



Hydaticus aequalis sp. n. and a new record of *H. devexus* Trémouilles, 1996 from Brazil (Coleoptera, Dytiscidae, Hydaticini)

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Abstract

Hydaticus aequalis sp. n. is described from Brazil, where it was recently discovered in the central lowlands region of the Amazon forest. The new species differs from all other Neotropical congeners by its uniformly brown dorsal surface and the shape of medial lobe. The dorsal habitus and male genitalia are illustrated, and a distribution map is provided. The habitat, a small stream and associated forest pool, is illustrated and described. In addition, a new record of *H. devexus* Trémouilles, 1996, previously known from a single specimen, is reported from the highlands of northeastern Brazil, and a modified key to Neotropical species of the genus is provided.

Key words: Coleoptera, Dytiscidae, *Hydaticus*, Amazonia, new species, key to species

Introduction

The genus *Hydaticus* Leach, 1817 presently comprises 150 species and 12 subspecies occurring worldwide (Hendrich & Balke 2020a, 2020b; Nilsson & Hájek 2020). Species that occur in the Neotropical region, all belonging to subgenus *Prodaticus* Sharp, 1882 have never been fully revised. The most comprehensive study was conducted by Trémouilles (1996) who revised the South American species. Recently Megna *et al.* (2019) reviewed the Peruvian species and Hendrich & Balke (2020a) describe an additional new species from Peru and another one from French Guiana (Hendrich & Balke 2020b), bringing the number of species known from the Neotropics to thirteen.

Recent fieldwork in Brazil has resulted in the discovery of a new species from Amazonas State, as well as the second known collecting of *H. devexus* Trémouilles, 1996 in Bahia State, first record after its description.

Material and methods

Specimens were examined using an Olympus SZ61 microscope. Measurements were taken with a millimetre ruler and an ocular scale. The following abbreviations are used in the text: TL (total length), TL-H (total length without head), and MW (maximum width).

Specimens for dissections and imaging were relaxed by placing them in lightly boiling water. The genitalia were then dissected and placed in warm 10% KOH for about five minutes. Following removal from KOH, the genitalia were placed in glacial acetic acid to neutralize the base, then washed in water. After dissection and /or illustration, genitalia were placed in microvials attached to the pin with the original specimens.

Images of the genitalia were taken on an Olympus SZX16 microscope with attached Olympus DP72 camera. Dorsal habitus was taken using a Visionary Digital BK+ light imaging. Genitalia images were taken in glycerin while the structures were hydrated. Images were edited using Adobe Photoshop® to improve clarity and color. Distribution maps were generated using SimpleMapp (Shorthouse 2010).

Specimens are deposited in the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA), and the Snow Entomological Collection, University of Kansas, Lawrence, Kansas, USA (SEMC).

Taxonomy

Hydaticus aequalis sp. n.

(Figs. 1A, 2A, 3A–B, 4)

Type locality. BRAZIL: Amazonas State: Tapauá County, c. 240 km N Humaita, on BR-319 (5.503S, 62.124W).

Type material. Holotype (♂): “BRAZIL: Amazonas: Tapauá/-5.50298°, -62.12392°; 54 m/ Humaita (c. 240 km N) on BR-319/ 11.vii.2018; leg. Short; forest/detrital pool; BR18-0712-01A”, “HOLOTYPE/*Hydaticus/aequalis* [red label]” (INPA) Notes: The holotype lacks all tarsomeres on right hind-leg and all tarsomeres on left fore-leg.

Paratype (♀): same labels, except margin of stream, BR18-0712-01B and blue paratype label (SEMC).

Diagnosis. Body elongate, oval. Size large (10 mm in length). General coloration in dorsal view evenly orangish brown; head and pronotum a little lighter; elytron evenly orangish brown; thoracic ventrite and abdomen evenly orangish brown. Median lobe of aedeagus in lateral view not dorsally recurved, with straight ventral margin, basal 1/3 dorsally bulged, apical 1/6 weakly expanded with narrowly rounded apex.

