

Discovery of the Water Scavenger Beetle Genus *Megagraphydrus*
HANSEN (Coleoptera, Hydrophilidae) from Japan,
with Description of a New Species

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Abstract The genus *Megagraphydrus* HANSEN, 1999 is recorded from Japan for the first time. A single undescribed species is recognized: *Megagraphydrus luteilateralis* sp. nov. from Iriomote-jima Island, Ryukyu Archipelago. Digital photographs and SEM photographs of holotype are provided. Male genital segments, bursa copulatrix, and spermathecal organ are illustrated. Key to the Japanese genera of the tribe Hydrophilini is provided. The new species was found from hygropetric habitat. Biological information and photographs of habitats are given.

Key words: Coleoptera, Hydrophilidae, *Megagraphydrus*, new record, new species, Ryukyu, Japan, hygropetric, taxonomy.

Introduction

The aquatic hydrophilid fauna of Japan is relatively well known at the genus level than those of other Asian countries. Since the middle of the 20th Century, taxonomic study of the beetle from Japan have been actively progressed owing to the works of T. NAKANE, M. SATÔ, and E. MATSUI, by whom many taxa were described and recorded. During the last two decades, several species were described as new and newly recorded, but from the generic viewpoint, only one genus was additionally recorded from the country (SATÔ & YOSHITOMI, 2004).

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In 2007, we had an opportunity to examine ten individuals of an unfamiliar beetle collected by the second author from Iriomote-jima Island, at the southwestern part of the Ryukyu Archipelago, Southwest Japan. After a careful examination, these individuals were proved to belong to the genus *Megagraphydrus* HANSEN, 1999 (Hydrophilinae, Hydrophilini), of which ten species have been known from the Oriental Region (HANSEN, 1999 b; SHORT & HEBAUER, 2006). It is so far unknown from Japan and the beetle was recognised as an undescribed species. The type locality, Shirahama is a very famous collecting site for Japanese entomologists. The individuals were collected from hygropetric habitat; it is perhaps for this reason, that the genus has been overlooked until now.

Material and Methods

Observation and dissection were mainly carried out using Olympus SZ40 stereoscopic microscope and Olympus BX41 compound light microscope; illustrations were made with the aid of a drawing tube. SEM photographs were taken using a Hitachi S-2250N scanning electron microscope.

The body parts were carefully removed and dissected with tweezers and placed into 10% KOH solution. They were subsequently warmed in the liquid for about 40–60 minutes at 60°C, rinsed with 80% ethanol, and dehydrated in 99% ethanol. If necessary, we used 10% KOH solution mixed with one or two drops of saturated solution of chlorazol black E dye (Wako Pure Chemical) in 70% ethanol, or stained the parts in lactic acid containing acid fuchsine and warmed in the liquid for 60–120 minutes at 60°C before rinsed. Spermathecal organ was generally rinsed and examined in distilled water; others were examined in glycerol or Euparal (Chroma-Gesellschaft). Their parts were mounted in Euparal on a slide glass card, which was pinned under the specimen (MARUYAMA, 2004), or were preserved in a small glass tubes with glycerol, which was pinned under the specimen.

Body measurements were taken using a micrometric eyepiece at 20× magnification with an accuracy of ± 0.025 mm. Measurements were given in text in the order of range, arithmetic mean \pm standard deviation; the latter two are in parentheses. The abbreviations of measurements used in the present paper are as follows: HW – width of head; ED – distance of between eyes; PL – length of pronotum; PW – width of pronotum; EL – length of elytra; EW – width of elytra; TL – total length (PL plus EL).

Label data of the holotype follow the original spellings between quotation marks. A forward slash (/) indicates a subsequent line of the label and a double forward slash (//) indicates separate labels. If label data were written in Japanese, they were transliterated into Roman characters between “<” and “>”.

