A New Species of the Genus *Laccophilus* (Coleoptera: Dytiscidae: Laccophilinae) from Honshu, Japan

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Abstract A new species, *Laccophilus shinobi* sp. nov., is described from Honshu, Japan. Key to the related species is provided.

Introduction

The genus *Laccophilus* Leach, 1815 is one of the largest and most widespread genus of the family Dytiscidae, and is represented by 289 species under 10 species groups (Brancucci, 1983), mainly distributed in the tropics (Nilsson, 2021). From Japan, 12 species under three species groups have been recorded (Nilsson, 2021).

*Laccophilus minutus* group is characterized in the body length less than 4 mm, and the elytral coloration dark brown and testaceous with brown wavy markings or sinuous longitudinal stripes, and is represented by 8 species and one subspecies (Brancucci, 1983). Of these, two species, *L. lewisi* Sharp, 1873 and *L. lewisioides* Brancucci, 1983, were recorded from Japan.

In this paper, we describe a new species of the species group from Japan.

Materials and Methods

The holotype is deposited in Mie Prefectural Museum (MPM). Some paratypes are deposited in the National Science Museum, Tsukuba (NSMT), Ehime University Museum (EUM), Kanagawa Prefectural Museum of Natural History (KPM), the Natural History Museum, London (NHM) and the authors' private collections.

External morphology and male genitalia were examined using a Leica MS5 and Nikon SMZ-1 stereoscopic microscope. Pictures were taken using an Olympus E-M1 Mark II digital camera equipped with an extension tube and Canon MP-E65mm lens and stacked using the software ZM from Alan Hadley.

The following abbreviations are used for measurements: LAI–XI = length of antennomeres I to XI in mm; WE/ED = Width between eyes / eye transverse diameter; PW/PL = pronotal width / pronotal length; EL/EW = elytral length / width; EL/PL = elytral length / pronotal length; MgL = length of median lobe (not including basal appendage).

The description of male genitalia and the measurement method in median lobe are shown in Fig. 5.

Taxonomy

*Laccophilus shinobi* Yanagi et Akita, sp. nov.

[Japanese name: Iga-tsubu-gengorô]

(Figs. 1, 2, 6, 7, 9, 12, 13)


Description of holotype. Male. Body length 4.16 mm (PL+EL 3.81 mm); body width (= EW) 2.34 mm. Body relatively large, oval, 1.78 times as long as broad.

Coloration yellowish brown, but apical parts of antennomeres VII–XI darker; middle parts of anterior and posterior margins of pronotum infuscate; central and posterior areas of the elytra partly blackish; hind legs dark yellow; ventral surface light dark yellow, sometimes darkened along the posterior margin of pro- and metasternal processes and

Fig. 1. Holotype of *Laccophilus shinobi* sp. nov. Scale: 1.0 mm

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abdominal ventrites (Fig. 1).

Head densely microreticulate; WE/ED 0.60; LAI–XI 1.05, 0.42, 0.40, 0.51, 0.45, 0.49, 0.39, 0.38, 0.32, 0.49.

Pronotum convex, widest at posterior margin, densely microreticulate, shallowly depressed; PW/PL 3.12; antero-lateral corners right-angled; postero-lateral corners obtuse. Scutellar shield invisible. Prosternal process carinate from middle to apex.

Elytra slightly convex, widest at middle, sparsely punctate, weakly shiny; EL/EW 1.39, EW/PW 1.28, EL/PL 5.57; sutural vittae running near base to apical 1/5; 2nd and 3rd vittae from basal 1/4 to apical 1/5, with oblong short vittae near base; 4th vittae longest, from base to apical 1/5; 5th and 6th vittae not attached to basal margin and apex, vanished in middle parts.

Median lobe moderate size (MgL = 1.34 mm); apical parts (Fig. 5A) long and slender, slightly curved near apex; ratio A/B = 0.56 (see Fig. 5).

