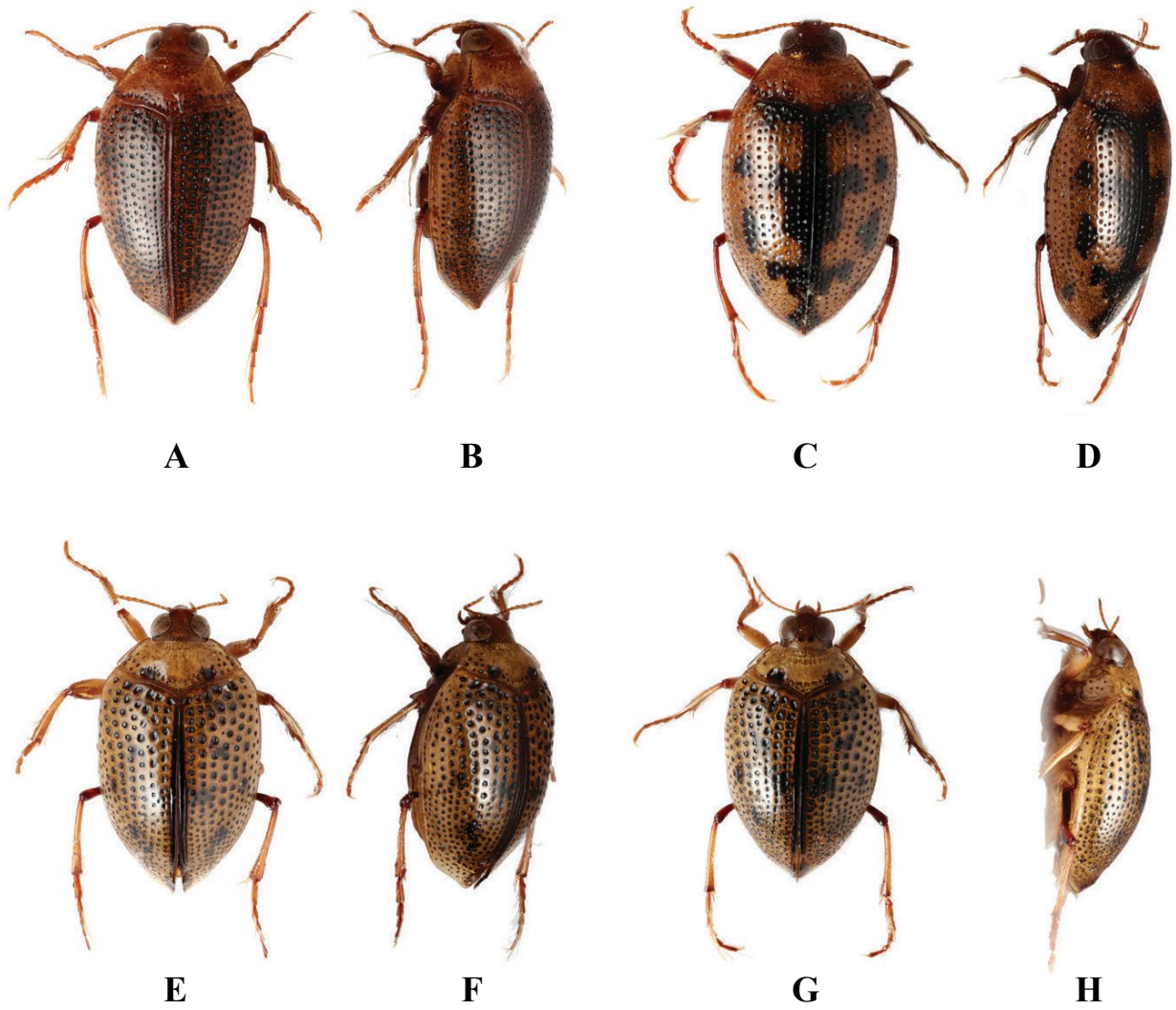


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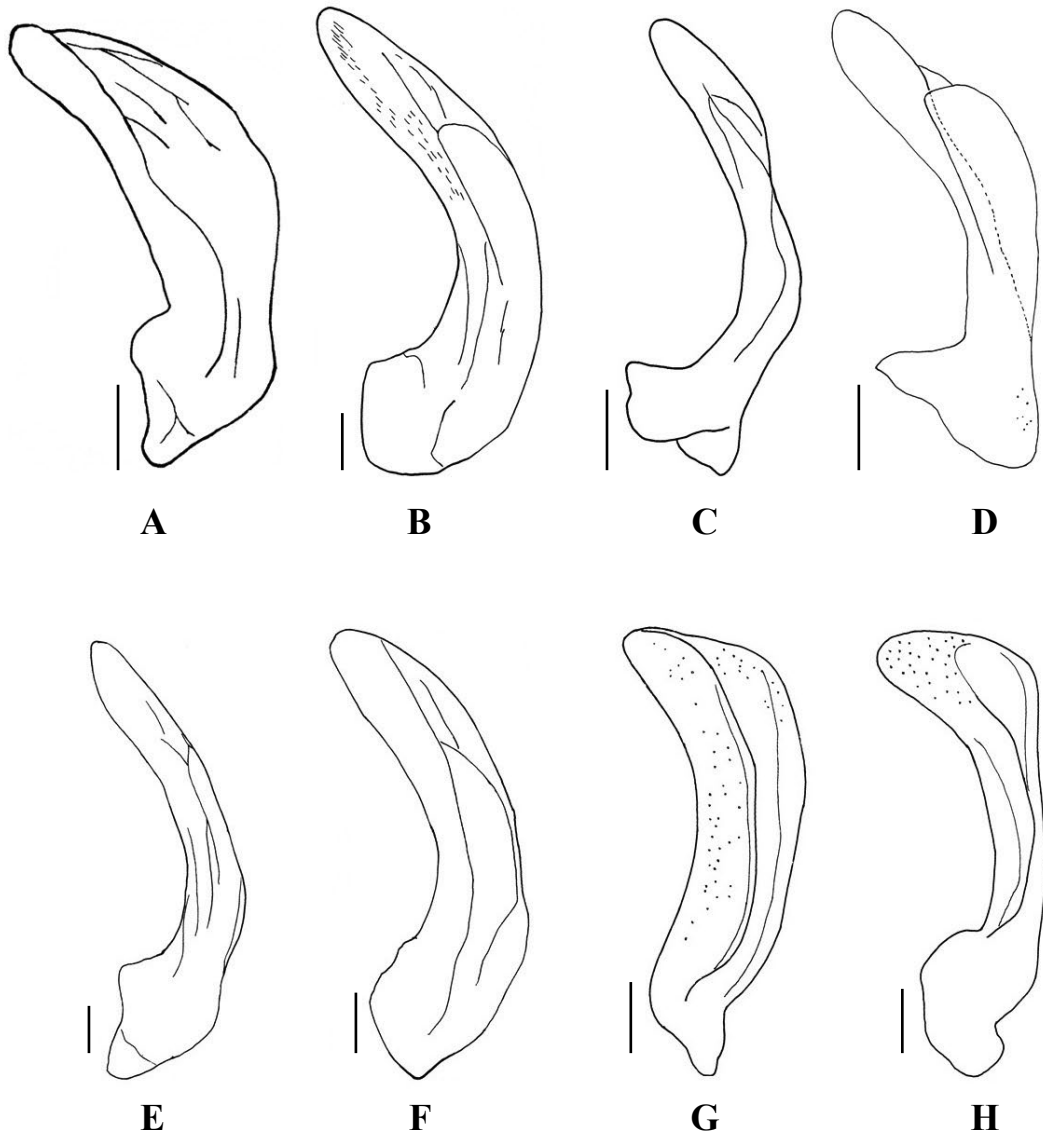


