

***Hydroporus uenoi* (Coleoptera: Dytiscidae: Hydroporinae) New to Korea, with Mitochondrial DNA Sequence**

Dae-Hyun Lee, Sang Woo Jung*

DASARI Research Institute of BioResources, Daejeon 35203, Korea

ABSTRACT

The genus *Hydroporus* Clairville is the most diverse group belonging to the subfamily Hydroporinae in the family Dytiscidae. However, members of this group have not been recorded in the Korean peninsula. The genus *Hydroporus* Clairville is characterized by the following features: body glabrous to distinctly setose; elytra and ventral surface mainly piceous to black; epipleuron lacking a carina on humeral angle; metacoxal process conjointly with hind margin straight or slightly angulate medially. We collected the high mountain wetland and identified the species of *Hydroporus uenoi* Nakane based on male genitalia for the first time. A habitus photo, a redescription, mitochondrial DNA sequence, illustrations of the aedeagus of species, and habitat information are provided.

Keywords: taxonomy, *Hydroporus uenoi*, Dytiscidae, Coleoptera, DNA barcode, Korea

INTRODUCTION

The genus *Hydroporus* Clairville is the most species rich genera of the family Dytiscidae occurring throughout the temperate and boreal regions of northern hemisphere. This genus contains 188 described species worldwide (Nilsson, 2015) and 164 species occur in the Palaearctic region (Nilsson and Hájek, 2014). Twelve species have been recorded in China and nine species in Japan and 16 species in the Far East of Russia (Nilsson and Hájek, 2014).

Members of *Hydroporus* are characterized by combination of the following features: body glabrous to distinctly setose; elytra and ventral surface mainly piceous to black; epipleuron lacking a carina on humeral angle; metacoxal process conjointly with hind margin straight or slightly angulate medially (Larson et al., 2000).

Most of specimens used in this study are deposited in DASARI Research Institute of BioResources, Daejeon, Korea. One male specimen has been deposited at the National Institute of Biological Resources, Incheon, Korea (NIBR). Habitus photograph was prepared based on our former study (Lee et al., 2015). The terms and measurements of specimens mainly followed Roughley and Larson (2001) and Balke (2005). Total genomic DNA was extracted from one male, using the whole body excepting the abdomen. The primer pair C1-J-2183 (5-

CAA CAT TTA TTT TGA TTT TTT GG-3) and TL2-N-3014 (5-TCC AAT GCA CTA ATC TGC CAT ATT A-3) was used to amplify an 826 base pairs (bp) of the cytochrome c oxidase subunit I (COI) gene (Simon et al., 1994). The obtained sequence was deposited in GenBank.

In this paper, we report *Hydroporus uenoi* Nakane for the first time in Korea. We also provide a habitus photo, a redescription, illustrations of aedeagus, and mitochondrial DNA sequence (mtDNA) of the species, and information of habitat.

SYSTEMATIC ACCOUNTS

Order Coleoptera
Family Dytiscidae

Genus *Hydroporus* Clairville, 1806

Hydroporus Clairville, 1806: 182. Type species: *Dytiscus fusculus* Schrank, 1781.

Hydrocoptus Motschulsky, 1853: 5. Type species: *Dytiscus tristis* Paykull, 1798.

Hydatoporus Gistel, 1856: 355. Type species: *Dytiscus palustris* Linnaeus, 1761.

Suphrodytes Gozis, 1914: 110. Type species: *Dytiscus dorsalis* Fabricius, 1787.

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***To whom correspondence should be addressed**

Tel: 82-70-7353-2547, Fax: 82-50-4387-2411
E-mail: elmidae79@gmail.com

Sternoporus Falkenström, 1930: 24. Type species: *Hydroporus longicornis* Sharp, 1871.

Hydrotarsus Falkenström, 1938: 4. Type species: *Hydrotarsus lundbladi* Falkenström, 1938.

Hydroporinus Guignot, 1945: 22. Type species: *Hydroporus neglectus* Schaum, 1845.

Hydroporidius Guignot, 1949: 9. Type species: *Hydroporus melanarius* Sturm, 1835.

Schizoporus Ádám, 1996: 20. Type species: *Hydroporus angustatus* Sturm, 1835.

***Hydroporus uenoi* Nakane, 1963 (Figs. 1, 2A–C, 3)**

(Korean name: Ko-San-Mul-Bang-Gae)

Hydroporus uenoi: Nakane, 1963: 25; 1988: 19; Nakane and Nilsson, 1993: 424; Nilsson and Kholin, 1994: 147; Nilsson, 1995: 52; 2015: 155; Mori and Kitayama, 2002: 86; Shaverdo, 2004: 146; Nilsson and Hájek, 2014: 35.

Material examined. Korea: 2♂♂, Gyeongnam Prov.: Yangsan-si, Wondong-myeon, Dae-ri, 35°25'22.83"N, 129°00'13.14"E, 745 m, 10 Sep 2016, Lee DH, Lee JS, ex forest wetland; same data as former except for 5♂♂7♀♀, 24 Apr 2020, Lee DH, Yoo IS; ♂, ditto but deposited in NIBR (ULFUIN0000010796).