Description. Habitus. Body elongate, oval, slightly attenuated posteriorly, dorsoventrally depressed; subparallel medially, widest just behind middle, lateral outline continuous in dorsal view.

Measurements. TL = 10 mm; TL-H = 9 mm; MW = 5 mm.

Coloration. General coloration in dorsal view evenly orangish brown; head and pronotum a little paler. Clypeus brown with two black spots near anterior margin; labrum yellowish brown with anterior margin darker; antenna dark yellow; palpi yellow, paler than antennae. Pronotum slightly darker on posterior margin; elytron and epipleuron evenly orangish brown. Metacoxal plates and abdomen evenly orangish brown; prosternum and metaventrite dark yellow; prosternal process with apex darker, brown. Legs dark yellow, mesotarsus, mesotibia and hind-legs little darker.

Sculpture and structure. Head with very fine punctation, coarser in basal margin; reticulation not visible at 100x. Pronotum with posterolateral angle slightly produced and rounded, posterior margin sinuate; lateral margins not margined; with very fine reticulation composed of rounded cells and fine punctation; more impressed punctures with scattered setae on posterior margin; with some wrinkles near posterior and lateral margins. Elytron with very fine reticulation of elongate cells corresponding to about 1/3 of distance between punctures; with one row of punctures slightly impressed near suture bearing short setae; some scattered setae on lateroapical margins. Ventral surface generally smooth, without punctures and reticulation. Prosternum with large setae on lateral margins. Prosternal process convex, laterally entirely margined, with apex spatulate; with reticulation of rounded cells. Metaventral wings narrow, with anterolateral margin straight. Male protarsomeres I–III modified in a transversely oval palette with ventral adhesive setae; mesotarsomeres I–III enlarged with ventral adhesive setae. Female pro and mesotarsomeres I–III not enlarged. Protibia with stout spines on apicodorsal surface. Profemur with a row of spines on anterior surface, with fine, scattered spines on posterior margin and one row of spines basally, near trochanter. Metatarsus with reticulation composed of elongate, transversal cells in dorsal and ventral view; metatarsal claws unequal, anterior claw shorter than posterior one. Metatibia with reticulation of elongate, transversal cells; with few large punctures and spines in posterior surface; metatibial spurs acuminate apically. Metafemur with fine reticulation composed of transversal cells. Abdomen: ventrites 3–5 with a one rounded shallow depression at each side.

Male genitalia. Median lobe in dorsal view narrow; in lateral view not dorsally recurved, ventral margin straight, dorsal margin bulged in basal 1/3, weakly expanded in apical 1/6 with narrowly rounded trilobate apex.

Etymology. From the Latin *Aequalis*, meaning uniform, due to the more or less uniform coloration of dorsal and ventral surfaces. The name is an adjective.

Distribution. This species is only known from the type locality, in Amazonas State, Brazil (Fig. 4). The site is midway along the Manaus-Humaita highway.

Habitat. The specimens were collected in the riparian corridor of a small forested stream. The holotype was taken from the margin of the stream itself, which was still flowing but largely reduced to a series of pools (Fig. 3A). The paratype was taken in a small isolated forest puddle that was ca. 5 m from the stream (Fig. 3B). Both the stream and puddle had a sand and mud substrate with abundant detritus.

Differential diagnosis. *Hydaticus aequalis* sp. n. is unique among Neotropical *Hydaticus* in having the general coloration in dorsal view almost evenly orange-brown and without elytral markings. Among the New World *Hydaticus*, *H. aequalis* sp. n. is somewhat similar to *H. piceus* LeConte being reddish in color and having elytra without markings, however the latter belongs to the subgenus *Hydaticus* (s.str.)

***Hydaticus devexus* Trémouilles, 1996**

(Figs. 1B, 2B, 3C–D, 4)

Hydaticus devexus Trémouilles, 1996: 26.