The materials are deposited in the following collections: JFC – private collection of Jun'ichi FUJIWARA; NMW – Naturhistorische Museum Wien, Vienna (M. JÄCH, A. KOMAREK); SEHU – Systematic Entomology, Hokkaido University, Sapporo (M. ÔHARA); YKC – private collection of Yuuki KAMITE.

Regarding the morphological terminology, we generally follow HANSEN (1991) and KOMAREK (2004). For the female spermathecal organ, we also refer to LINDROTH & PALMÉN (1970) and BAMEUL (1992).

Results

Genus *Megagraphydrus* HANSEN

Megagraphydrus HANSEN, 1999 a, 137 (original description, genus, type species: *Megagraphydrus siamensis* HANSEN, 1999 by original designation).

Diagnosis. The genus is somewhat similar to other Japanese genera of the subtribe Acidocerina. However, it is distinguishable from them by the following character states: 1) head rounded apically; 2) second maxillary palpomere weakly swollen towards apex; 3) elytra widest at bases, weakly attenuated posteriad; 4) elytra with slightly irregular series of coarser punctures, without sutural stria; 5) mesoventrite with mesoventral process.

Megagraphydrus luteilateralis MINOSHIMA et FUJIWARA, sp. nov.

(Figs. 1–3, 4A)

Type locality. Japan: Okinawa Prefecture, Iriomote-jima Island, Shirahama, N24° 21' 59", E123° 45' 22".

Type material. Holotype. male. "Iriomote-jima: Ryukyu: Japan"/"Shirahama" <"(Shirahama)">"(wet rock)"/"24° 21' 59" N123° 45' 22" E"/"4.XII.2008, M. Ôhara"/"[IR-08-MO-039a]"/"MiYu-D-00176"/"MINOSHIMA Yûsuke"/"SEHU, Japan"/"D-00176" [handwritten on slide glass card.]/"HOLOTYPE"/"Megagraphydrus"/"luteilateralis"/"Minoshima et Fujiwara"/"det. Minoshima & Fujiwara, 2009"/"0000010203"/"Sys.Ent."/ "Hokkaido Univ."/ "Japan [SEHU]" (SEHU). Paratypes: 3 males & 2 females, same data as the holotype (NMW, SEHU). 3 males, 4 females, & 3 exs., Ūshikû-mori, Shirahama, Iriomote-jima Is., Okinawa Pref., 11-IX-2007, J. FUJIWARA leg. (NMW, SEHU, JFC, YKC). 1 female, West of Yuchin-bashi Br., Iriomote-jima Is., Okinawa Pref., 8-IX-2007, J. FUJIWARA leg. (SEHU).

Description. Male. Body oblong-oval, slightly attenuated posteriad, moderately convex (Figs. 1A, C, 4A). Colour: Dorsum shining. Dorsal surface of head dark reddish brown. Pronotum reddish brown, lighter than head; anterior, lateral, and posterolateral portions yellowish, lighter than median portion; two dark spots on posteromedial part undetectable. Elytra reddish brown, lateral margin distinctly yellowish. Ventral surface of head reddish brown; stipes slightly paler than mentum. Antenna, maxillary palpi, and labial palpi light yellowish brown; antennal club slightly infuscated. Thoracic ventrites reddish brown; prosternum, epipleura, pseudepipleura, and legs slightly paler than meso- and metaventrites. Abdominal ventrites reddish brown.