Variability of male (n = 25): Body length 4.10–4.27 mm, EW 2.29–2.50 mm; WE/ED 0.58–0.61, PW/PL 3.11–3.12, EL/EW 1.37–1.42, EW/PW 1.25–1.33, EL/PL 5.54–5.63, MgL 1.33–1.34 mm, A/B 0.56–0.57. Hind wings continuously variation from macropterous to micropterous. The pattern of elytral maculation somewhat variable; 4th vittae rarely not attached to basal margin.

Female. Externally similar to male, but body somewhat slender; pro- and mesotarsi without large ventral fields of adhesive setae; middle area of ventrite VI slightly punctate, weakly convex ventrally.

Variability of female (n = 15): Body Length. 4.12–4.23 mm, EW 2.26–2.42 mm; WE/ED 0.55–0.59, PW/PL 3.10–3.12, EL/EW 1.35–1.43, EW/PW 1.25–1.31, EL/PL 5.53–5.59.

Larva. Similar to the related species (Figs. 9–11). Head with a pair of black spots between compound eyes. Pronotum widest at middle; anterior margin shallowly concave; anterior corners angulate.

Habitat. The habitat of this species is an agricultural pond (ca 100×100 m, 150 cm in depth) of stagnant water (Figs. 13, 14).

Notes. This new species is related to L. lewisius and L. lewisioides, and is distinguished from them by the following characteristics of median lobe: general forms long and slender (short and stout in L. lewisioides); apex curved (straightly projecting in L. lewisius); ratio of the length (A/B) in L. shinobi, L. lewisius and L. lewisioides (n = 25) as 0.56–0.57, 0.48–0.50, 0.54–0.55.

This new species has continuous variation of hind wing from micropterous to macropterous, it is strongly suspected that
Figs. 6–14. *Laccophilus shinobi* sp. nov. (6, 7, 9, 12–14), *L. lewisius* (8, 10) and *L. lewisioides* (11). 6–8. Hind wings: 6, most developed; 7, degenerated. 9–11. Larvae in dorsal views. 12–14, photographs: 12, living individuals (in laboratory); 13, status of collected *L. shinobi* sp. nov. when scooping the bottom of the pond once; 14, type locality.
both forms have not capable for flying. Even in macropterous individuals, the costa and subcosta are soft, and the entire hind wing is brittle. Under any conditions even in the breeding experiment of 2-weeks, we could not observe its flight.

We anticipate that further research on the ecology, biogeography and conservation of L. shinobi will be conducted.

Etymology. Named “shinobi” which is another Japanese word for a ninja. Iga as the type locality is the birthplace of Japanese ninja. This species is also very similar to other species, and the fact the features have remained hidden until now is also reminiscent of the Japanese ninja.

Key to species of the Laccophilus minutus group of Japan

1(2) Body length shorter (3.2–3.8 mm). Male genitalia extremely smaller (0.7–0.9 mm), thick in apical part (Fig. 4). Larvae lacking a pair of black spots between compound eyes (Fig. 11). ......................L. lewisioides Brancucci, 1983.

2(1) Body length longer, over 4.1 mm in length. Male genitalia larger (1.3–1.5 mm), long and slender in apical part (Figs. 2, 3). Larvae having a black spot between compound eyes (Figs. 9, 10). ......................................................3.

3(4) Elytral 4th vittae attached to basal margin (Fig. 1). The hind wings micro- or macropterous, not functional (Figs. 6, 7). Apex of median lobe straightly projecting (Fig. 3); A/B 0.48–0.50 (Avg. 0.49). Larva: pronotum widest in anterior 1/4 to 1/3, gently arcuate in anterior margin, round in anterior corner (Fig. 10). .............................................L. lewisioides Sharp, 1873.

3(3) Elytral 4th vittae not attached to basal margin (but attached in individuals of eastern part of Japan). The hind wings well developed, functional (Fig. 8). Apex of median lobe straightly projecting (Fig. 3); A/B 0.48–0.50 (Avg. 0.49). Larva: pronotum widest in anterior 1/4 to 1/3, gently arcuate in anterior margin, round in anterior corner (Fig. 10). .............................................L. shinobi sp. nov.

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