

***Hydrophilus harpe* sp. nov., a remarkable
new species of giant water scavenger beetle from Brazil
(Coleoptera: Hydrophilidae)**

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Abstract. A remarkable new species of giant water scavenger beetle, *Hydrophilus* (*Dibolocelus*) *harpe* sp. nov., is described from Northeastern and Southeastern Brazil. Measuring nearly 5 cm in length, it is one of the largest species of Hydrophilidae in the world. It is superficially similar to *Hydrophilus masculinus* (Régimbart, 1901) but is differentiated from that species by the form of the male protarsal claw and tibial spurs. A lectotype for *Hydrophilus masculinus* is also designated.

Key words. Coleoptera, Hydrophilidae, aquatic beetles, taxonomy, lectotype designation, South America, Neotropical Region

Introduction

The genus *Hydrophilus* Geoffroy, 1762, namesake of the family Hydrophilidae, contains some of the largest aquatic beetles in the world. The genus presently contains 48 species distributed in three subgenera: *Hydrophilus* s. str. that occurs worldwide, *Temnopterus* Solier 1834, that contains a pair Afrotropical species, and *Dibolocelus* Bedel, 1891 with nine species that are primarily Neotropical with one species in the Nearctic Region. SHORT (2010) reviewed and circumscribed the genus, and provided a cladistic analysis of the Hydrophilini based on adult morphology.

Despite being relatively common and widespread, the last comprehensive treatment of the genus is more than 100 years old (RÉGIMBART 1901). Although some efforts have been made to review the taxonomic status and provide key for some species and regions (e.g. BACHMANN 1965, 1969), these have dealt with only small subsets of the overall diversity, and the types of most species have never been reexamined. Thus, making confident identifications have been difficult except for a few well-defined species or regions.

Several specimens of an exceptionally large *Hydrophilus* species in the subgenus *Dibolocelus* were recently found in the collections of the Smithsonian Institution and the Carnegie

Museum of Natural History. Upon reviewing type specimens of *Hydrophilus* on a recent visit to the Muséum national d'Histoire naturelle in Paris, it became apparent that these large specimens represented an undescribed species of the genus. Though we have not seen any wrongly identified specimens and the known ranges of the two species do not overlap, the species may have been unknowingly confused with the similar species *H. (D.) masculinus* (Régimbart, 1901). Here, we diagnose and describe this spectacular new species and designate a lectotype for *H. masculinus*.

Materials and methods

Dorsal habitus images were taken using a Visionary Digital imaging system (either conventional or mobile Passport system) and CombineZP image stacking software (HANDLY 2010). The male genitalia were already dissected from the holotype when it was examined. It was lightly cleared in heated 10% KOH. Measurements were made using a SZX15 Olympus microscope.

Specimens examined are deposited in the following collections:

CMNH	Carnegie Museum of Natural History, Pittsburg, USA (J. Rawlins);
MNHN	Muséum national d'Histoire naturelle, Paris, France (A. Mantilleri);
SEMC	University of Kansas, Lawrence, Kansas, USA;
USNM	Smithsonian Institution, Washington, DC, USA (C. Micheli).

Taxonomy

Hydrophilus (Dibolocelus) harpe sp. nov.

(Figs 1–5)

Type material. HOLOTYPE: ♂, BRAZIL: RIO GRANDE DO NORTE: “BRAZIL, R.G.N. / Ceara-Mirim / VII-6&7-1969 / P. & P. Spangler”, “USNMENT / [Matrix Barcode] / 00776385” (USNM). PARATYPES (3 spec.): BRAZIL: BAHIA: 15 km E. Itabuna, 3.vii.1969, leg. P. & P. Spangler, USNMENT 00776384 (1 ♀, USNM). MINAS GERAIS: Aguas Vermelhas, xii.1983, leg. M. Alvarenga (1 ♂, CMNH). RIO GRANDE DO NORTE: Same data as holotype, USNMENT 00776386 (1 ♂, SEMC).