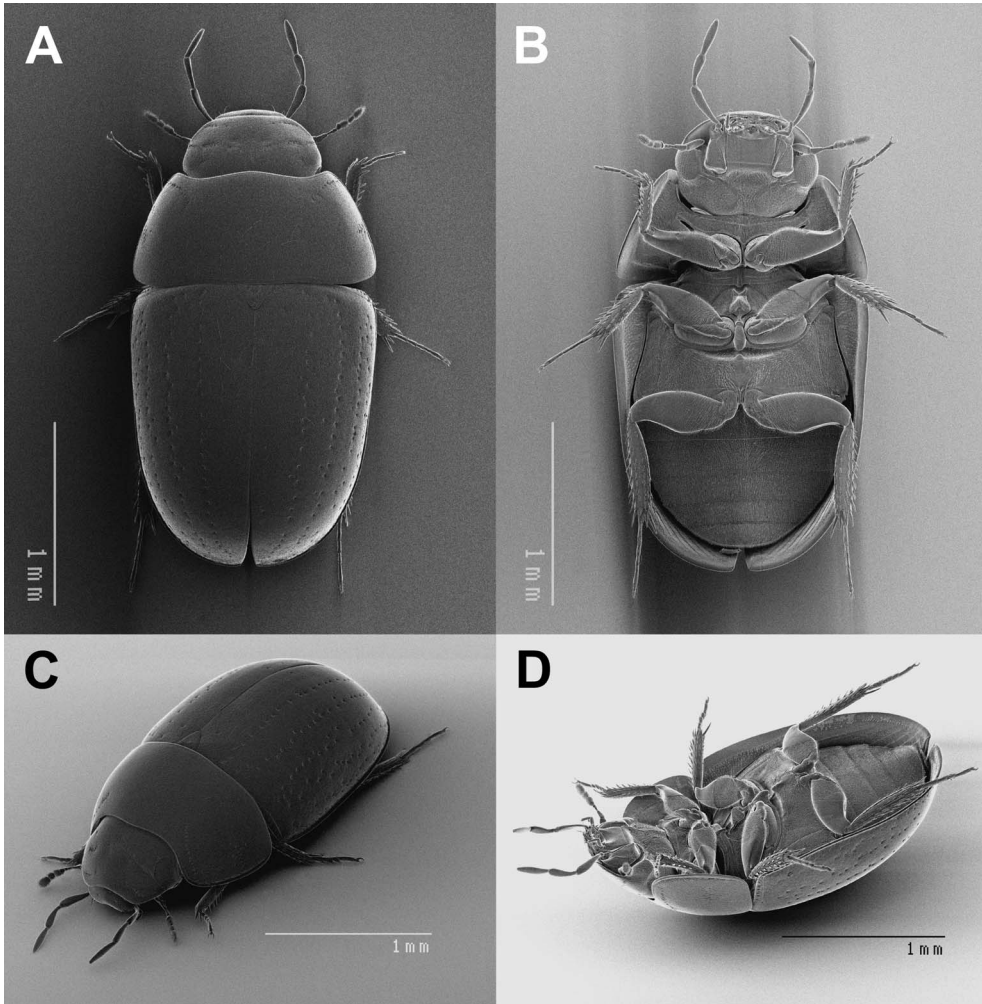


Fig. 1. SEM photographs of *Megagraphydrus luteilateralis*, holotype, male. — A, Habitus, dorsal view; B, ditto, ventral view; C, ditto, dorso-oblique view; D, ditto, ventro-oblique view.

Head (Figs. 2A, C): — Labrum about 2.8 times as wide as long; punctulation on labrum fine, moderately densely distributed; systematic puncture on labrum composed of a few setiferous punctures bearing fine erect setae mediolaterally. Punctulation on clypeus and frons moderately fine; interspaces between punctures about 1.0–3.0 times of the width of a puncture, sometimes more or less distant. Frontoclypeal sulcus fine but distinct. Systematic punctures of clypeus composed of a row of setiferous punctures bearing fine erect setae anterolaterally. Systematic punctures of frons composed of a row of setiferous punctures bearing fine, rather long, erect setae in anterolateral

