



## *Hydraena bahiana* sp. n., a new minute moss beetle (Coleoptera, Hydraenidae) from highlands of Northeast Brazil

CESAR J. BENETTI<sup>1</sup>, LUIS F. VALLADARES<sup>2</sup>, JUAN A. DELGADO<sup>3</sup> & NEUSA HAMADA<sup>4</sup>

<sup>1</sup>Departamento de Biodiversidad y Gestión Ambiental, Facultad de Ciencias Biológicas y Ambientales, Universidad de León, León, SPAIN; Coordenação de Biodiversidade, Programa de Pós-Graduação em Entomologia (PPGEnt), Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, AM, BRAZIL.

✉ [cjbenetti@gmail.com](mailto:cjbenetti@gmail.com); <https://orcid.org/0000-0001-6795-2194>

<sup>2</sup>Departamento de Biodiversidad y Gestión Ambiental, Facultad de Ciencias Biológicas y Ambientales, Universidad de León, León, SPAIN. ✉ [lvald@unileon.es](mailto:lvald@unileon.es); <https://orcid.org/0000-0002-8368-254X>

<sup>3</sup>Departamento de Zoología y Antropología Física, Facultad de Biología, Universidad de Murcia, Murcia, SPAIN.

✉ [jdelgado@um.es](mailto:jdelgado@um.es); <https://orcid.org/0000-0002-7805-0353>

<sup>4</sup>Coordenação de Biodiversidade, Programa de Pós-Graduação em Entomologia (PPGEnt), Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, AM, BRAZIL.

✉ [neusaha@gmail.com](mailto:neusaha@gmail.com); <https://orcid.org/0000-0002-3526-5426>

### Abstract

*Hydraena* (*Hydraenopsis*) *bahiana* sp. nov. is described from Bahia State, Northeast Brazil, based on three specimens collected in pools at the headwater of a stream, 1,705 m. asl. The new species belongs to the *Hydraena scintillabella* subgroup of the *leechi* group. Description and diagnostic characters are offered; habitus photographs and line drawings of both male and female genitalia are provided. Habitat and distributional data of the new species are also included.

**Key words:** Aquatic Coleoptera, aquatic insect, Serra do Barbado, Serra do Espinhaço, taxonomy

### Introduction

Hydraenidae, minute moss beetles, inhabits many aquatic ecosystems. According to Perkins (2011) a considerable amount of the Neotropical hydraenid fauna remains undescribed and undocumented. This is especially true for species that inhabit unique and little explored habitats, like those found in much of the Amazon or in isolated mountain ranges, so that fieldworks in these areas may result in the discovery of new species (e.g., Benetti *et al.* 2020, 2021).

In South America, the most speciose Hydraenidae genus is *Hydraena* Kugelann, 1794, currently comprising 84 described species (Perkins 2011; Benetti *et al.* 2020), most in the subgenus *Hydraenopsis* Janssens, 1972 (Trizzino *et al.* 2013). This genus was revised in South America by Perkins (1980), who added 22 new species to the four previously described by Orchymont (1923, 1937) and Janssens (1972). Later, Perkins (2011) published a new comprehensive revision of *Hydraena* from South America in which 54 additional species were described. From these, 31 species were recorded in Brazil. Recently, Benetti *et al.* (2020) described two new species from Brazil, increasing to 33 the list of Brazilian species (Benetti 2022).

Recent fieldwork in highlands of Northeast region of Brazil has resulted in the discovery of a new species from Bahia State which is described here.

### Materials and methods

The specimens were collected in Northeast region of Brazil in 2018 and analyzed under an Olympus SZX12 stereomicroscope attached with a LED ring light. Line drawings were prepared using a camera lucida attached to a Nikon

Eclipse E600 microscope. Genitalia were temporarily mounted on glass slides using Hoyer's mounting medium. Habitus photographs were taken with a Nikon DS-U2 camera unit attached to a Leica MZ9S stereomicroscope and assembled using the Combine ZP freeware program.

For the pairs of foveae on the pronotum we follow the nomenclature of Perkins (2011). Exact label data of the type specimens are cited as follows: / indicates a new line in the same label and // indicates a different label. The distribution map was generated using SimpleMapper (Shorthouse 2010). The type-material is deposited in the Invertebrate Collection of the National Institute of Amazonian Research (INPA), Manaus, Amazonas, Brazil.