Description. *Size and form.* Body length = 42–47 mm. Body broadly oval, strongly convex. *Color.* Dorsum of head, pronotum, and elytra charcoal black, usually with a metallic green iridescent sheen which is most easily visible under direct light. Ventral surface of head, thorax, and abdomen uniformly black; protarsi slightly paler. Antennomeres 1–6 pale yellow, antennomeres 7–9 brown. Maxillary palps reddish-brown. *Head.* Antennae made up of nine articles, including a three-segmented pubescent club. Length of scape subequal to cardo, pedicel and following three segments combined subequal to length of scape. Cupule large, ca. two-thirds length of preceding six antennomeres combined or ten times length of preceding antennomeres. Maxillary palps with four palpomeres; in male, second palpomere ca. five times as long as first palpomere, third palpomere ca. half as long as second palpomere, fourth palpomere ca. half as long as third palpomere; third palpomere greatly inflated, ca. three times as large as the apical palpomere. Maxillary palps unmodified in female. Combined length of palps subequal to width of head. Labial palps with three palpomeres; in male, second palpomere ca. five times as long as palpomere one and ca. two times as long as apical

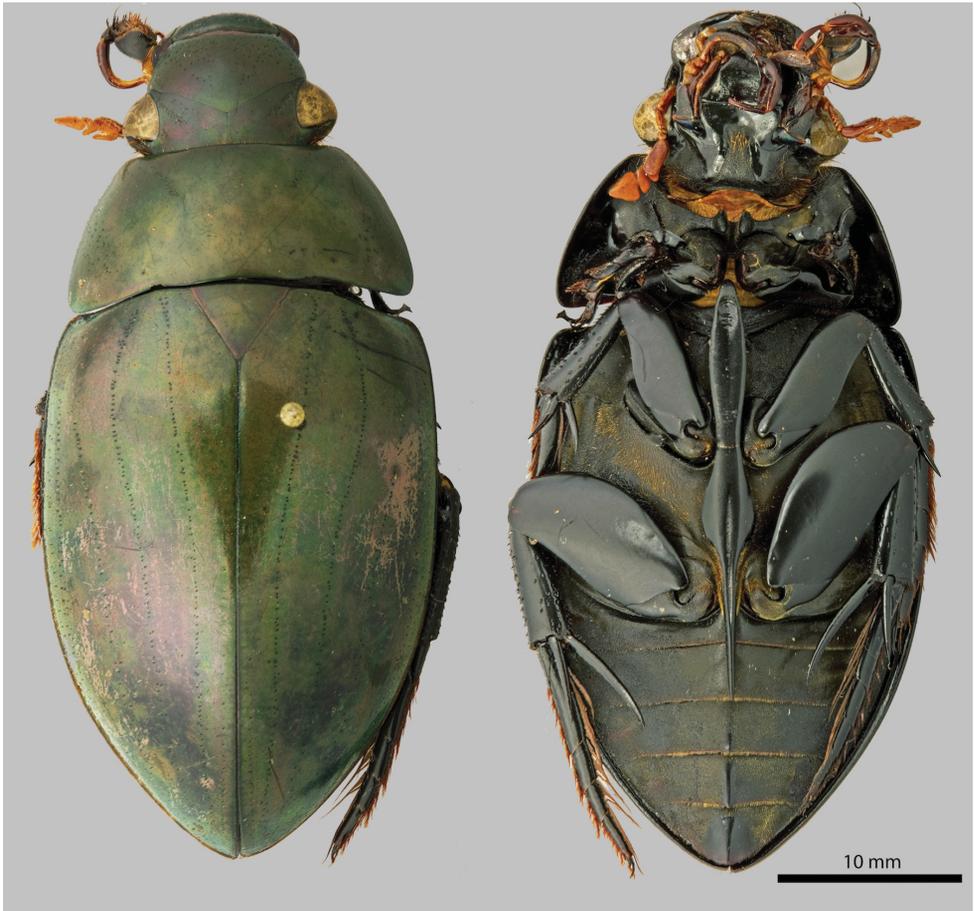
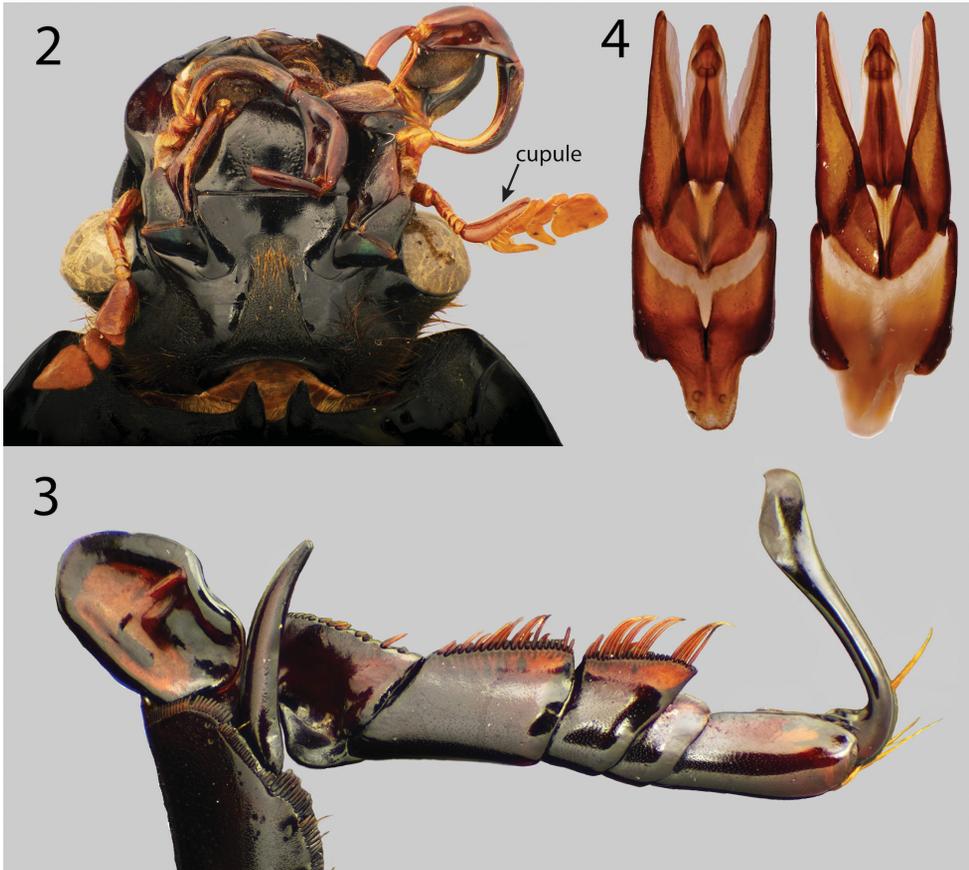