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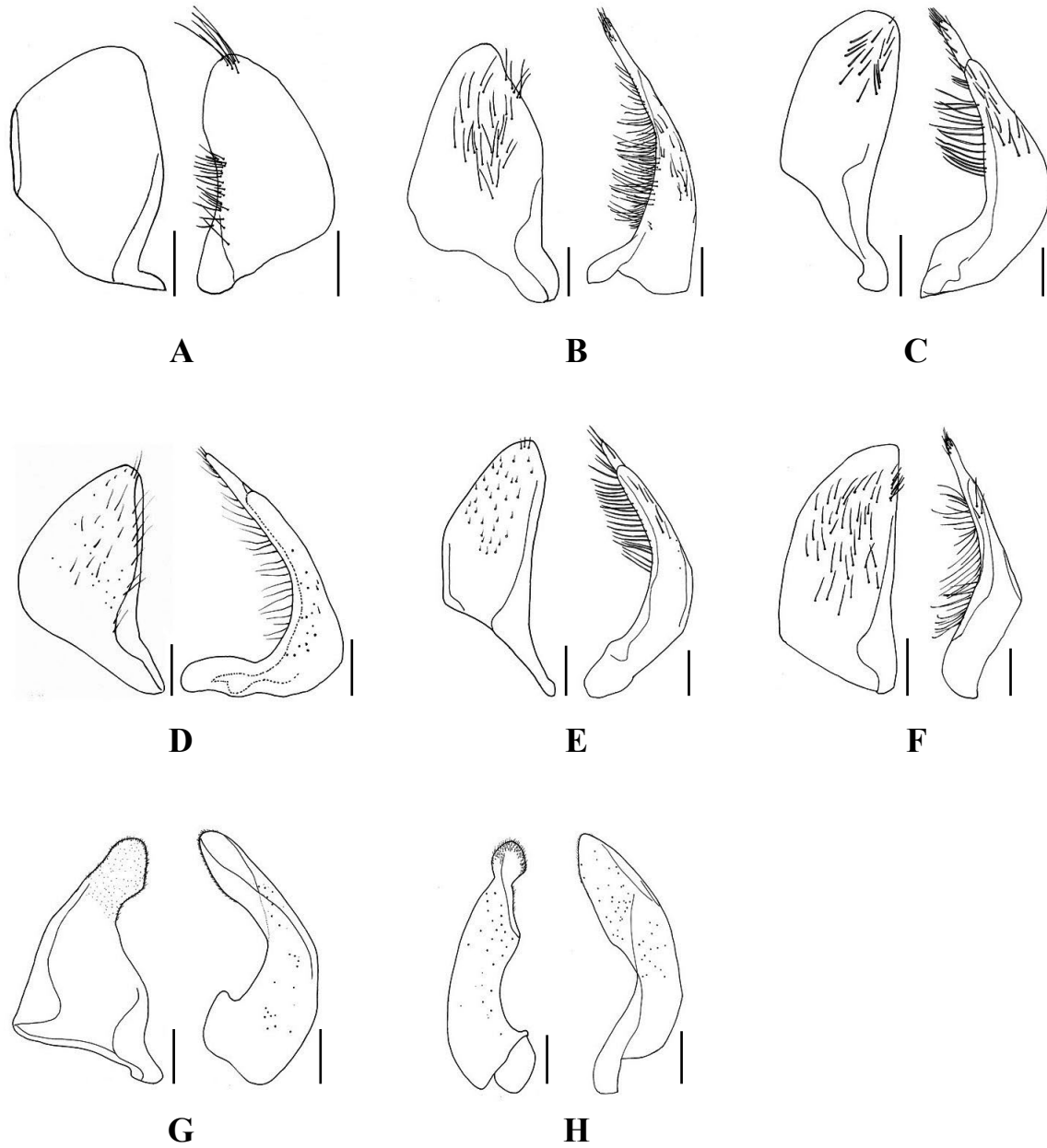


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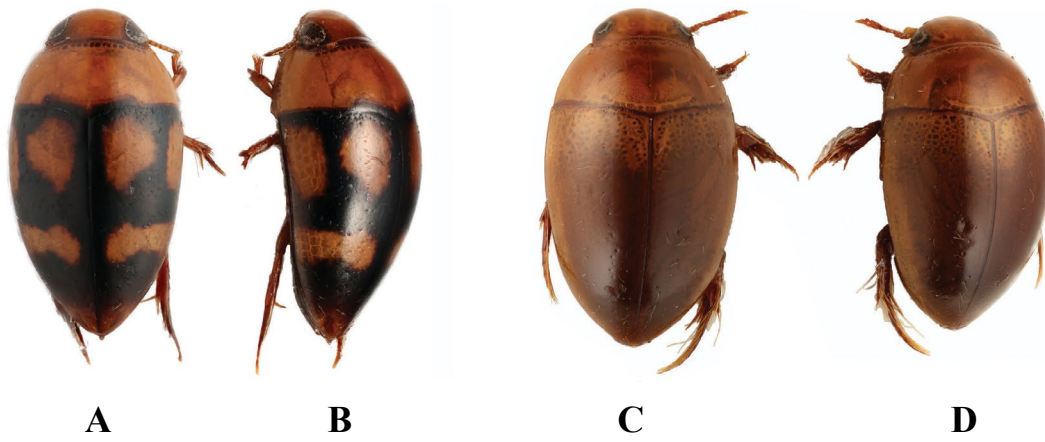