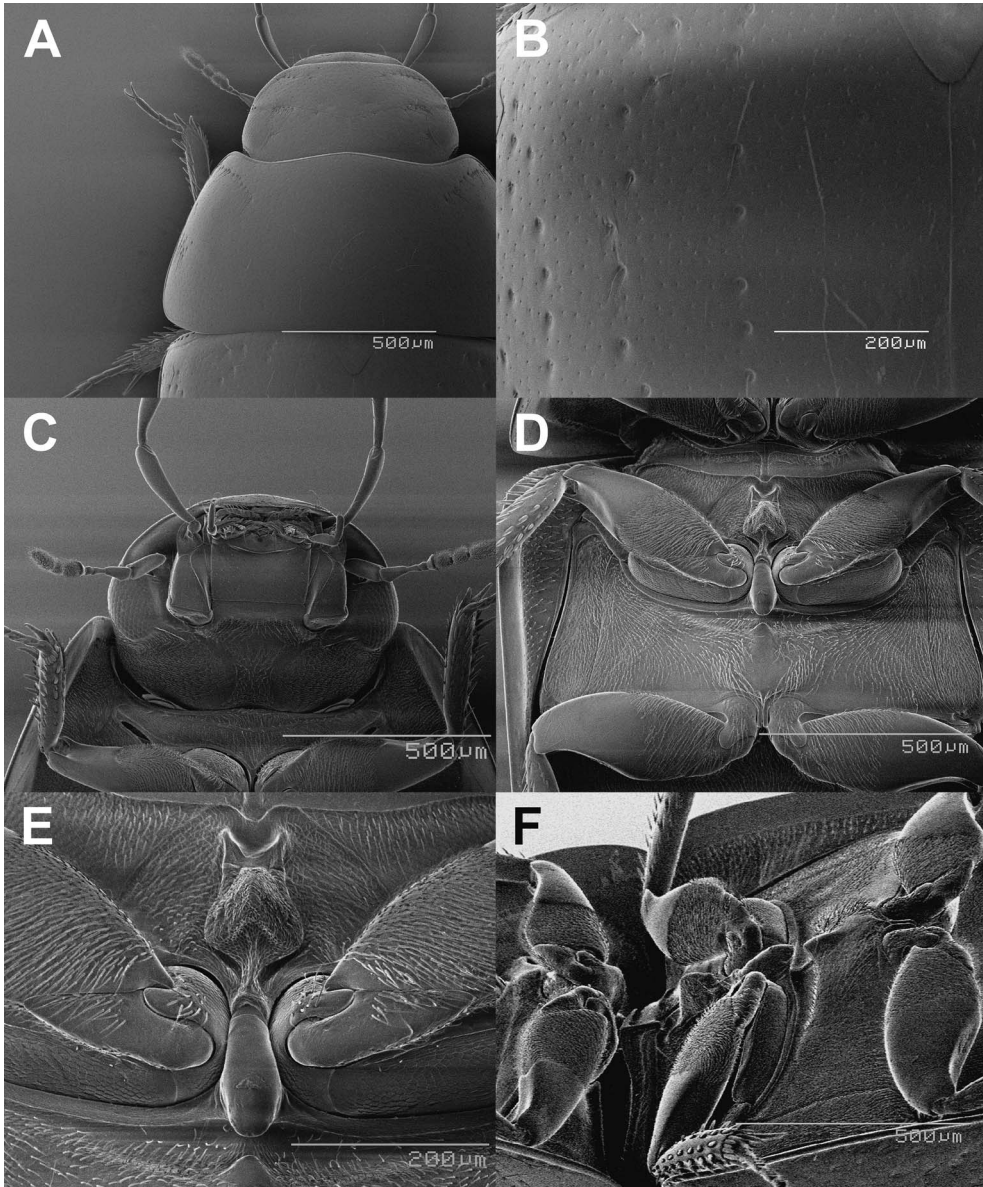


Fig. 2. SEM photographs of *Megagraphydrus luteilateralis*, holotype, male. — A, Head and pronotum, dorsal view; B, punctuation pattern of elytra, dorsal view; C, head and prosternum, ventral view; D, meso- and metaventrites, ventral view; E, meso-metaventral junction, ventral view; F, meso- and metaventrites, ventro-lateral view.