Fig. 1. *Hydrophilus (D.) harpe* sp. nov., male paratype; dorsal and ventral habitus.

palpomere; second palpomere very swollen, ca. three times as wide as apical palpomere; lateral outer margin with dense row of long setae; inner lateral margin with a small patch of setae at apex; in female, second segment only slightly wider than apical palpomere. Combined length of labial palps subequal to combined length of the first two maxillary palpomeres. Mentum triangular; glabrous except for a few short, fine setae along lateral margins. *Thorax*. Prosternum divided into two lobes which are conical and tapered to a point with tufts of setae on the anterior margin. The sternal keel formed by the fusion of the meso- and metaventrite extending slightly past posterior margin of ventrite 2. Anterior tenth of keel with a small depression lined with transverse grooves. Keel glabrous except for few, short setae along anterior margin of depression. Apical protibial spurs of male dimorphic, one rounded and



Figs 2–4. *Hydrophilus (D.) harpe* sp. nov. 2 – male paratype, head, ventral view; 3 – male paratype, protarsus; 4 – male holotype, aedeagus, dorsal and ventral views.

shield-like, the other slightly curved and pointed at apex (Fig. 3). Single row of long setae on inner margin of protibiae. Male protasal claws asymmetrical, with outer claw extremely long and recurved, the apex explanate and forming a sickle-shaped hook (Fig. 3) and with inner claw shorter and not expanded or flattened apically. In males, ventral face of meso- and metatarsi set with rows of thick, dense setae appearing as a brush; in females, they are set with only 2–3 regular rows. *Abdomen* with five exposed ventrites; ventrites 2–5 subequal in length. Ventrites densely covered with uniform short pubescence; ventrites 3–5 with a medial glabrous patch of varying size: glabrous patches on ventrites 4 and 5 subequal in length, glabrous patch on ventrite 3 ca. one-third length of other patches. Glabrous patches on ventrites 3 and 4 subequal in width, ca. one-fourth width of patch on ventrite 5. Posterior margin of ventrites 3 and 4 slightly overhangs onto following segment; overhang of fourth segment margin far more pronounced. Glabrous patch on ventrite 5 creased medially due to elevated ridge down abdominal midline. Aedeagus as in Fig. 4.

Differential diagnosis. Antennal cupule elongate, more than twice as long as wide in both sexes. Maxillary palps of male greatly swollen (Fig. 2). Labial palps of male distinctly enlarged and triangular. Ventral surface of male meso- and metatarsi with dense brush of setae, rather than just two rows of coarse spicules. Male inner tibial spur plate-like, and with outer protarsal claw flattened and expended into a hook apically (Fig. 4) Abdominal ventrites 3–5 with slight, blunt median carina; ventrites 3–5 slightly creased medially and broadly glabrous in medial third (Fig. 1).