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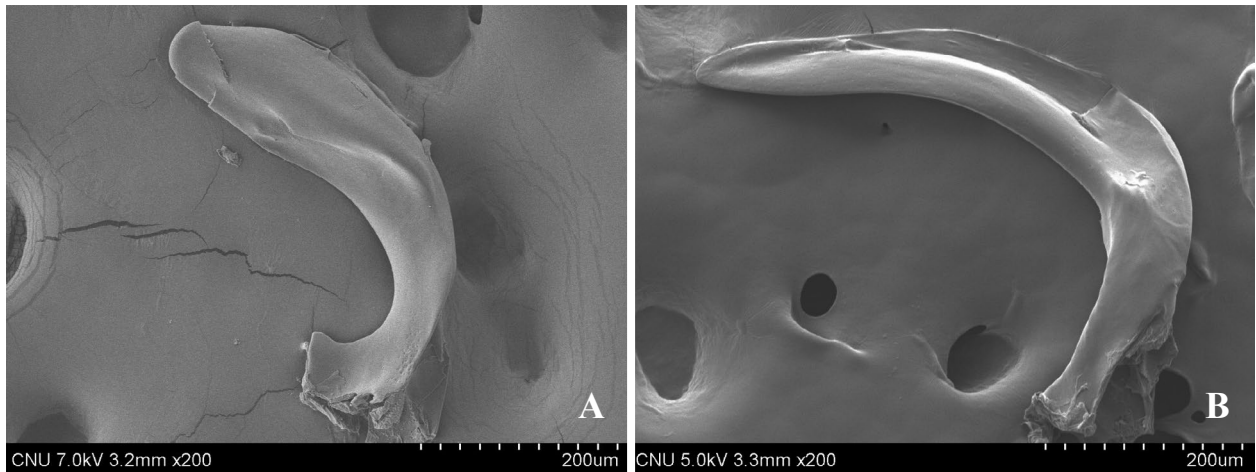


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