Redescription. Length 3.9–4.5 mm. Body long oval, slightly convex, with microreticulation and small punctures.



Fig. 1. Habitus of *Hydroporus uenoi*, 4.2 mm.

Color. Head yellowish brown to brown; pronotum dark brown, lateral margins broadly yellowish brown; elytra dark brown, anterior part and lateral margin yellowish brown. Ventral surface most dark brown to black, and antennae, mouthparts, hypomeron, epipleura and legs yellow.

Head. Head semicircular, about 1.6 times as wide as long, widest across eyes, with compact setae on around eyes and clypeal grooves. Anterior margin of clypeus more or less rounded. Width of frons about 3.0 times as wide as eye. Antenna long and slender; antennomeres longer than wide; 1 longest, widest at middle; 2–10 broad apically, with few setae on subapical part; 11 long oval, about 1.5 times as long as 10, widest at middle. Labrum with long setae on antero-medial part, emarginated at anterior margin. Maxillary palpomere 1 broad apically, slightly longer than 2; 2 broad apically, shortest; 3 broad apically, 2.0 times as long as 2; 4 longest, 3.0 times as long as 3, widest at basal a third, apex bifid. Labial palpomere 1 broad apically, shortest; 2 broad apically, slightly longer than 1, with long setae on apical part; 3 oval, 2.0 times as long as 2, widest at middle, apex bifid. Gula quadrate; gula suture parallel, discontinuous. Mentum widest at middle, with long setae on antero-lateral parts; antero-medial margin bisinuate; antero-lateral parts protrude; anterior corner acute; lateral margin rounded; posterior corner obtuse; posterior margin straight.

Thorax. Pronotum subquadrate, widest at middle, about 2.5 times as wide as long, slightly wider than head, with coarse setae, with long setae on lateral parts; anterior margin straight; antero-lateral part protruded; anterior corner acute; lateral margin slightly rounded; posterior corner obtuse; posterior margin transversely bisinuate. Elytra acute apically, widest at middle, slightly wider than pronotum, with coarse setae. Prosternum transverse, convex medially and with long setae. Prosternal process long and vented, convex medially, with long setae; posterior part long oval. Metaventrite with coarse setae and longitudinal suture on medial part. Procoxa subtriangular, with sparse setae. Protochanter subtriangular, with long setae on ventral part. Profemur with short spines on baso-medial part, with a row of setae on dorso-ventral parts. Protibia with short spines, with a row of setae on dorsal part. Protarsomere 1 slightly longer than 2; 2 as long as 3; 5 elongated, longest, 2.0 times as long as 3. Protarsal claws shorter than tarsomere 5. Mesocoxa rounded, with setae. Mesotrochanter triangular, with long setae on ventral part. Mesofemur with sparse spines. Mesotibia with sparse spines. Mesotarsomere 1 slightly longer than 2; 2 as long as 3; 5 elongated, longest, 2.0 times as long as 3. Mesotarsal claws shorter than tarsomere 5. Metacoxal plate with coarse setae. Metacoxal process with compact setae on posterior part; apex bifid. Metatrochanter semicircular. Metafemur with sparse setae. Metatibia with a row of spines on dorsal and medial

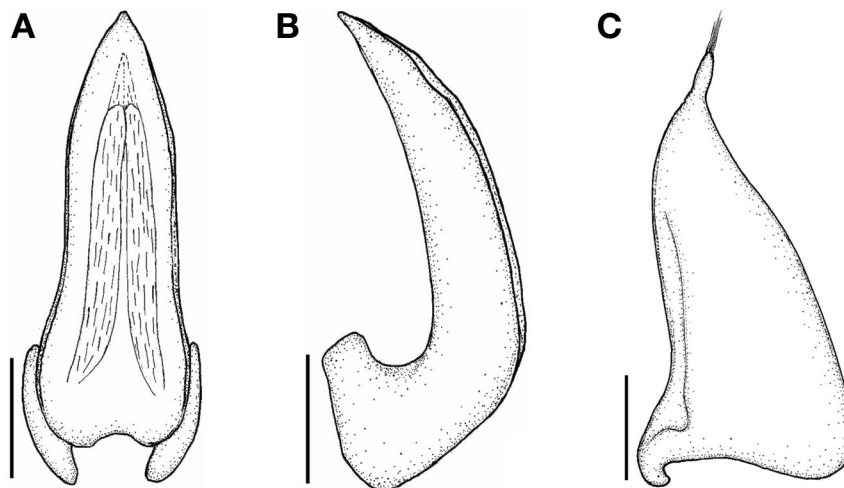
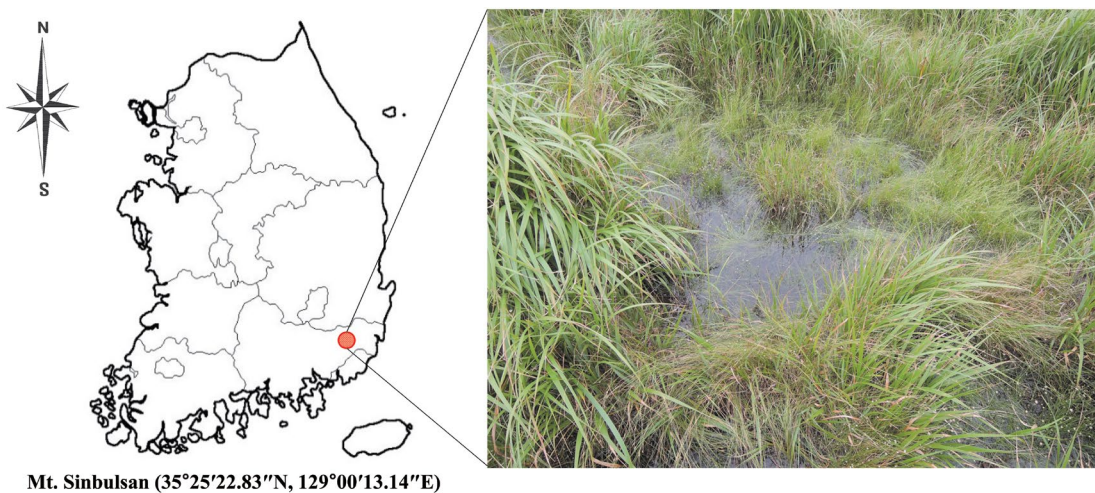