Material Examined (2): BRAZIL: Bahia State: Abaira County, Pico do Barbado, W of Catolés, -13.29053, -41.90489, 1705 m asl, 26.ii.2018, leg. Benetti & team, BR18-0226-01A (1 male, 1 female; INPA, SEMC).

Diagnosis. Body elongate, oval. Size large (16 mm in length). Pronotum black with broad yellow lateral margins; elytron with a subbasal transverse yellow fascia, confluent with sublateral, longitudinal and yellowish stripes, without a subtriangular, postmedial and broad spot. Median lobe of aedeagus in lateral view dorsally recurved with sinuate ventral margin, constricted medially, apical 1/3 expanded with broadly pointed apex.

Distribution. The species was previously known from the unique male holotype that was reported from “Serra do Cipó”, in Minas Gerais State. The new material collected in 2018 from the Pico do Barbado in Bahia State, extends the distribution of the species 700 km north.

Habitat. The two specimens were taken from a more than a meter deep, densely vegetated pool that had formed in a high saddle region of the Pico do Barbado, the highest mountain in northeast Brazil (Fig. 3C–D). This represents the first known habitat data for this taxon as the unique type specimen was collected at a light.

Modification of key to the species of subgenus *Hydaticus* (*Prodaticus*) of the Neotropical Region (Hendrich & Balke 2020b)

- 5(1) Pronotum evenly orangish brown, without yellowish lateral margins or black band on anterior and posterior margin. Elytron evenly orangish brown, somewhat darker than pronotum and head, without any markings *Hydaticus aequalis* sp. n.
- Pronotum not as above. Elytron totally black or with yellowish markings 5a
- 5a(5) Pronotum black with yellowish lateral margins 6
- Pronotum yellowish with a black band on anterior and posterior margin 9

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References

- Hendrich, L. & Balke, M. (2020a) *Hydaticus (Prodaticus) hauthi* sp. nov., a new diving beetle from the cloud forest in the Cordillera El Sira, Peru (Coleoptera: Dytiscidae). *Zootaxa*, 4743 (3), 419–426.
<https://doi.org/10.11646/zootaxa.4743.3.9>
- Hendrich, L. & Balke, M. (2020b) *Hydaticus (Prodaticus) kourouensis* sp. n., a new diving beetle species from French Guiana (Coleoptera: Dytiscidae). *Aquatic Insects*. [published online first]
<https://doi.org/10.1080/01650424.2020.1748201>
- Megna, Y.S., Balke, M., Apenborn, R. & Hendrich, L. (2019) A review of Peruvian diving beetles of the genus *Hydaticus* Leach, 1817, with description of *Hydaticus (Prodaticus) panguana* sp. nov. and notes on other Neotropical species (Coleoptera: Dytiscidae). *Zootaxa*, 4615 (1), 113–130.
<https://doi.org/10.11646/zootaxa.4615.1.5>
- Nilsson, A.N. & Hájek, J. (2020) A World catalogue of the family Dytiscidae, or the diving beetles (Coleoptera, Adephaga). Version 1 January 2020. 311 pp. Available from: http://www.waterbeetles.eu/documents/W_CAT_Dytiscidae_2020.pdf (accessed 20 April 2020).
- Shorthouse, D.P. (2010) *SimpleMappr*, an online tool to produce publication-quality point maps. Available from: <http://www.simplemappr.net> (accessed 23 April 2020)
- Trémouilles, E.R. (1996) Revisión del género *Hydaticus* Leach en América del Sur, con descripción de tres nuevas especies (Coleoptera, Dytiscidae). *Physis, Buenos Aires*, 52B (122–123), 15–32. [1994]



FIGURE 1. Habitus of *Hydaticus* spp. (A) *H. aequalis* sp. n., (B) *H. devexus*. Scale bars = 2.0 mm.



FIGURE 2. Median lobe of aedeagus in dorsal (left) and lateral (right) view of *Hydaticus* spp. (A) *H. aequalis* sp. n., (B) *H. devexus*. Scale bars = 0.5 mm.