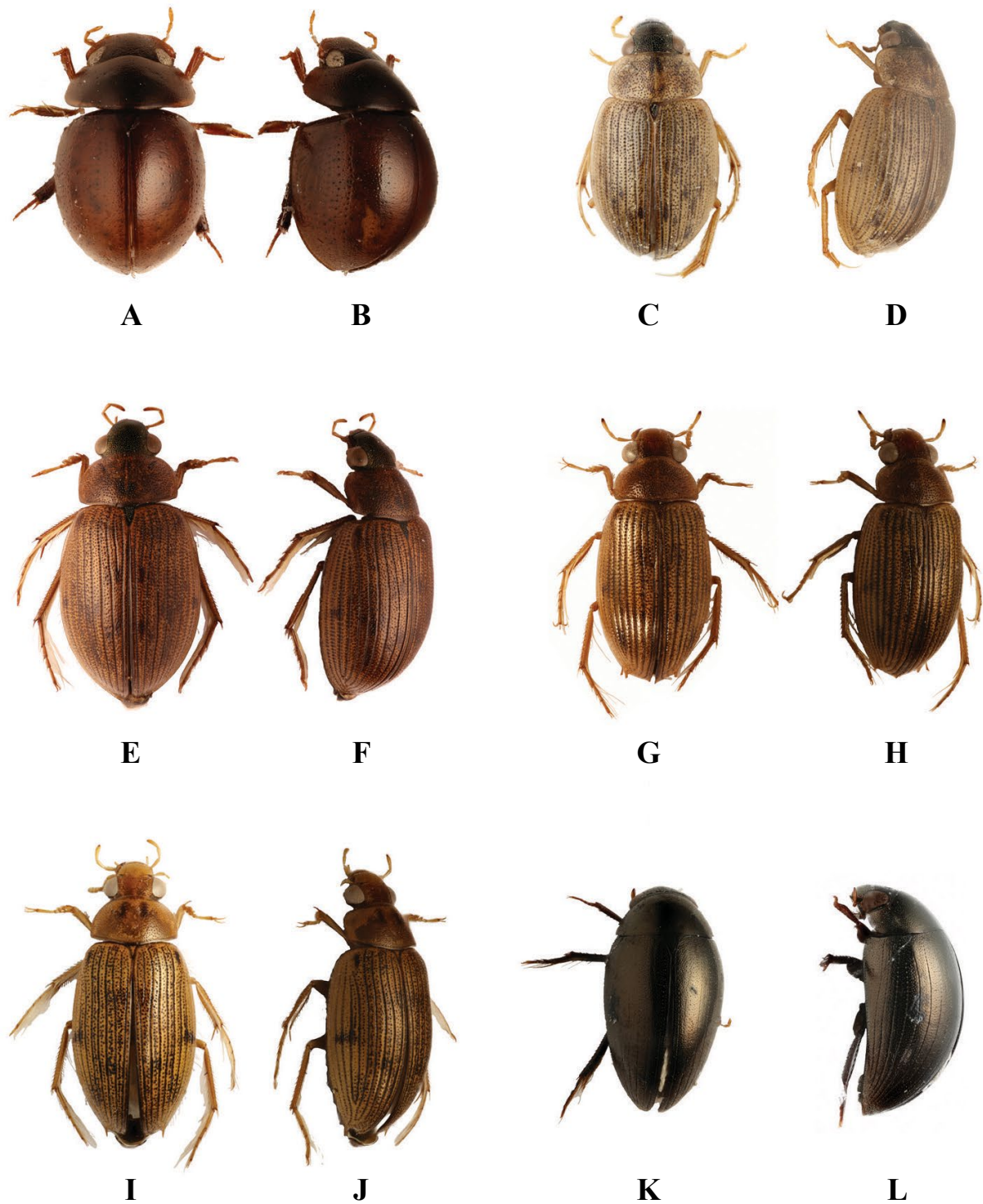


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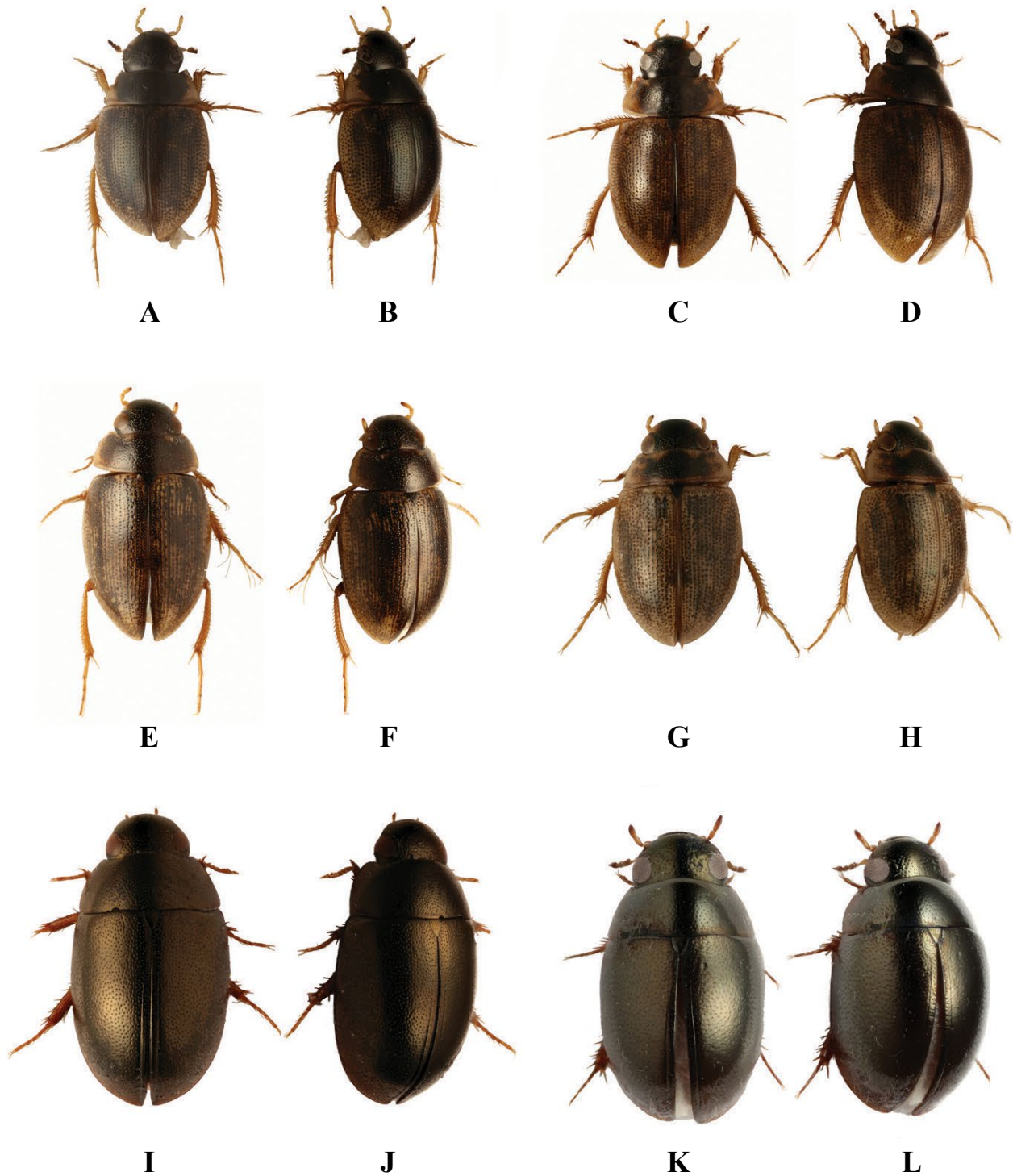


