



Hamadiana chapadensis, a new genus and species of diving beetle from Brazil (Coleoptera, Dytiscidae, Laccophilinae, Laccophilini)

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Abstract

Hamadiana chapadensis **gen. n.** and **sp. n.** is described based on a single male specimen collected in Central Brazil. The new species belongs to the diving beetle tribe Laccophilini but could not be assigned to any existing genera, therefore a new genus is described to accommodate it. *Hamadiana* **gen. n.** is unique among Laccophilini in having the hind margin of the metacoxal process deeply incised and medially slightly protruded backwards. In addition, it differs from other genera of the tribe by having the antennomeres simple, not expanded, the metacoxal lines not straight, and the metatibiae with two simple apical spurs. The habitus, male genitalia, and diagnostic features are illustrated, and a distribution map is provided. A recently published key to Laccophilini is modified to include the new genus.

Key words: Dytiscidae, Laccophilini, new genus, new species, taxonomy, Neotropics, Brazil

Introduction

The diving beetle subfamily Laccophilinae is currently divided into two tribes: Agabetini with a single genus, *Agabetes* Crotch, 1873, distributed in North America and southwest Asia, and Laccophilini (Miller & Bergsten 2016). The Laccophilini is an extremely diverse and widely distributed group with 13 currently recognized genera and about 440 species (Nilsson & Hájek 2019). The megadiverse genus *Laccophilus* Leach, 1815 accounts for more than half of the tribe's diversity with more than 280 species. The remaining genera are more regional in distribution, some of which are rarely collected, and four are monotypic.

Four genera of Laccophilini are known from the New World (Benetti *et al.* 2018): the cosmopolitan genus *Laccophilus* with more than 90 species in the Neotropics (Nilsson & Hájek 2019), the Neotropical endemic genera *Laccodytes* Régimbart, 1895 with 11 species (Toledo *et al.* 2010; Toledo *et al.* 2011), *Napodytes* Steiner, 1981 with a single species from Ecuador (Steiner 1981), and the recently described genus *Lacomimus* Toledo & Michat, 2015 with 13 species mainly distributed in the Neotropics, with one species reaching the southern Nearctic region (Toledo & Michat 2015; Braga & Ferreira (Jr.) 2016).

Recent fieldwork in the state of Goiás in Central Brazil yielded a strange laccophiline specimen that could not be assigned to any existing genus. Here, we describe this taxon as a new genus and new species, illustrate its diagnostic features, and accommodate it in a previously existing key to the genera of Laccophilini.

Material and methods

The single studied specimen was collected in 2017 in the state of Goiás, Central Brazil, in the tropical savanna biome “cerrado”, in a medium size stream. It was captured with a water beetle net and afterwards stored in 99%

alcohol. The description is based on external morphology and male genitalia studied with a Leica M165C stereomicroscope and an Olympus BX51 optical microscope. Body microsculpture was observed with a magnification of 100×. The following measurements were taken: TL (total body length), TL-H (total length without head), MW (maximum body width), EL (elytra length), PW (maximum pronotum width), HW (maximum head width), EW (distance between eyes). The ratios TL/MW and HW/EW were also calculated.

Multi-layer photographs were obtained using a Leica DFC 420 camera attached to the Leica M165C stereomicroscope with a Planapo 1.0x objective and LED dome lighting for uniform reflection of light on specimens (Kawada & Buffington 2016). The final images were generated using Digital Leica Application Suite v.3.7 and Helicon Focus (6.7.1 Pro) software. Male genitalia were photographed using a DFC295 camera attached to a Leica DM5500B optical microscope. Drawings were made from photographs and edited using Adobe Illustrator CS5 software. The terminology to denote the orientation of the genitalia follows Miller & Nilsson (2003). The distribution map was generated using SimpleMappr (Shorthouse 2010).

The studied specimen is deposited in the Invertebrate Collection of the National Institute of Amazonian Research (INPA), Manaus, Amazonas, Brazil.