## Abbreviations

BL	Body length (front anterior margin of labrum to elytral apex)
EL	Elytral length (from outer angle of shoulder to apex)
EW	Elytral width at widest point
PF1	Anteromedial foveae on the pronotum
PF2	Posteromedial foveae on the pronotum
PF3	Anterolateral foveae on the pronotum
PF4	Posterolateral foveae on the pronotum
PL	Pronotal length
PW	Pronotal width at widest point
INPA	Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil

## Taxonomy

### *Hydraena (Hydraenopsis) bahiana* sp. n.

(Figs 1–4)

**Type locality.** BRAZIL, Bahia State, Abaíra County, Catolés, Serra do Barbado (13°17'24.0"S, 041°54'21.5"W).

**Type material. Holotype** (male): "BRAZIL: Bahia State, Abaíra County / Catolés, Serra do Barbado, pools, 1,705 m.a.s.l. / 13°17'24.0"S; 041°54'21.5"W; 26/ii/2018 / C. J. Benetti & A.E.Z. Short leg. // ♂ // HOLOTYPUS [red label] // *Hydraena (Hydraenopsis) bahiana* sp.n." (genitalia extracted and mounted on same card) (INPA).

**Paratypes:** 2 females. Same data as holotype except: // ♀ // PARATYPUS [red label] (genitalia extracted and mounted on same card) (INPA).

**Type depository.** Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil

**Description.** *Habitus* as in Fig. 1. *Size:* Holotype: Male BL 1.47 mm; EL 0.93 mm; EW 0.62 mm.

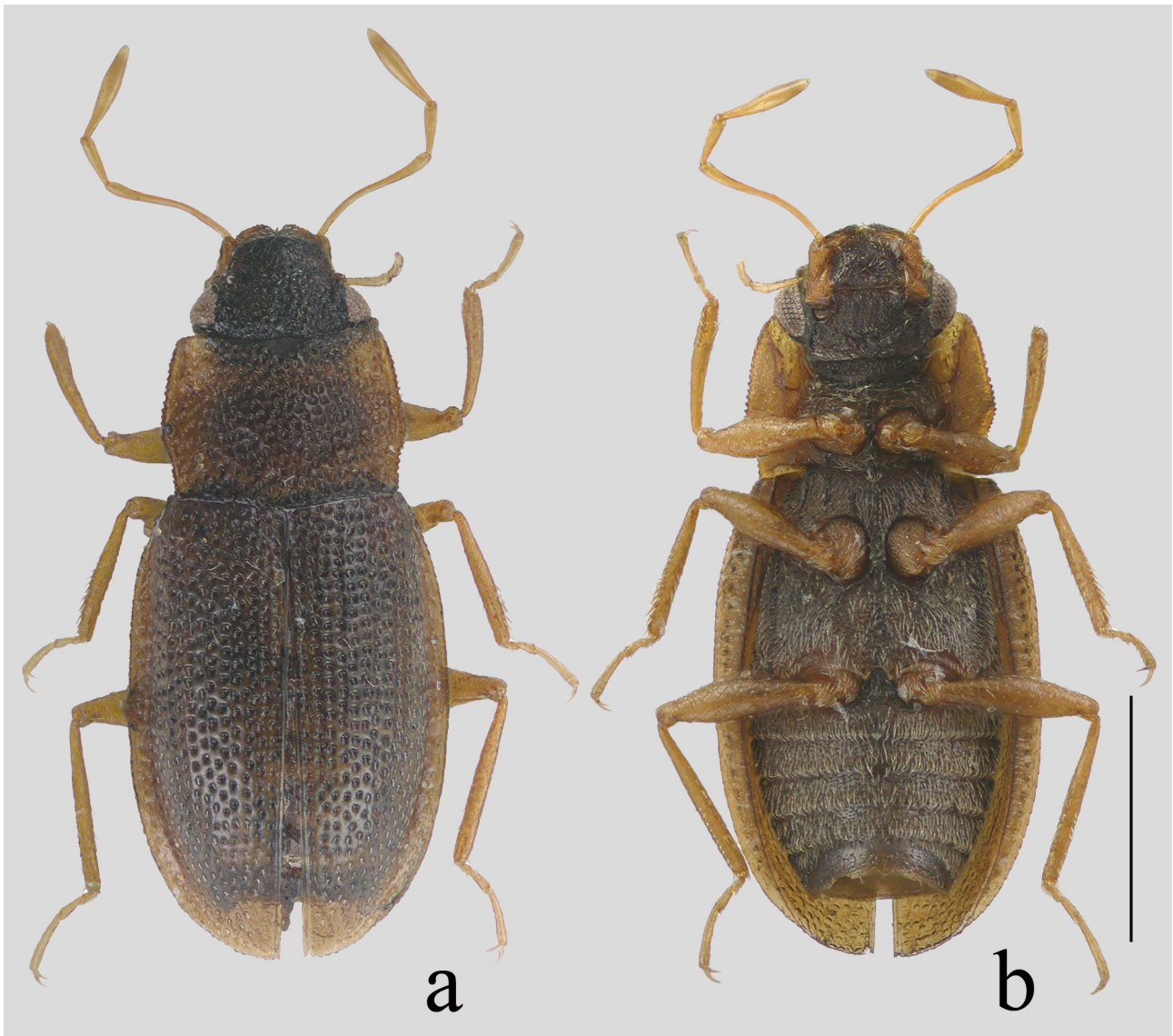
*Color* (Fig. 1): Dorsum of head black, labrum dark brown with lateral sides yellowish; pronotum with disc dark brown and extensive lateral sides yellowish brown, scintilla black; elytra dark brown, lateral margins and apex yellowish brown. Antennae and maxillary palps testaceous, last palpomere with preapical area brown; legs testaceous. Both ventral surface and epipleura dark brown.