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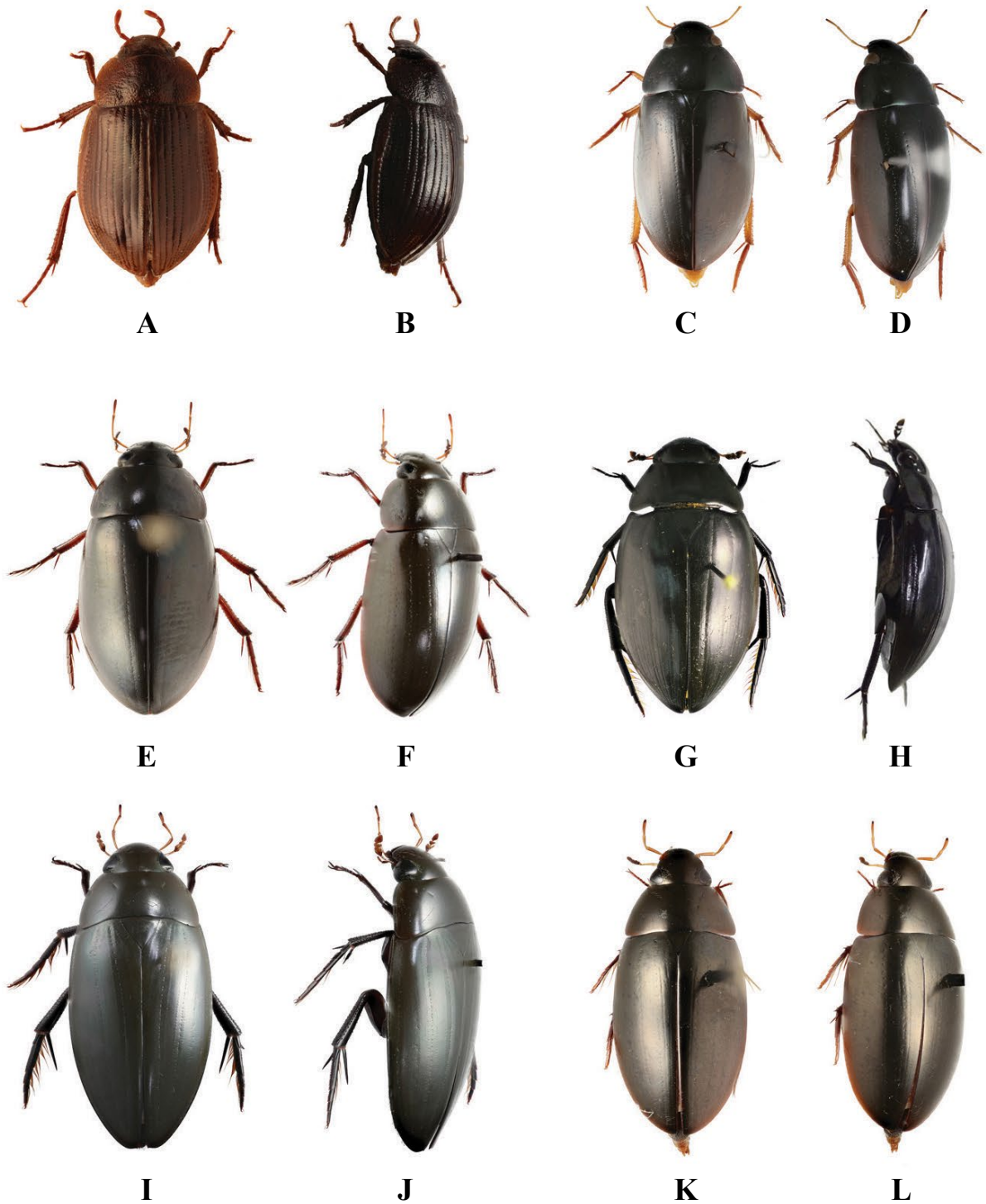


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