Taxonomy

Hamadiana gen. n.

(Figs 1–15)

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Type species. *Hamadiana chapadensis* sp. n. by present designation.

Description. The new genus is unique among Laccophilini in having the hind margin of metacoxal process deeply incised and medially slightly protruded backwards (Fig. 9). Other diagnostic characters are: antennomeres simple, not expanded; metacoxal lines not straight, converging anteriorly in posterior 3/4 of their length, slightly diverging anteriorly in anterior 1/4 (Fig. 9); metatibia with two simple apical spurs (Fig. 6). Moreover, the last metatarsomere is bilobed, with inner lobe long and acute and outer lobe about half shorter; the single metatarsal claw is curved, apically rounded and short, about as long as the outer lobe of last metatarsomere (Fig. 11).

Etymology. This genus is named after Neusa Hamada, INPA, in recognition of her significant contribution to the knowledge of aquatic insects in Amazonia. The gender of the name is feminine.

Discussion. Among the Neotropical genera of Laccophilini, the new genus is easily differentiated from *Laccophilus* and *Napodytes* in having two simple apical spurs on metatibiae (single apical spur in *Napodytes* and two apically bifid spurs in *Laccophilus*). This character is shared with *Laccodytes* and *Lacomimus*, but *Hamadiana* gen. n. can be differentiated from these two genera by the shape of metacoxal processes, which are unique in having the hind margin strongly incised and medially protruded backwards (Fig. 9). From *Laccodytes*, the new genus can be distinguished by the metacoxal lines converging anteriorly in posterior 3/4 of their length, slightly diverging anteriorly in anterior 1/4 (straight in *Laccodytes*) and by the larger body (more than 3 mm in length in *Hamadiana* gen. n. and less than 2.4 mm in *Laccodytes*). From *Lacomimus*, *Hamadiana* gen. n. differs also in having the prosternal process elongate and apically acute (relatively short and apically rounded in *Lacomimus*), in the mesotibial spurs not longer than mesotarsomeres 1–2 (longer than mesotarsomeres 1–4 in *Lacomimus*) and in the larger body (more than 3 mm in length in *Hamadiana* gen. n. and less than 2.5 mm in *Lacomimus*).

Hamadiana chapadensis sp. n.

(Figs 1–15)

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Type locality. Brazil: Goiás State, Alto Paraíso de Goiás County, “Rio dos Couros, Cachoeira” (ca. 14°17'S 047°45'W).

Holotype. m*, “Brasil, Goiás, Alto Paraíso de Goiás, Rio dos Couros, cachoeira, 21.vi.2017, leg. N. Hamada *et al.*”, “Holotype, Hamadiana **gen. n.**, chapadensis **sp. n.** Benetti, Short & Michat det. 2019” [red, printed] (INPA).

Description. *Habitus* (Figs 1–2). Body shape oval, short and broad, gradually narrowed posteriorly, with apex slightly acuminate; lateral outline continuously curved from head to elytra; dorsally strongly convex, ventrally slightly convex. Maximum width at about mid length.

Measurements (n = 1). TL: 3.1 mm; TL-H: 2.85 mm; MW: 1.9 mm; EL: 2.35 mm; HW: 1.2 mm; PW: 1.7 mm; EW: 0.75 mm; TL/MW: 1.63; HW/EW: 1.61.

Color (Figs 1, 2). Head orangish; pronotum brown with two broad dark yellow to orangish spots on lateral margins and one vague light spot on middle region; elytra brown, each with four well marked yellow spots (one basal, one submedian reaching lateral margin, one submedian near suture and one subapical) and two vague light spots on apical third (one elongate near suture and one on apex); prosternum, procoxae and basal 1/3 of epipleura dark yellow; metaventricle, metacoxae, abdominal ventrites and apical 3/4 of epipleura brown to reddish-brown (ventrite 1 and posterior margins of ventrites 3–5 somewhat lighter); legs reddish-brown.