margins. Antennae with eight antennomeres; scape as long as antennomeres 2–5 combined; antennomere 2 distinctly narrowed to apex; antennomere 3 small, narrow, about as long as antennomere 4; antennomere 6 as long as antennomere 7; apical segment larger than antennomere 7. Maxillary palpi moderately short; palpomere 2 longer than palpomeres 3 and 4; palpomere 2 about 1.5 times as long as palpomere 3, about 1.3 times as long as palpomere 4; palpomere 3 slightly curved inwards at base, swollen into apex. Labial palpi short, shorter than width of mentum; palpomere 2 rather swollen than palpomere 3; palpomeres 2 and 3 with a few, fine setae. Mentum about 1.7 times as wide as long; punctulation of mentum fine, sparsely distributed.

Thorax: — Pronotal punctulation fine, interspaces between punctures 1.0–3.0 times of the width of a puncture, sometimes more or less distant. Systematic punctures of pronotum slightly indistinct, composed of setiferous punctures bearing fine recumbent setae; anterior series composed of a row of punctures anterolaterally, distinctly longer than posterior row; posterior series composed of irregularly distributed punctures mediolaterally (Fig. 2A). Elytra widest at bases, slightly attenuate posteriad, rounded apically; general punctulation on elytra fine, slightly more densely set than on pronotum; serial punctures of elytra composed of coarse, setiferous punctures bearing very fine setae, at least four distinct series from dorsum (Figs. 1A, 2B); a few coarse, setiferous punctures bearing very fine setae in interspaces between row of serial punctures. Prosternum weakly convex medially, without distinct median carina. Mesoventrite with mesoventral process, the process on posterior half strongly projected ventrally; anterior margin of mesoventral process M-shaped, with lateral margins swollen on posterior half (Figs. 2D, E). Metaventrite with mesal portion bearing a small glabrous area medially; anteromedian portion with distinct oblong transverse groove along anterior margin of metaventrite (Figs. 2E, F); mesal portion projected anteriorly in anteromedial part (Fig. 2F); anteromedial process of metaventrite strongly bulbous, projected anteriorly and posteriorly, joint with posterior margin of mesoventral process anteriorly (Fig. 2E). Pro- and mesofemora pubescent in basal halves; metafemur pubescent in about basal two-fifths.

Abdomen: — Abdominal ventrites densely covered with fine pubescence. Aedeagus (Fig. 3A): Median lobe slender, about as long as parameres, almost parallel-sided medially, attenuated towards apex; basal aphophysis short, stout; inner margin of basal aphophysis slightly projected inwards at apex; punctulation of median lobe very fine, sparsely distributed in apical two-fifths; corona in apical portion. Paramere wider in medial part, attenuated towards base and apex, weakly rounded apically, weakly curved inwards in apical third; inner margin of paramere almost straight in basal half, then curved outwards, curved inwards apically; outer margin of paramere curved inwards in apical one-third, abruptly curved inwards at basal third, then almost straight; punctulation of paramere fine, moderately densely distributed, denser in apical part. Phallobase wider than long, wider in base; anterior margin of ventral surface of phallobase deeply split in a V-shape medially; manubrium distinct, semi-oval.

F e m a l e. Bursa copulatrix with a small sclerotised patch near a junction of bursa