As a member of the subgenus *Dibolocelus*, the new species can be separated from those of the subgenus *Hydrophilus* s. str. by the bilobed prosternum (Fig. 1). Of the 10 now-described species of *Dibolocelus*, the males of five other species have inflated palps (e.g., Fig. 2): *H. iricolor* (Régimbart, 1901), *H. masculinus* (Régimbart, 1901), *H. palpalis* Brullé, 1837, *H. pollens* Sharp, 1887 and *H. purpurascens* (Régimbart, 1901). Both males and females of these species and *H. harpe* sp. nov. may also be distinguished by having an elongated, yellow antennal cupule (Fig. 2; the other species have a short, circular and usually darkly-colored cupule). Only *H. masculinus* and *H. harpe* also have the meso- and metatarsi modified to possess a dense setal brush ventrally (e.g., Figs 6–7). The new species may be easily separated from the former species by the plate-like protibial spur (Fig. 3) and strongly modified, sickle-like protarsal claw (Fig. 3).

Etymology. *Harpe* (Greek), in reference to the distinctive sickle-like modifications of the male protarsal claws; noun in apposition. In Greek mythology, the harpe sword is identified as the weapon used to Perseus to behead Medusa. The harpe is also the weapon used by the Titan Cronus to castrate and overthrow his farther, Uranus.

Biology. Though no ecological data is indicated on the labels, Paul Spangler's field notes indicate the collecting event from 15 km E. of Itabuna was in a "pool in pasture", and the collecting event in Ceará-Mirim was in a "flooded field".

Distribution. Known from two localities situated in Northeastern Brazil (Ceará-Mirim Municipality in Rio Grande do Norte State and Itabuna Municipality in Bahia State) and from Southeastern Brazil (Águas Vermelhas Municipality in northernmost Minas Gerais State, near border with Bahia State) (Fig. 5).



Fig. 5. *Hydrophilus* (*D.*) *harpe* sp. nov., distribution map.

***Hydrophilus (Dibolocelus) masculinus* (Régimbart, 1901)**

(Figs 6–9)

Dibolocelus masculinus Régimbart, 1901: 223.*Hydrous (Dibolocelus) masculinus*: ZAITZEV (1908: 366).*Hydrophilus masculinus*: BLACKWELDER (1944: 171).**Type material examined.** LECTOTYPE: ♂ (here designated): “MUSEUM PARIS / Rosario / Claine 1898” (MNHN: Régimbart Collection). PARALECTOTYPE: Same data as Lectotype (1 ♀, MNHN: Régimbart Collection).**Additional material examined:** (2 spec.): “Rosario / de S. Fe”, “Dr. Stem. / pelmann.”, “37.” (1 ♂, MNHN: Régimbart Collection), “Republ. / Argentina” (1 ♀, MNHN: Régimbart Collection),**Differential diagnosis.** See Differential diagnosis for *H. harpe*.**Distribution.** Argentina, Uruguay (HANSEN 1999).**Remarks.** Of the specimens of *H. masculinus* he examined, RÉGIMBART (1901) remarked as follows: ‘République Argentine: Rosario (Claine, 1898), collection du Muséum de Paris et la mienne’. It is clear from the description he saw both males and females though he does not indicate the number of specimens he examined. In the collection of Régimbart, which is maintained separately at MNHN, the *Hydrophilus* specimens are arranged as he had them in the same order as presented in the 1901 publication. There are four specimens situated

Figs 6–9. *Hydrophilus (D.) masculinus* (Régimbart, 1901), male lectotype: 6 – mesotarsus, 7 – metatarsus, 8 – protarsus, 9 – label. Arrows in Figs 6–7 note the dense tuft of ventrally-facing setae.

by the name '*masculus*', including a male and female pair with identical information to those listed above. The male is here designated as the lectotype for *H. masculinus* to fix the identity of this species. The other two specimens (also from Argentina) do not bear Rosario labels and it is unclear if they were part of the original type series or not. Consequently, we have opted not to designate these two specimens as paralectotypes as it is unclear if they were part of the original type series.

Discussion

Despite being among the largest aquatic beetles in the world, it may seem surprising that new species remain to be described in the genus *Hydrophilus*. However, the genus remains poorly known in tropical regions, especially in South America. Members of the subgenus *Dibolocelus* in particular are much less common than *Hydrophilus* s. str. and rarely collected in long series. Consequently, as more material from these areas becomes available for study, even more gigantic new species may be found.

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