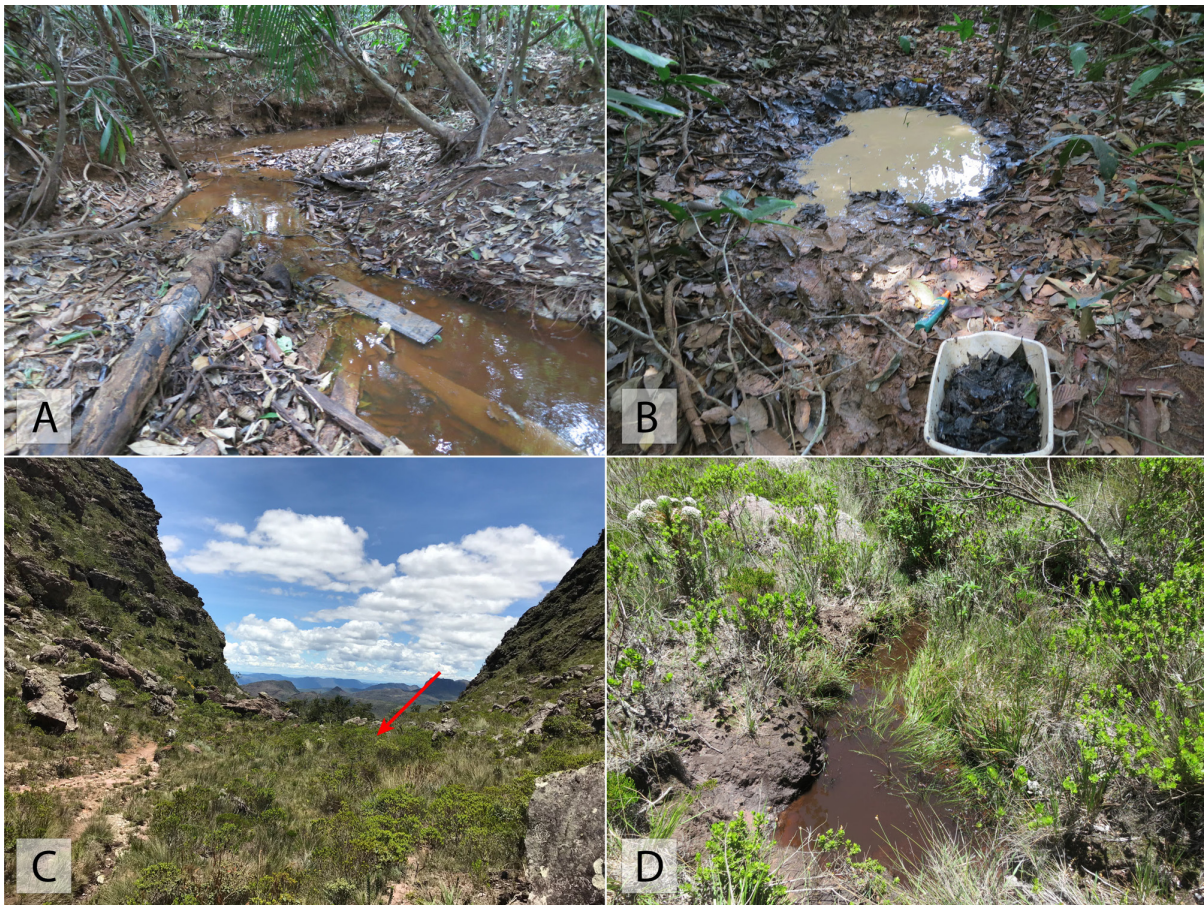


FIGURE 3. Habitat of *Hydaticus* spp.: (A) Habitat of *H. aequalis* sp. n., collecting event BR18-0712-01B; (B) Habitat of *H. aequalis* sp. n., collecting event BR18-0712-01A; (C) Habitat of *H. devexus*, near the summit of Pico do Barbardo; red arrow indicates location of pool; (D) Vegetated pool in which *H. devexus* was found, collecting event BR18-0226-01A.