Head. Surface smooth, shiny, without microreticulation, with fine impressed shallow punctures near anterior and inner margin of eyes.

Pronotum. Surface smooth, shiny, with fine microreticulation composed of polygonal cells; with fine regular micropunctation and well impressed wide punctures mostly along lateral sides and fore margin, arranged in more or less regular series. Basal margin nearly straight, lateral margins bordered, posterior angles rounded (Fig. 3).

Elytra. Surface smooth, shiny, with fine microreticulation composed of polygonal cells; with fine, regular, shallow micropunctation and faintly impressed, hardly visible wide punctures, sparse and arranged in irregular, longitudinal series, mainly on apical third. Epipleuron without microreticulation, with some sparse punctures at middle. Scutellum not visible when elytra closed (Fig. 1). Elytra elongate, apically slightly acuminate, attenuate and narrowly bordered laterally; suture between elytron and epipleuron faintly visible dorsally on apical third; epipleuron broad up to level of hind margin of metacoxal plates, then strongly narrowed, distinctly attenuate just before elytral tip (Fig. 2).

Underside. Surface smooth, shiny; microreticulation present on metacoxal processes and abdominal ventrites, composed of elongate cells; metaventricle with several punctures in middle region; metacoxa with stridulatory file in form of a series of parallel, closely spaced ridges (Fig. 5); last abdominal ventrite with shallow scratchlike microsculpture on posterior half (Fig. 10). Prosternum and head separated by a shallow step; prosternum with small median ridge. Prosternal process elongate, lanceolate and bordered, clearly carinate, reaching mesocoxae but not extending beyond their hind margins; laterally compressed at level of procoxae, apically simple, with apex elongate, thorn-like, very acute (Figs 4, 8). Metasternal wings thin and arched; metacoxal lines converging anteriorly in posterior 3/4 of their length, slightly diverging anteriorly in anterior 1/4 (Figs 5, 9). Metacoxal process distally bilobed, with hind margin deeply incised and medially slightly protruded backwards (Figs 5, 9). Ventrite 3 with a medial protrusion on posterior margin (= median process raised apically) (Fig. 6) being probably a male sexual character; last abdominal ventrite as long as previous two ventrites combined, almost straight at sides, with anterolateral angles rounded and hind margin indented (Fig. 10).

Legs. Fore and middle legs long and slender; tarsomeres longer than wide, tarsomere 5 almost as long as tarsomeres 3 and 4 combined; pro- and mesotarsal claws slightly shorter than tarsomere 5; protarsal claws subequal in length and shape, unmodified; mesotibial spurs short, larger one not longer than first two tarsomeres together; posterior surface of mesofemora with a series of 3–4 long, stiff setae; swimming setae on mesotibiae present only apically. Metatibiae short, broad, about 2/3 as long as metafemur, with two simple apical spurs being acuminate at tip (Fig. 6); metatarsomeres 1–4 with well developed, elongate lobes on posterolateral angles, each lobe bearing small set of flat spines and a strong spine on inner margin (Fig. 7); metatarsomere 5 bilobed, inner lobe long and acute, outer lobe about half shorter, bearing single, short, curved, apically rounded claw; claw about as long as outer lobe of metatarsomere (Fig. 11).

Male. Pro- and mesotarsomeres 1–3 not dilated, each one bearing ventrally a pair of stalked suction palettes (Fig. 2). Aedeagus asymmetrical as in other genera of Laccophilini. Median lobe in dorsal view (Fig. 12) with lateral margins slightly curved, basal 1/2 broader, distal 1/2 narrower, tip slightly curved; in lateral view (Fig. 13) elongate, with curved thicker base, distal portion subparallel at basal 2/3, narrowed towards apex at distal 1/3, ending in curved rounded apex; ventral margin sinuous, dorsal margin straight in middle region, with small protrusion at distal 1/4 near apex. Parameres short, right one larger, both reaching less than half of length of median lobe. Left paramere (Fig. 14) in lateral view with ventral margin almost straight and dorsal margin convex; with small pointed

apex and two long setae at tip. Right paramere (Fig. 15) in lateral view subtriangular, wider at base, ventral margin almost straight, dorsal margin slightly sinuous; lacking setae at tip.