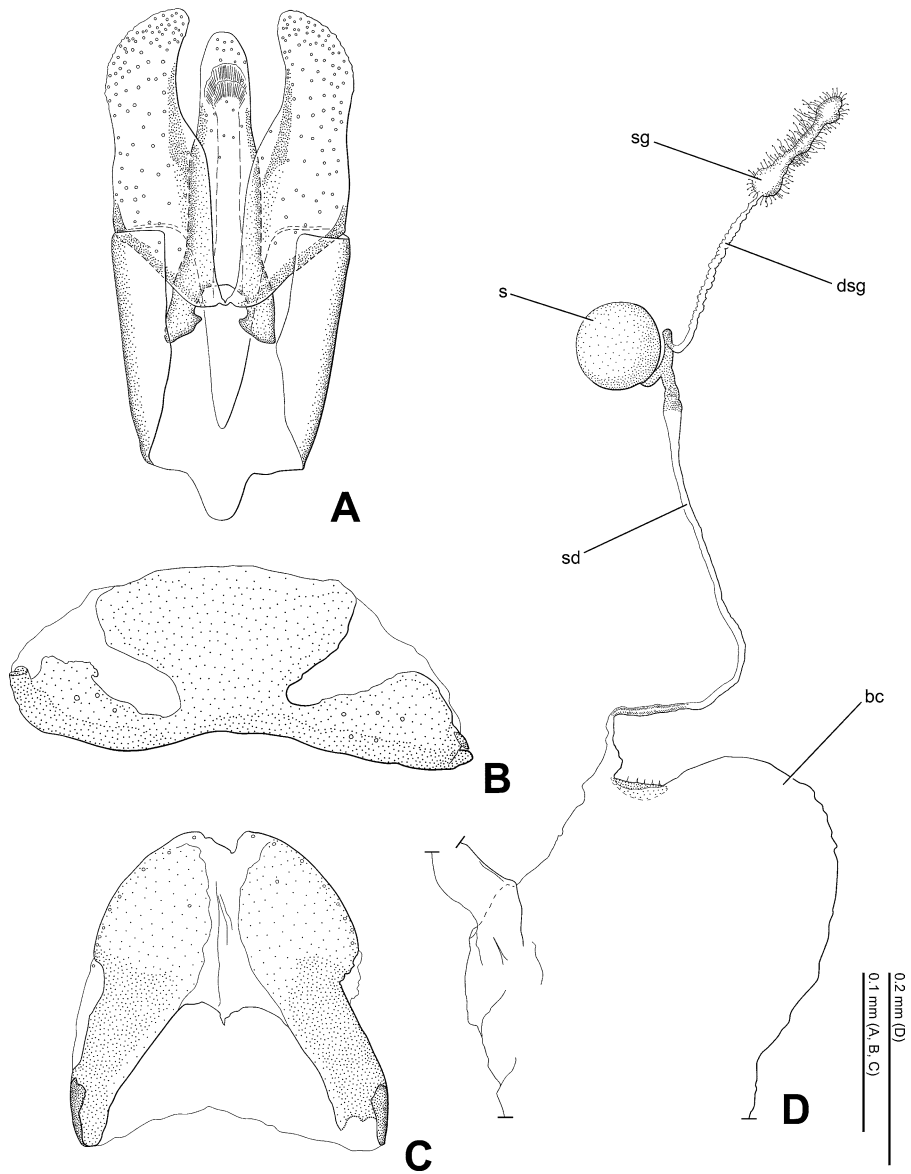


Fig. 3. Genitalia of *Megagraphydrus luteilateralis*. — A, Aedeagus, dorsal view; B, 9th tergite, ventral view; C, 9th sternite, dorsal view; D, bursa copulatrix and spermathecal organ. bc: bursa copulatrix; dsd: duct of the spermathecal gland; s: spermatheca; dsd: spermathecal duct; sg: spermathecal gland. [A, paratype, male, MiYu-08-004; B, C, holotype, male; D, paratype, female, MiYu-08-007].

copulatrix and spermathecal duct (Fig. 3D). Spermathecal organ (Fig. 3D): Spermathecal duct narrow as a duct of the spermathecal gland, very long, about 2.5 times as long as duct of the spermathecal gland, swollen apically; infundibulum short, slightly swollen. Spermatheca composed of large bulbous division and oblong reniform division; bulbous division connected only to oblong reniform division; oblong reniform division connected to bulbous division, spermathecal duct, and duct of the spermathecal gland. Spermathecal gland elongate; spermatozoa densely distributed.