Fig. 2. *Hydroporus uenoi*. A, Median lobe of aedeagus (dorsal view); B, Median lobe (lateral view); C, Paramere (lateral view). Scale bars: A-C=0.1 mm.



Mt. Sinbulsan (35°25'22.83"N, 129°00'13.14"E)

Fig. 3. Habitat of *Hydroporus uenoi* in the forest wetland of Mt. Sinbulsan.

parts; metatibial largest spine 0.3 times shorter than tarsomere 1. Metatarsomere 1 longest, 1.5 times as long as 2; 2 slightly longer than 3; 4 shortest; 5 about 1.5 times as long as 4. Metatarsal claw 0.3 times shorter than tarsomere 5.

Abdomen. Sternite with coarse setae; V–VI with compact setae on medial part; VII with a row of setae on posterior margin. Median lobe of aedeagus (Fig. 2A, B) long, more and less robust and narrowed apically, apical part rounded in dorsal view; narrowed apically, anterior a third part slightly thick, apex protrude and rounded in lateral view. Paramere (Fig. 2C) slightly longer than median lobe (including dorsal sturt), widest anterior two-third; lateral margin rounded; apex protrude and rounded, with long setae.

Habitat. The specimens were collected in small pool of forest wetland, which is 20–120 cm in width and about 10–20 cm in depth, with muddy floor (Fig. 3). They were found with *Copelatus weymarni* Balfour-Browne (Dytiscidae), *Enochrus uniformis* (Sharp) (Hydrophilidae) and *Helophorus auriculatus* Sharp (Helophoridae).

Distribution. Korea (new record), China, Japan, Far East of Russia.

Molecular sequence information. mtDNA sequence deposited in GenBank under accession number OQ571333. The partial mitochondrial COI gene sequence for the species of *H. uenoi* Nakane is shown in the below: ACATCCAGAAGT ATACATTTTAATTTTACCAGGATTTGGGATAATTTCTC

ATATTATTAGACAAGAAAGCGGGAAAAAGGAAA
 CTTTTGGTTCACTAGGAATAATTTATGCAATACTAGCC
 ATTGGATTATTAGGATTTGTAGTTTGTAGCTCATCAT
 ATATTTACTGTTGGTATAGATGTTGATACCCGGGCATA
 TTTTACTTCTGCAACTATAATTATTGCTGTTCCCACTG
 GAATTAATAATTTTTCTGACTAGCAACATTACATGG
 ATCTCAAATTTTCATATAGACCTTCTTTATTATGAG
 CTTTAGGATTTGTATTTCTATTTACAGTTGGGGGAT
 TAACGGGGGTAGTTCTTGCTAATTCCTCAATTGATAT
 TATTCTTCATGATACATATTATGTAGTTGCACATTT
 TCATTATGTTCTTTCAATAGGAGCTGTATTTGCTATTCT
 AGCCGGATTTATCCAATGATTTCCCTTTATTTACAGG
 AATTTCAATAAACTCAAATATTGAATATTCAATT
 TCTAATTATATTATTGGAGTAAATTTAACATTTTTTCC
 CCAACATTTTTTAGGATTGAGAGGAATACCTCGTC
 GATATTCTGATTATCCGGATGCATATACCTCTTGAAA
 TGTAATTTCTTCTATTGGATCAACAATTTCAATTTATTGG
 AGTATTAATATTAATTTATATTATTTGAGAAGCTTTT
 ATCTCTCAACGTTTAGTAATTTTTTCTAACCAAAAT
 ACCTACTTCAATTGAATGATTCCAAAAATCCCTCCT
 GCAGAACATAGATATTCTGAATTACCAATATTATCTA
 ATTTT

ORCID

Dae-Hyun Lee: <https://orcid.org/0000-0001-6629-6367>

Sang Woo Jung: <https://orcid.org/0000-0001-9545-1207>

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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