Female. Unknown.

Etymology. This species is named after the “Chapada dos Veadeiros”, a plateau in northeast of the Goiás state, Central Brazil, where the type locality is located. The name is an adjective in the nominative singular.

Distribution and ecology. Central Brazil, currently only known from the state of Goiás (Fig. 16). The specimen was collected in a river, in rapids (Fig. 17) at 950 m a.s.l., in the tropical savanna biome “cerrado”.

Modified key to Laccophilini genera from Balke & Hendrich (2019)

- 4(3) Base of pronotum projecting hindwards in a distinct angle at middle; pro and mesotibia and femur at most with fine punctation. Neotropical *Laccodytes phalacroides*-group
- Base of pronotum straight or almost so; pro and mesotibia and femur with fine or coarse punctation. 4a
- 4a(4) Metacoxal lines converging anteriorly in posterior 3/4 of their length, slightly diverging anteriorly in anterior 1/4; hind margin of metacoxal processes deeply incised and medially slightly protruded backwards; pro and mesotibiae and femur with sparse, fine punctation. Neotropical *Hamadiana* **gen. n.**
- Metacoxal lines almost straight; hind margin of metacoxal processes slightly incised and medially not protruded backwards; pro and mesotibiae and femur with dense, coarse punctation. Palearctic *Japanolaccophilus*

Acknowledgments

The senior author thanks CNPq and FAPEAM for a post-doctoral fellowship (processes 151461/2014-7 and 302031/2015-4). INPA/MCTIC and CNPq provided financial support for field activities and laboratory infrastructure (PROTAX/ CNPq—440616/2015-8; Insetos aquáticos na América do Sul/CNPq—307849/2014-7). AEZS was supported by a Fulbright Scholar fellowship to Brazil. Collections were done under SISBIO license number 10873-1. We are very grateful to Neusa Hamada for the material of the new genus.