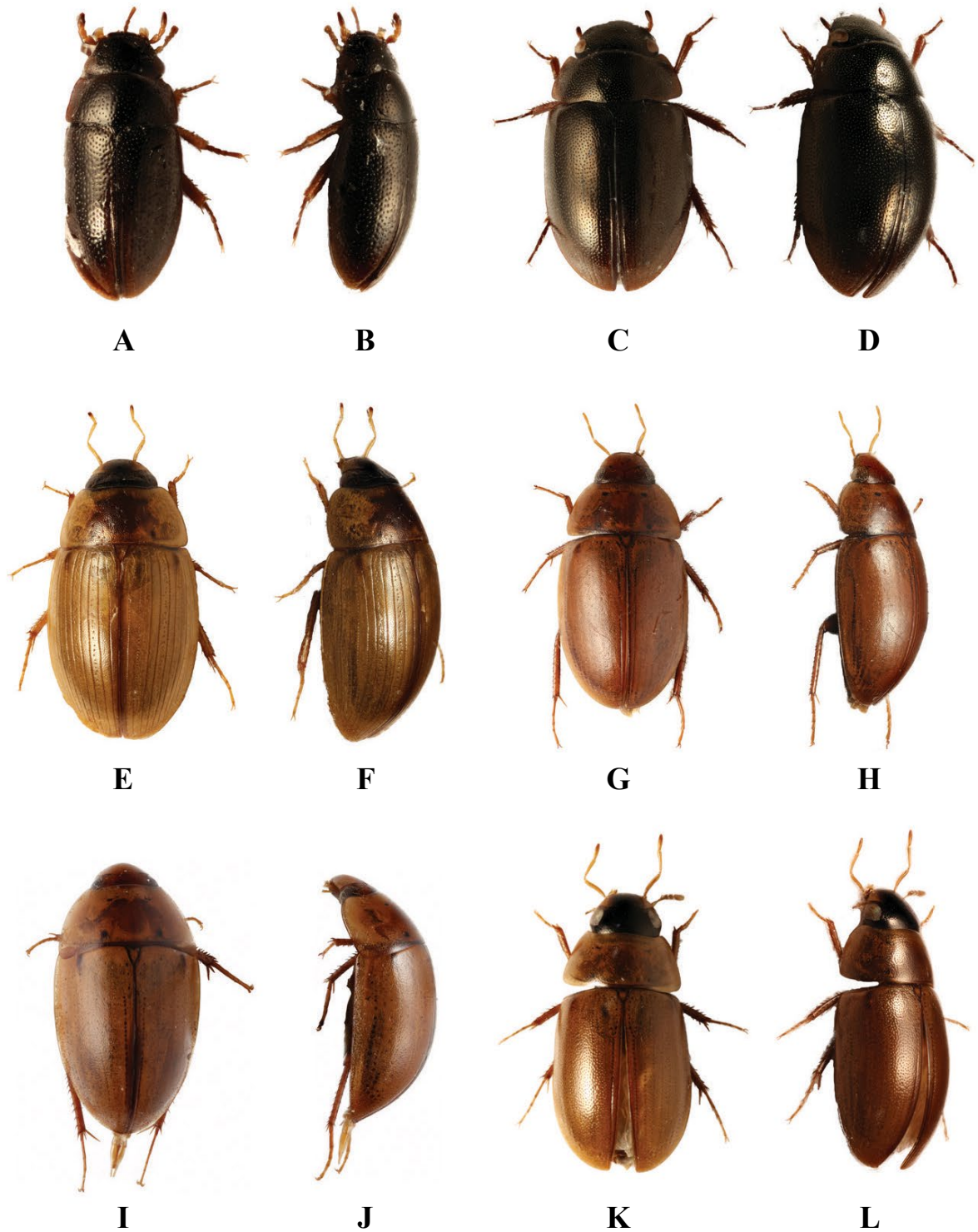


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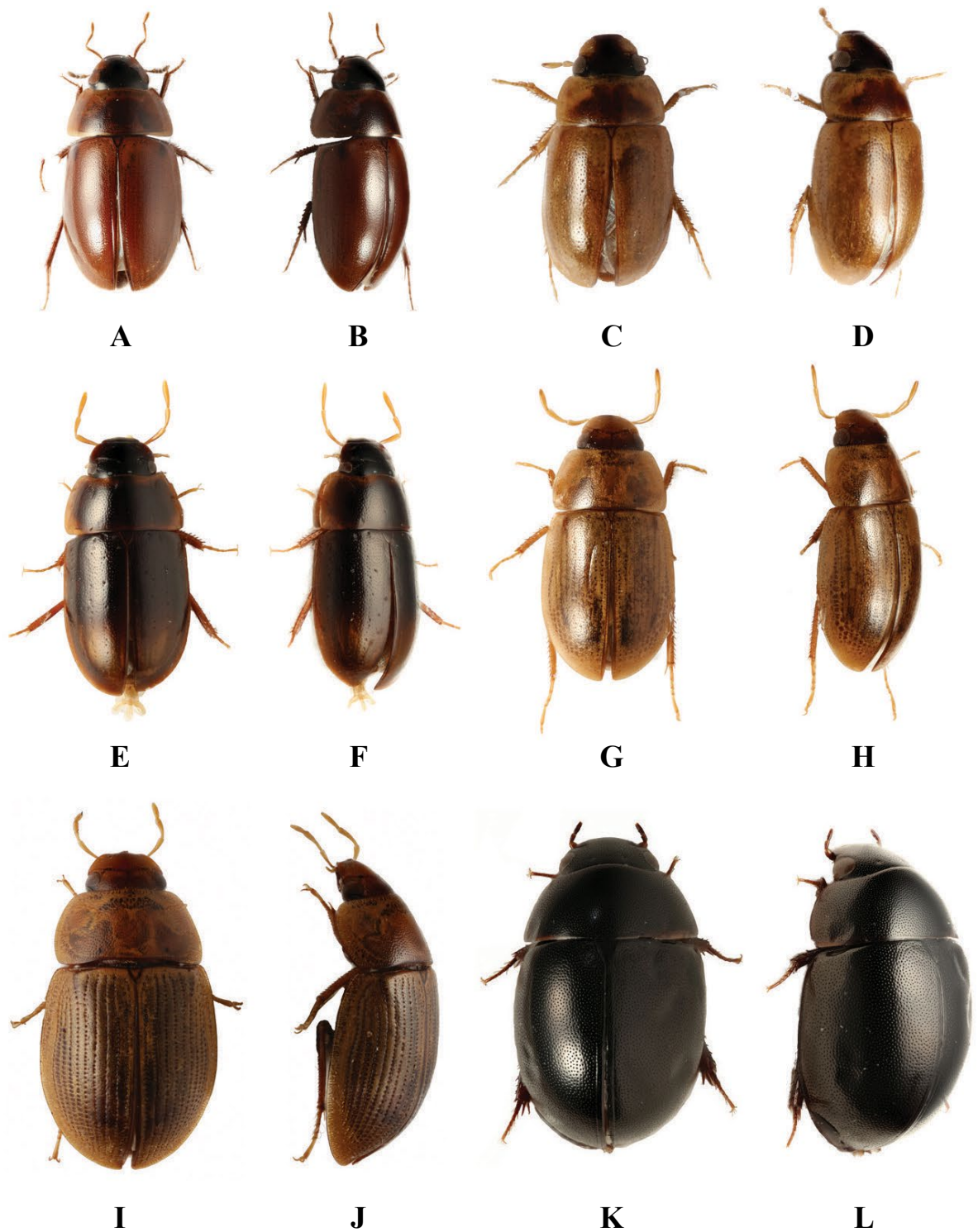


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