*Head:* Labrum scarcely punctured, with an open v-shaped apicomedian emargination and a median small projection, margins of lateral lobes convex. Clypeus rugose with large, sparsely arranged punctures each bearing a small white seta. Punctures on frons very broad, deep and adjoining, interstices between punctures convex and shiny.

*Pronotum:* Wider than long (PW 0.48 mm, PL 0.33 mm), maximum width slightly below mid length. Anterior margin clearly emarginate behind frons except at the convex scintilla margin, disc broadly and completely punctured. Scintilla distinct, deep, shiny, impunctate, with arcuate anterior and posterior margins. Lateral sides weakly convex, with margins strongly serrate. Posterior margin slightly convex. Discal punctures large, deep, similar in size and shape to those of marginal areas, interstices wide and shiny. PF1 absent, PF2 shallow deep, PF3 very wide, oval and moderately deep, PF4 absent.

*Elytra:* Arcuate laterally, with marked shoulders. Lateral explanate margins wide, obsolete at apex. With eight rows of rather regular impressed punctures between suture and shoulder; size of punctures similar to those of pronotum. Intervals wide, not raised, shiny. Apex rounded with a small sutural echancre.

*Mesoventrite:* With internal and external carinae, posteriorly divergent; median carina extended to base of intercoxal process; intercoxal process moderately wide, apex blunt, with convex end.



**FIGURE 1.** *Hydraena bahiana* sp. n., holotype male. Dorsal (a) and ventral (b) habitus. Scale bar = 0.5 mm.

*Metaventrите*: Plaques faintly marked, microreticulate, wide and straight, posterior margins connate; width of each plaque similar to that of distance between.

*Legs*: Protibiae slightly arcuate and expanded towards apex. Mesotibiae and metatibiae straight and slender.

*Abdomen*: Sternite X and spiculum gastrale as in Fig. 2. Sternite X (Fig. 3c) subtriangular, distal end rounded, basal angles mucronate, markedly produced laterally, disc glabrous and irregularly bordered by a translucent lamina; spiculum gastrale long, parallel sided and firmly attached to sternite X; distal end of spiculum distinctly dilated, resembling the capitate stigma of a pistil (Figs 2 a, b, d).