Measurements (n = 10). TL: 1.75–1.94 (1.83 ± 0.06) mm; PW: 1.10–1.22 (1.14 ± 0.04) mm; PL: 0.49–0.57 (0.53 ± 0.02) mm; EL: 1.26–1.40 (1.31 ± 0.05) mm; EW: 1.06–1.20 (1.13 ± 0.05) mm; HW: 0.63–0.69 (0.66 ± 0.02) mm; ED: 0.45–0.49 (0.47 ± 0.02) mm; PW/PL: 2.09–2.26 (2.19 ± 0.05); EL/EW: 1.09–1.28 (1.16 ± 0.06); EL/PL: 2.33–2.63 (2.49 ± 0.10); EW/PW: 0.90–1.02 (0.98 ± 0.04); TL/EW: 1.54–1.77 (1.63 ± 0.07); HW/ED: 1.38–1.44 (1.41 ± 0.02).

Distribution. Japan (Iriomote-jima Island).

Biology. Collected at a hygropetric habitat.

Etymology. The specific epithet is a combination of the Latin “luteus” meaning “yellow” and Latin “lateralis” meaning “the side”, referring to yellowish lateral margins of elytra.

Remarks. This new species is most closely similar to *M. politus* HANSEN, 1999, which is distributed in Taiwan; however, it can be distinguished from the latter by the following characters: 1) elytra with five rows of coarse punctures; 2) metaventrite strongly bulbous between mesocoxae (Fig. 2E); 3) anteromedian portion of metaventrite with distinct groove along anterior margin of metaventrite (Figs. 2D, F).

Biological Notes

Iriomote-jima Island is a very famous collecting site for Japanese entomologists. The Ryukyu Archipelago, which contains Iriomote-jima Island, is well known as an area of high biological diversity and endemism in Japan, and hence many entomologists have surveyed the island chain and described many species of insects. In particular, many studies on the aquatic Coleopteran fauna of the Ryukyu Archipelago were published (SASAKI *et al.*, 2002; SATÔ, 2003).

The present specimens were collected from a hygropetric habitat, such as a wet rock surface. This habitat is unique but many aquatic and semi-aquatic insects depend on it (e.g., WARD, 1992). Several studies of Hydrophilidae that live in the habitat were published in recent years; in Japan, for example, KAMITE *et al.* (2007) described two *Laccobius* from eastern Honshu, MINOSHIMA *et al.* (2007) recorded *Crenitis neglecta*

Fig. 4. A, *Megagraphydrus luteilateralis*, holotype, male, dorsal and lateral views; B, Shirahama, type locality and habitat of *M. luteilateralis*, Iriomote-jima Island, Ryukyu Archipelago, Japan; C, collecting locality of *M. luteilateralis*, 2 km west of Yuchin-bashi Bridge. Photographs of habitats by J. FUJIWARA.



NAKANE et MATSUI, 1985 from Kyushu. However, records of Hydrophilidae of hygropetric habitats are still limited. It is perhaps for this reason that the genus has been overlooked.

At the type locality Shirahama, on the western coast of the island (Fig. 4B), the hydrophilid beetle was found on wet rock surface covered with fallen leaves, where waters coming from small seepages trickled down. The slope was mostly covered with natural forest and crepuscular. On the rock *Cylindera psilica luchuensis* BROUERIIUS VAN NIDEK (Cicindelidae) cohabited, and *Microdytes uenoi* SATÔ (Dytiscidae), *Hydraena satoi* JÄCH et DÍAZ (Hydraenidae), *Stenelmis ishiharai* SATÔ (Elmidae) and *Zaitzevia aritai* SATÔ (Elmidae) were simultaneously collected in a small stream running below the rock.