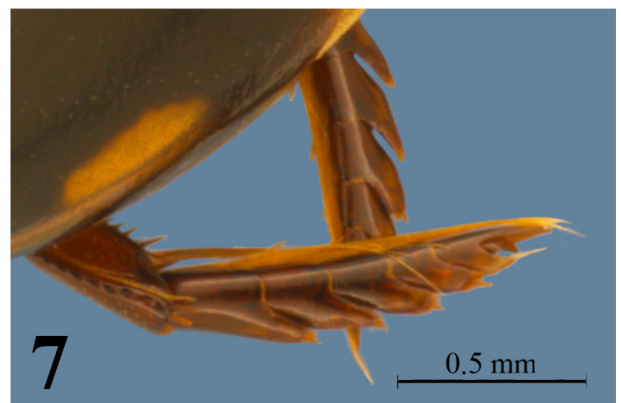
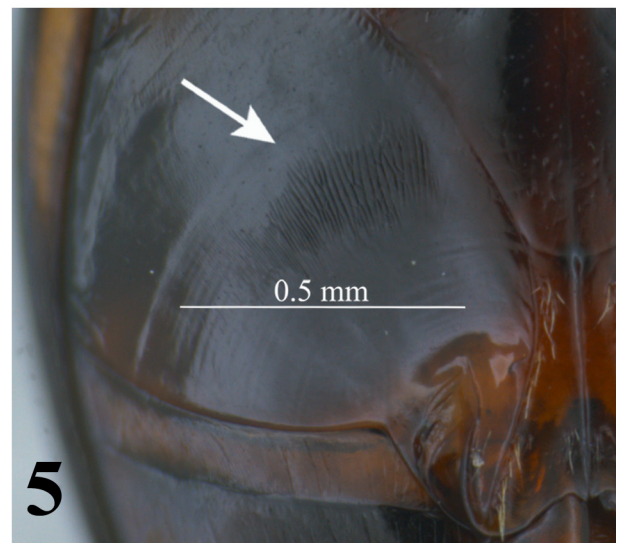
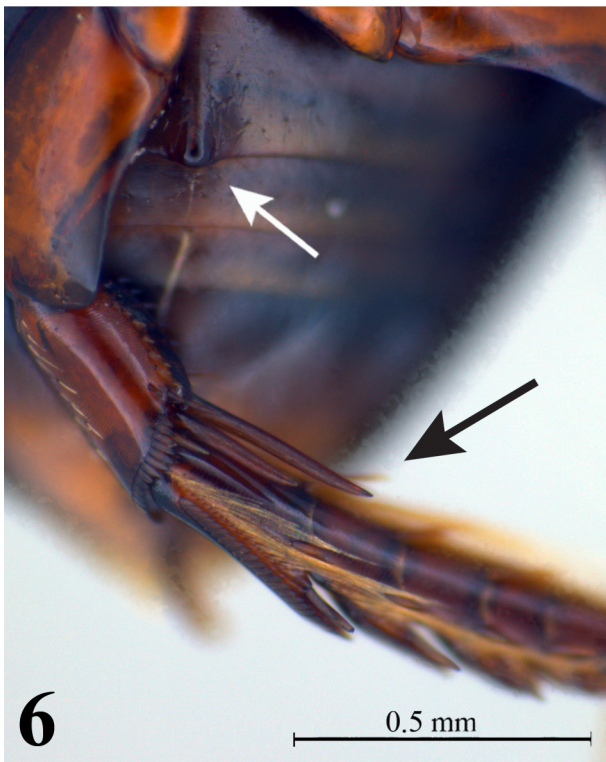
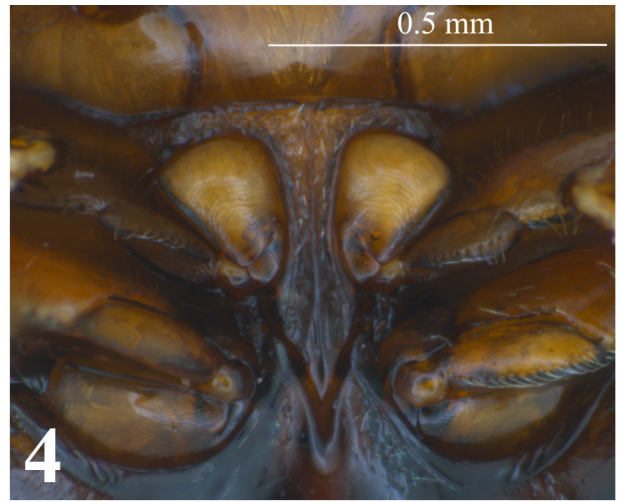
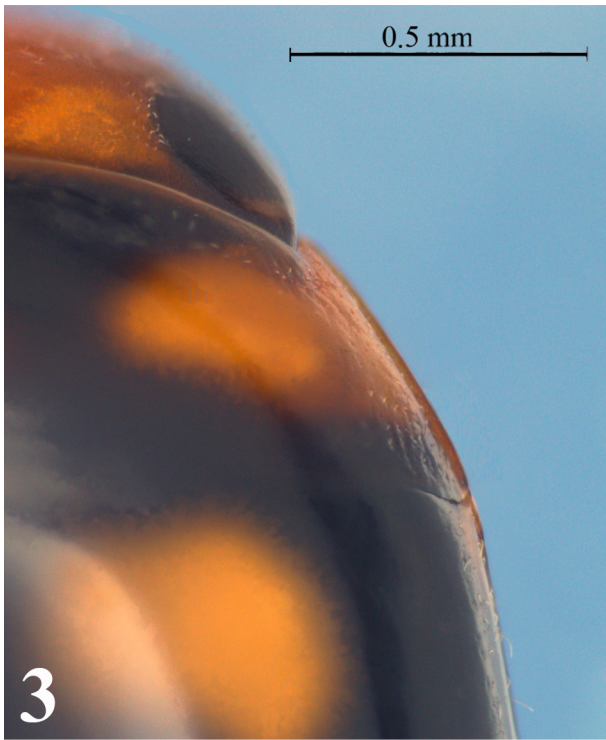
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FIGURES 1–2. *Hamadiana chapadensis* sp. n.: 1) habitus, dorsal view; 2) habitus, ventral view.