Aedeagus as in Fig. 3. Parameres of similar shape, strong and straight, both ended in a laminar, blade-shaped area (Figs 3 a, c). Left paramere shorter (Figs 3 c, d). Main piece in lateral view (Fig. 3 b) curved and wide, distinctly projected ventrally in a heel just at the area of insertions of parameres. Distal lobe with two major appendages: basal one broad, membranous and bearing the gonopore, distal one longest and, in ventral view (Fig. 3 d), abruptly constricted basally forming a narrow neck and a broadly subquadrate lobe at apex (Fig. 3 d).

*Female*: Size: Paratypes (n=2): BL 1.44–1.46 mm; EL 0.89–0.91 mm; EW 0.62–0.64 mm. Shape and color similar to male. Pronotum similar to male; PF1 absent, PF3 elongated, moderately deep, PF2 very shallow, PF4 absent. Protibiae with the outer edge very slightly curved, meso and metatibiae straight. Metaventral plaques more marked than the male studied.

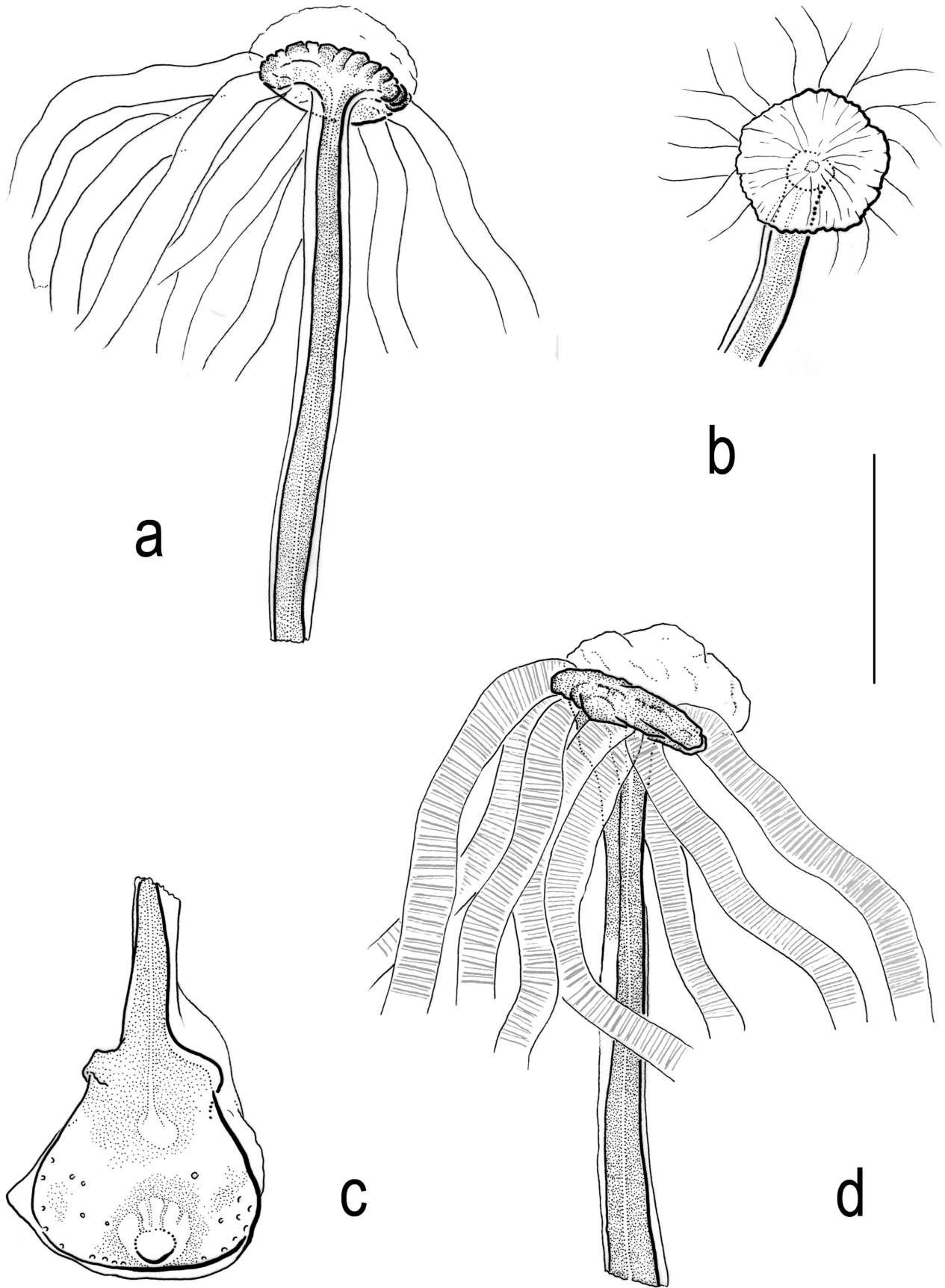
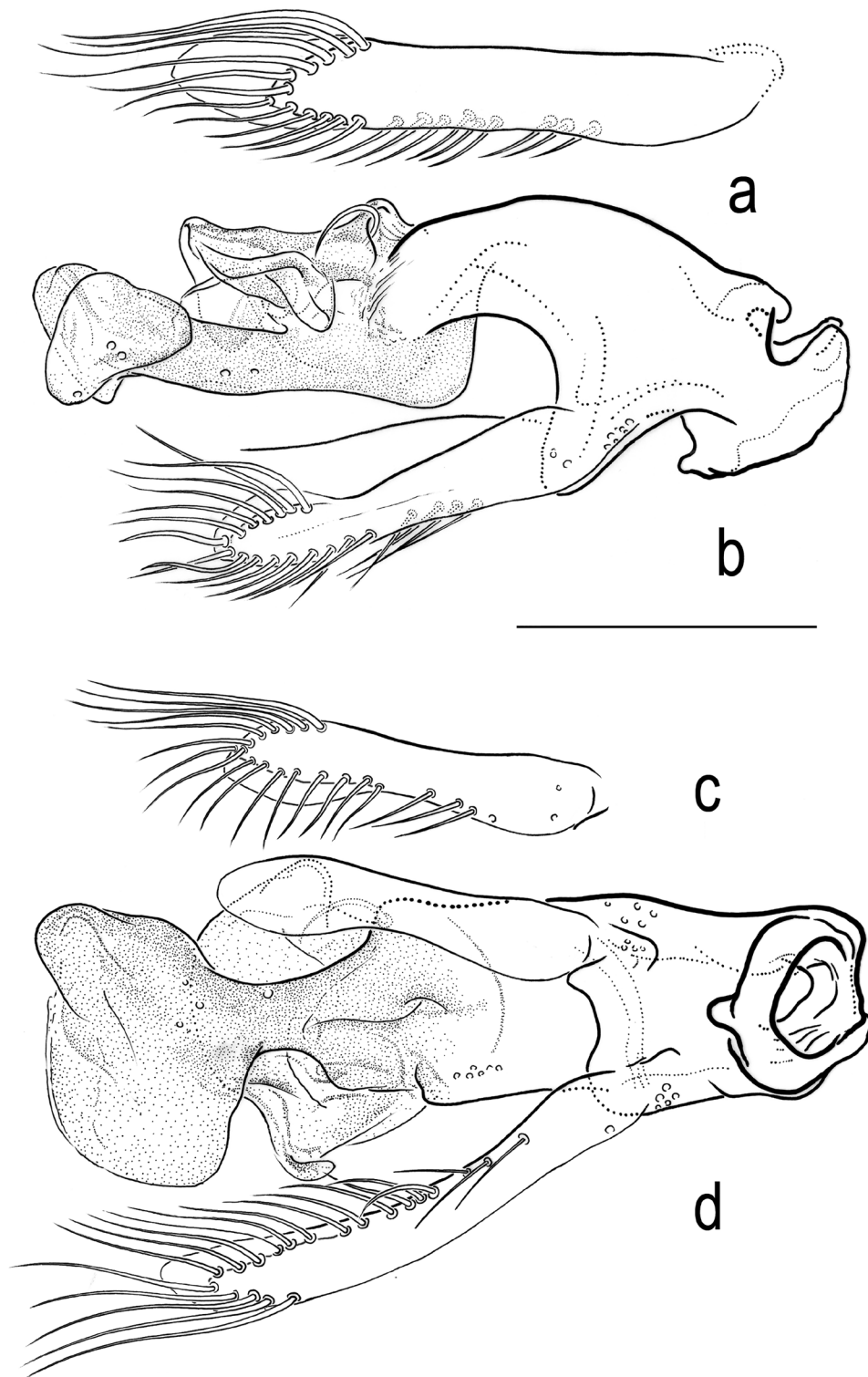
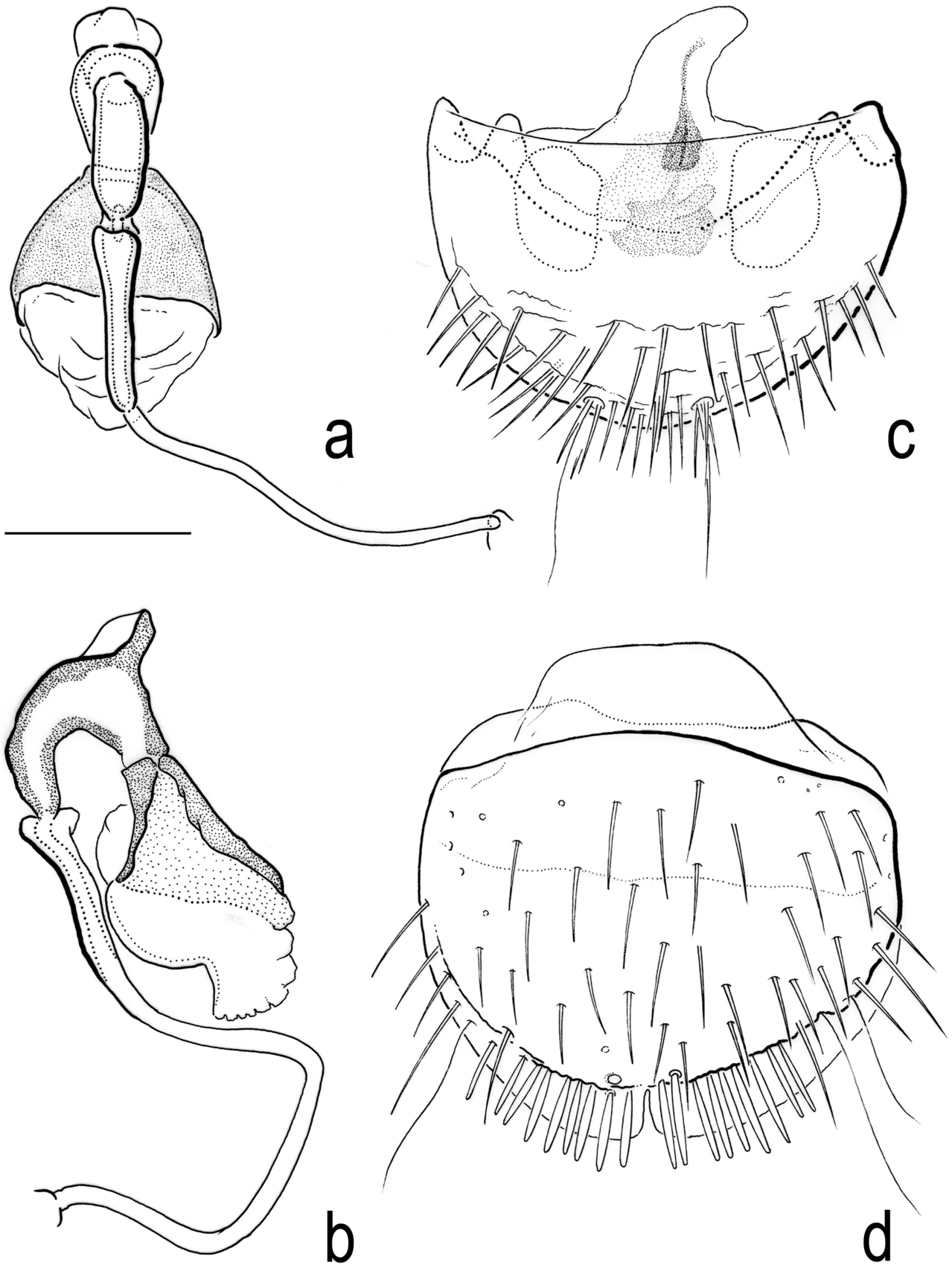