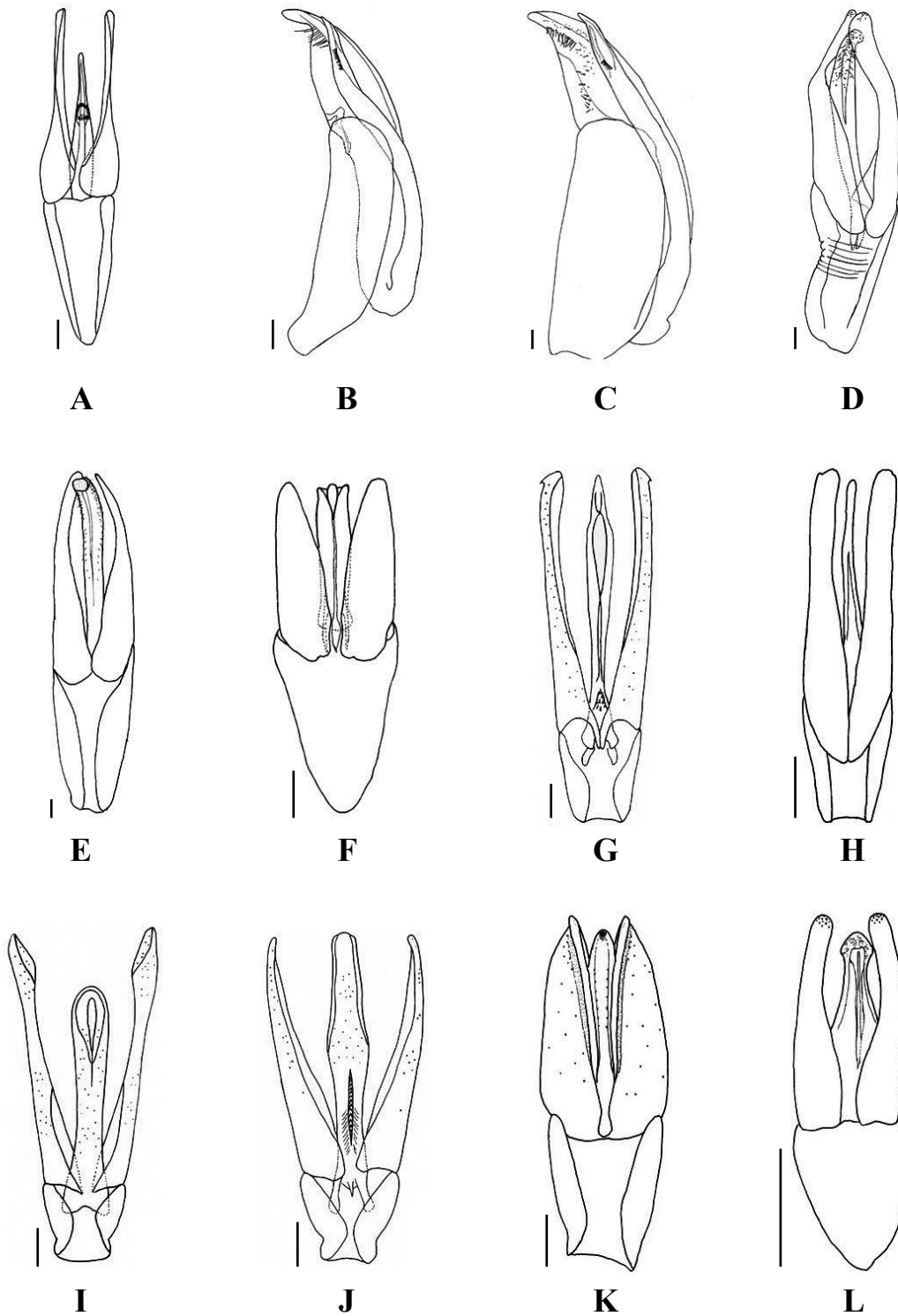


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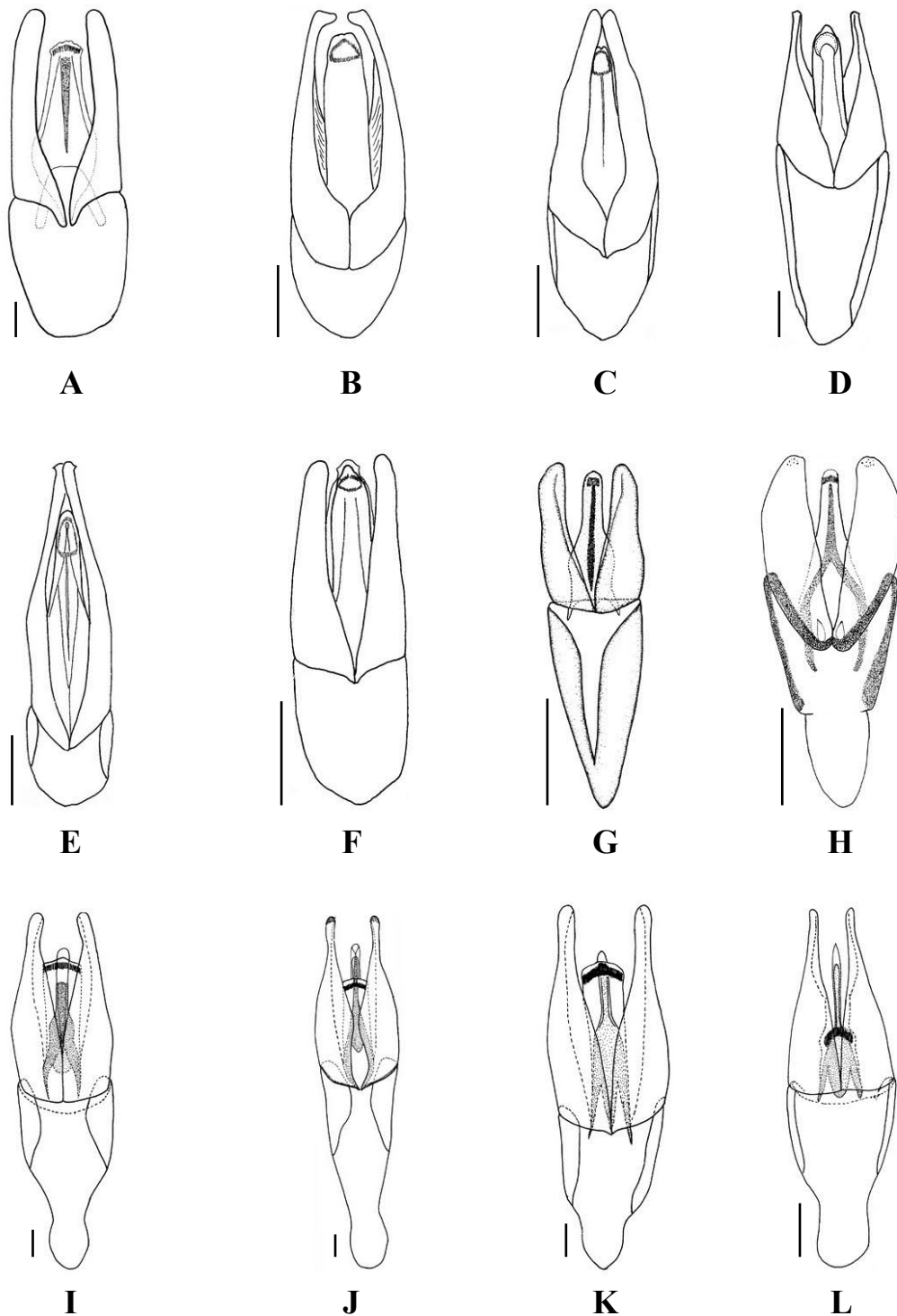