FIGURES 3–7. *Hamadiana chapadensis* sp. n.: 3) posterior pronotal angle; 4) prosternal process; 5) metacoxa, arrow indicating stridulatory file; 6) abdomen and right hind-leg, arrows indicating simple apical tibial spurs and medial marginal protrusion on abdominal ventrite 3; 7) left metatarsus.

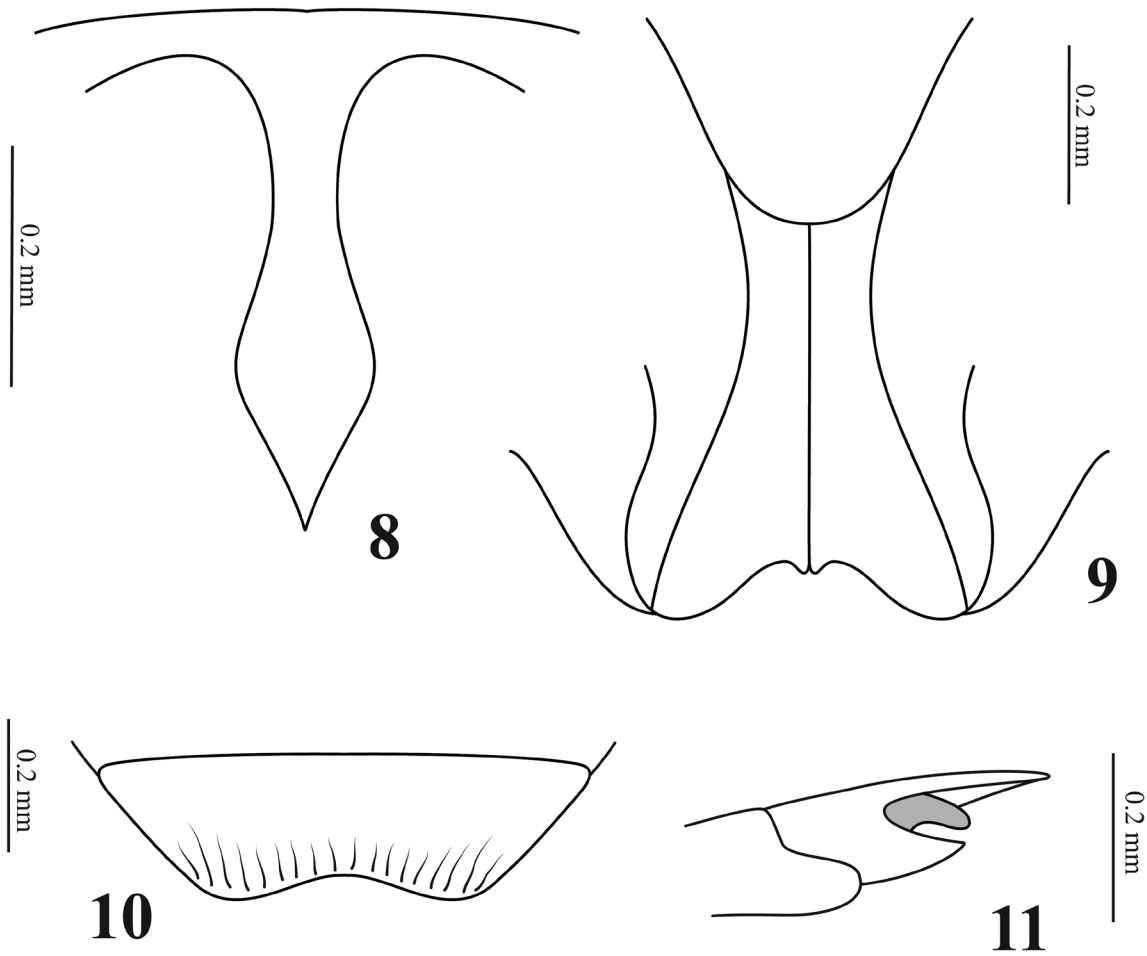
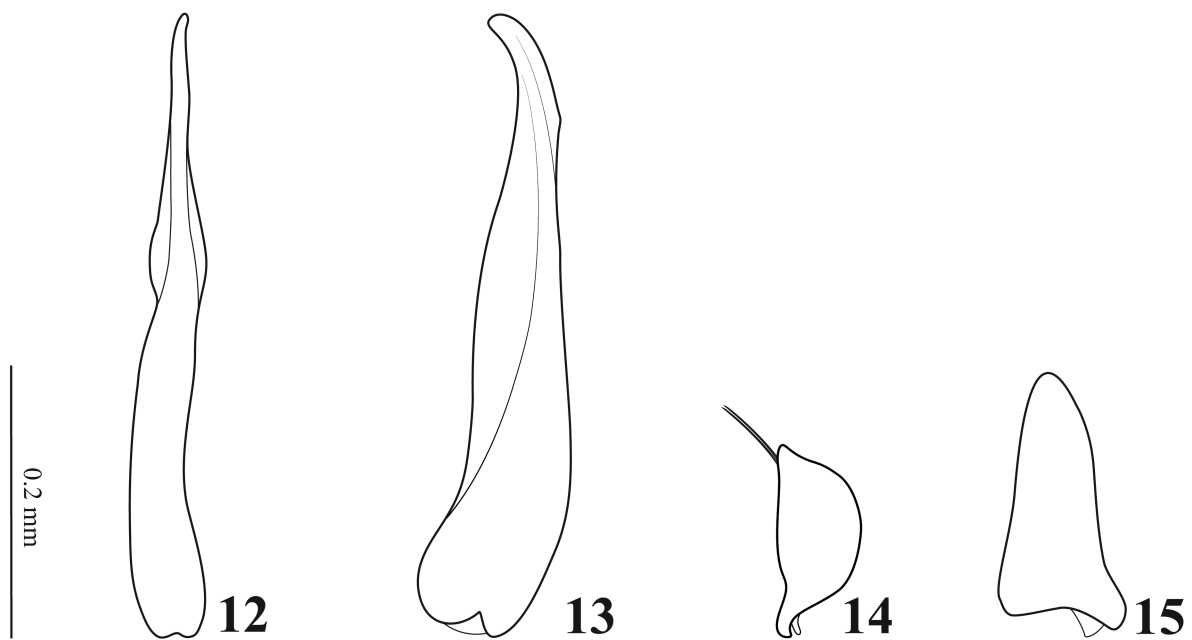


FIGURE 8–11. *Hamadiana chapadensis* **sp. n.**, ventral view: 8) prosternal process; 9) metacoxal processes; 10) last abdominal ventrite; 11) left metatarsus.



FIGURES 12–15. *Hamadiana chapadensis* **sp. n.**: 12) median lobe, dorsal view; 13) median lobe, left lateral view; 14) left paramere, left lateral view; 15) right paramere, left lateral view.



FIGURE 16. Type locality of *Hamadiana chapadensis* **sp. n.**



FIGURE 17. Habitat of *Hamadiana chapadensis* **sp. n.** Brazil: Goiás State, Alto Paraíso de Goiás County, “Rio dos Couros”.