FIGURE 2. *Hydraena bahiana* sp. n., holotype male. Sternite X (c) and Spiculum gastrale (a, b, d). Scale bar = 0.1 mm.



**FIGURE 3.** *Hydraena bahiana* sp. n., holotype male. Aedeagus in lateral (a, b) and ventral (c, d) view. Scale bar = 0.1 mm.



**FIGURE 4.** *Hydraena bahiana* sp. n., paratype female. Last abdominal segments and spermatheca. Spermatheca (a, b), last abdominal ventrite (c) and terminal tergite (d). Scale bar = 0.05 mm.

Terminal abdominal segments and spermatheca: Terminal tergite (Fig. 4d) subelliptical. Disc covered by short setae and with distal margin slightly emarginated. Last abdominal ventrite (Fig. 4c) with two plates. Ventral plate semicircular, with two subapical tufts composed of three setae. Dorsal plate symmetrical, with a proximal central area pointed and bent to the right (Fig. 4c), distinctly surpassing the proximal rim of ventral plate. With two slightly impressed subelliptical depressions.

Spermatheca (Figs 4 a, b) long, curved and bell-shaped distally.



**FIGURE 5.** Habitat of *Hydraena bahiana* sp. n.. Pools at 1,705 m. altitude (a, b). General view of Serra do Barbado, Bahia State (c, d)

**Differential diagnosis.** The new species is a member of the *Hydraena scintillabella* subgroup of the *leechi* group. In this subgroup Perkins (2011) set aside a number of species with uncertain relationships. The new species should be placed in this provisional section. Externally, the *scintillabella* subgroup is quite variable in shape and coloration. Most of these species are medium sized and have a distinct scintilla (Perkins 2011), which is very evident in *H. bahiana* sp. n. The new species resembles a group of three related species from Eastern Brazil (Minas Gerais State): *Hydraena scintillutea* Perkins, 1980, *H. alterra* Perkins, 1980 and *H. terralta* Perkins, 1980, whose members share a similar pronotal and aedeagal morphology. The pronotal fovea pattern is quite similar, with shallow or absent foveae except for the marked PF3 foveae. It differs from these three species by having a larger size, especially from the smaller *H. alterra*, which also lacks scintilla and metasternal plaques. From the other two, the new species also differs in the metasternal plaques, being shallow, wide, and straight in the new species, but narrow and convergent anteriorly in *H. scintillutea* and very small and oval in *H. terralta*. The general structure of the aedeagus in the

*scintillabella* subgroup is rather constant, consisting in a broad main piece with a basal heel and distal lobe with two appendages of different shape: basal one plicate and bearing the gonopore and distal one more elongate. The aedeagus of the new species specially resembles to that of *H. alterra* and *H. terralta* but differs in having a more symmetrical, distinctly capitate distal lobe in ventral view. Externally it also differs from these two related species by having a wider and shiny scintilla.

**Etymology.** This species is named after the State of Bahia in Brazil, where the type locality is located. The name is in apposition in the adjective case.

**Habitat** (Fig. 5). Specimens were collected in pools connected to the headwater stream named Forquilha, at 1,705 m above s.l., this stream belongs to the Rio de Contas drainage basin and is located in Serra do Barbado Environmental Protection Area (EPA), where Pico do Barbado, the highest point in the Northeast of Brazil (2,033m above s.l.) is located (INEMA 2022). This mountain range is part of the Serra do Espinhaço, a wide mountain range running in north-south direction and extended through the east and northeast of Brazil. This EPA represents a transition zone between the Caatinga, Cerrado and the Atlantic Forest biomes, in addition to the presence of “campos rupestres” in the higher portions and has been identified as an important endemism center. “Serra do Barbado” is considered a priority area for biodiversity conservation (Silva *et al.* 2008) and represents a true “cradle of springs” functioning as a watershed for different hydrographic basins, with a great profusion of springs sculpting the relief with waterfalls.