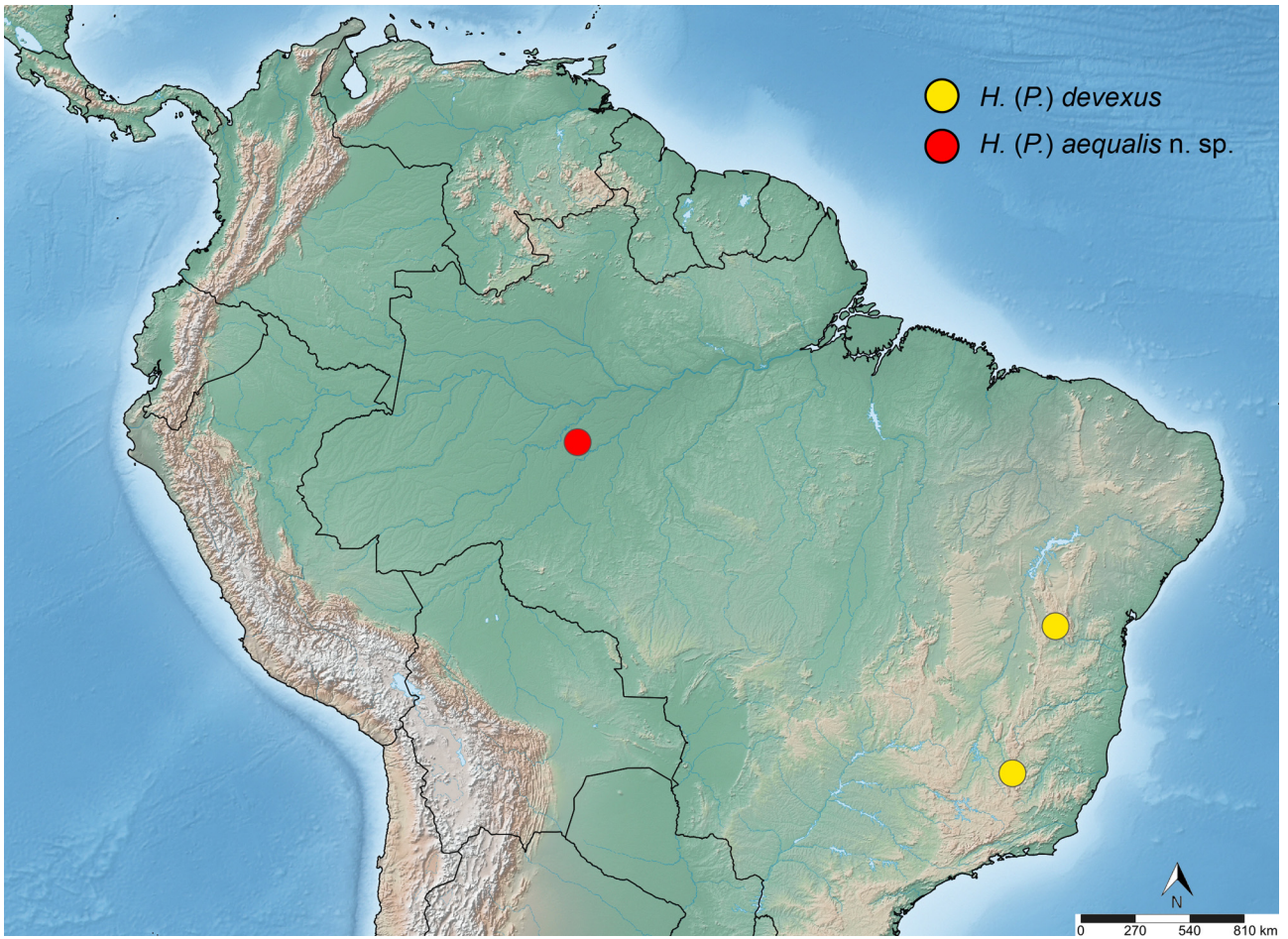


FIGURE 4. Known distribution of *Hydatiscus aequalis* **sp. n.** and *H. devexus*.