At the other site, a small stream located 2 km east of Yuchin-bashi Bridge, in the northeastern part of the island (Fig. 4 C), an individual of the hydrophilid beetle was found in a pile of fallen leaves deposited by a rocky edge of the stream. This site was near to a road, being sunny. *Hydraena satoi*, *S. ishiharai* and *Grouvellinus babai satoi* JENG et YANG (Elmidae) were collected in the same stream. A large number of *G. b. satoi* aggregated in a mass of hydrophytic roots grown in a crevice on the rock.

Key to the Japanese Genera of the Tribe Hydrophilini

1. Maxillary palpi longer than antennae2.
- Maxillary palpi about as long as antennae*Hydrobius* LEACH, 1815.
2. Large to medium-sized species (ca. 9–40 mm); coloration of body almost black; meso- and metaventrites strongly raised medially to form a common median keel, extending posteriorly into a spine3.
- Small to medium-sized species (ca. 2–8 mm); coloration of body various; meso- and metaventral elevations not forming a common median keel, thus not extending posteriorly into a spine5.
3. Body more than 20 mm in size; first segment of antennal club deeply split into two asymmetrical divisions, narrow one with long setae*Hydrophilus* GEOFFROY, 1762.
- Body less than 20 mm in size; first segment of antennal club not divided into two asymmetrical divisions, without long setae4.
4. Body more than 15 mm in size; apical segment of maxillary palpus not longer than the penultimate; first segment of antennal club comma-shaped*Hydrochara* BERTHOLD, 1827.
- Body less than 15 mm in size; apical segment of maxillary palpus longer than the penultimate; first segment of antennal club not comma-shaped*Sternolophus* SOLIER, 1834.
5. Second segment of maxillary palpus distinctly to slightly curved outwards, not swollen towards apex*Enochrus* THOMSON, 1859.
- Second segment of maxillary palpus distinctly to slightly curved inwards, sometimes

- only in apical half, swollen towards apex6.
6. Elytra with sutural stria*Chasmogenus* SHARP, 1882.
 – Elytra without sutural stria7.
7. Elytra slightly attenuated posteriorly, widest at bases
*Megagraphydrus* HANSEN, 1999.
 – Elytra not attenuated posteriorly, not widest at bases8.
8. Apical segment of maxillary palpus slightly to distinctly longer than the penultimate; body almost parallel-sided, wider medially
*Agraphydrus* RÉGIMBART, 1903.
 – Apical segment of maxillary palpus slightly to distinctly shorter than the penultimate; body not or slightly parallel-sided, generally wider in apical one-third
*Helochares* MULSANT, 1844.

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要 約

蓑島悠介・藤原淳一：オオツヤヒラタガムシ属 *Megagraphydrus* の日本からの発見と1新種の記載。—— 日本未記録のオオツヤヒラタガムシ属（新称）*Megagraphydrus* を琉球列島西表島から記録した。キベリオオツヤヒラタガムシ（新称）*Megagraphydrus luteilateralis* を新種として記載し、生態的な知見を付した。さらに、日本産ガムシ族の属への検索表を加えた。

本属は、以下の形態的特徴で日本産の近似属と区別が可能である。1) 頭部は前方に向かい丸まる；2) 小顎肢第二節は先端に向かい太くなる；3) 上翅は基部で最大幅で、後方に向かいやや細くなる；4) 上翅にはわずかに乱れた粗い点刻列があり、垂会合線はみられない；5) 中胸腹板には中胸腹板突起がある。また、キベリオオツヤヒラタガムシは本属の近似種とは以下の形態的特徴で区別が可能である。1) 上翅に5列の粗い点刻列があり、最外列は不明瞭；2) 後胸腹板は中脚基節の間で強く膨らむ (Fig. 3E)；3) 後胸腹板中央前方には、後胸腹板前縁に沿った明瞭な溝がある (Figs. 3D, F)。

属レベルでは十分な研究がなされていたと考えられる日本の水生ガムシ類で未記録属が発見されたのは、本種の生息環境が *hygropetric* (湿った岩盤) という特異な環境によるものと考えられる。

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