**Distribution.** Currently only known from the type locality in Bahia State, Brazil (Fig. 6).



**FIGURE 6.** Map with type locality of *Hydraena bahiana* sp. n.. (red circle).



## Acknowledgments

This study was supported by US National Science Foundation grant DEB-1453452, a Fulbright/ CAPES (Process 3038.015858/2017-01) Scholar Fellowship to Andrew E. Z. Short. NH was supported by CNPq/ PROTAX (process 440616/2015-8); CNPq research fellowship (process 308970/ 2019-5); MCTI/ INPA, and FAPEAM (PROTAX and POSGRAD program). CJB thanks CNPq and FAPEAM for a post-doctoral fellowship (processes 302031/2015-4, 104231/2018-1, and 160666/2019-8) and CEI-Triangular-E3, Universidad de León (Spain) for an Invited Researcher fellowship in 2017. Fieldwork in Brazil was conducted under SISBIO license 59961-1. We wish to thank Jeferson Oliveira da Silva for assistance with fieldwork.

## References

- Benetti, C.J. (2022) Hydraenidae. *In*: Catálogo Taxonômico da Fauna do Brasil. PNUD. Available from: <http://fauna.jbrj.gov.br/fauna/faunadobrasil/123671> (accessed 8 February 2022)
- Benetti, C.J., Valladares, L.F., Delgado, J.A. & Hamada, N. (2020) Two new species of *Hydraena* Kugelann, 1794 from Brazil (Coleoptera: Hydraenidae). *Zootaxa* 4750 (3): 391–402. <https://doi.org/10.11646/zootaxa.4750.3.5>
- Benetti, C.J., Valladares, L.F., Delgado, J.A. & Hamada, N. (2021) Morphological remarks on *Adelphydraena amazonica* Perkins & Ribera, 2020 and new records of two other Hydraenidae from Brazil (Coleoptera). *Zootaxa*, 4966 (1), 61–68. <https://doi.org/10.11646/zootaxa.4966.1.6>
- INEMA [Instituto do Meio Ambiente e Recursos Hídricos] (2022) APA da Serra do Barbado. Available from: <http://www.inema.ba.gov.br/gestao-2/unidades-de-conservacao/apa/serra-do-barbado/> (accessed 1 February 2022)
- Janssens, E. (1972) Essai sur la systematique des *Hydraena* des regions intertropicales. *Bulletin et Annales de la Société royale belge d'Entomologie*, 108, 253–261.
- d'Orchymont, A. (1923) Les *Hydraena* Americaines. *Annales de la Société Entomologique de Belgique*, 63, 33–44.
- d'Orchymont, A. (1937) Contribution a l'étude des Palpicornia X. *Bulletin et Annales de la Société Entomologique de Belgique*, 77, 458–475.
- Perkins, P.D. (1980) Aquatic beetles of the family Hydraenidae in the Western Hemisphere: classification, biogeography and inferred phylogeny (Insecta: Coleoptera). *Quaestiones Entomologicae*, 16, 3–554.
- Perkins, P.D. (2011) New records and description of fifty-four new species of aquatic beetles in the genus *Hydraena* Kugelann from South America (Coleoptera: Hydraenidae). *Zootaxa*, 3074 (1), 1–198. <https://doi.org/10.11646/zootaxa.3074.1.1>
- Shorthouse, D.P. (2010) SimpleMappr, an online tool to produce publication-quality point maps. Available from: <http://www.simplemappr.net> (accessed 12 November 2021)
- Silva, J.A., Machado, R.B., Azevedo, A.A., Drumond, G.M., Fonseca, R.L., Goulart, M.F., Moraes Jr., E.A., Martins, C.S. & Ramos Neto, M.B. (2008) Identificação de áreas insubstituíveis para conservação da Cadeia do Espinhaço, estados de Minas Gerais e Bahia, Brasil. *Megadiversidade*, 4, 248–270.
- Trizzino, M., Jäch, M.A., Audisio, P.A., Alonso, R. & Ribera, I. (2013) A molecular phylogeny of the cosmopolitan hyperdiverse genus *Hydraena* Kugelann (Coleoptera, Hydraenidae). *Systematic Entomology*, 38, 192–208. <https://doi.org/10.1111/j.1365-3113.2012.00654.x>