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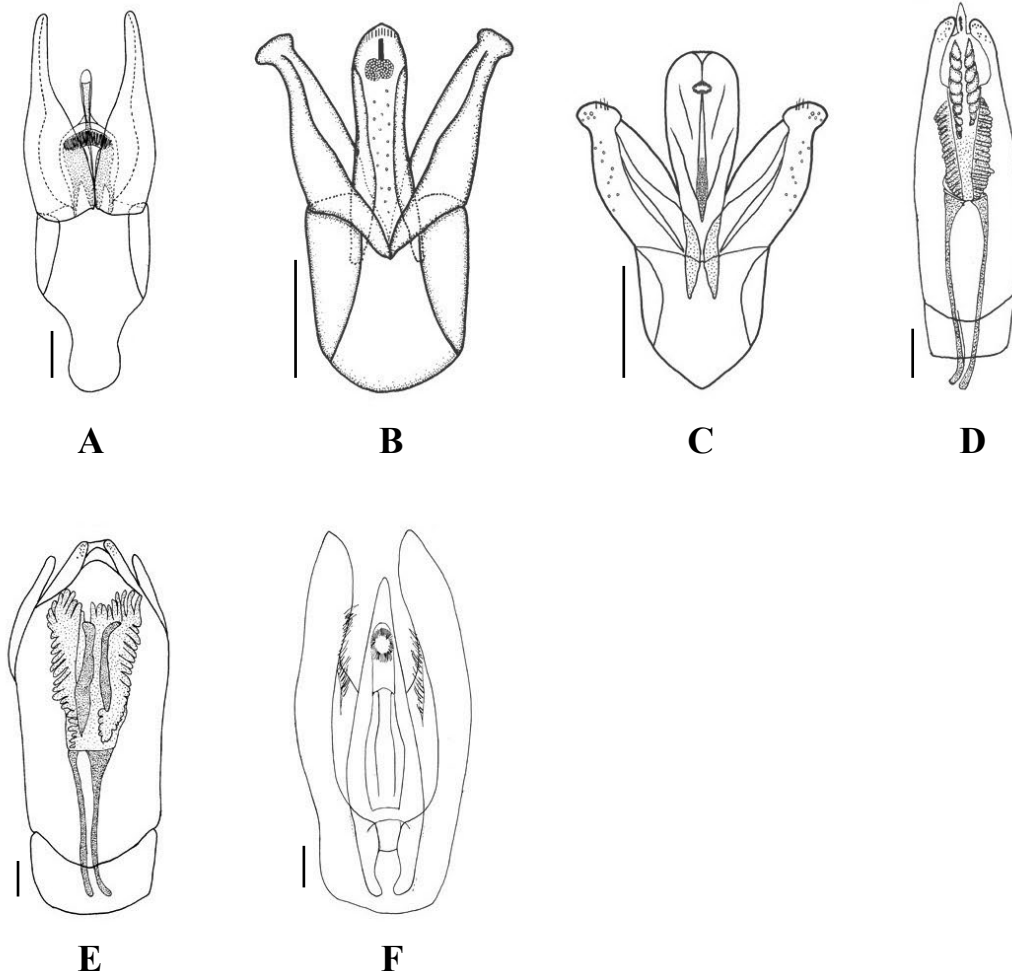


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