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Pupating in bubbles: *Spumacinctus* gen. nov. (Coleoptera: Scirtidae) from the Neotropical region, with a key to saltatorial genera

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Abstract. *Spumacinctus* gen. nov. is described as a new saltatorial genus of Scirtidae, comprising three species: *Spumacinctus mindu* gen. et sp. nov., and *Spumacinctus porcicaudalis* gen. et sp. nov. from the Brazilian Amazon, and *Spumacinctus championi* (Picado, 1912) comb. nov., a species previously placed in *Scirtes* Illiger, 1807 from Costa Rica. We also describe the last instar larvae of the two new species, obtained by rearing larvae in laboratory conditions to produce both male and female adults. Bionomic observations are also provided, including a peculiar mode of pupation in which the pupa is surrounded by foam. An identification key (adults and larvae) to the saltatorial genera of Scirtidae from the Neotropical region is also presented.

Keywords. Aquatic insects, marsh beetles, immature, bromeliad, wild banana tree.

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Introduction

The Scirtidae Fleming, 1821 is a family of coleopterans with a worldwide distribution, commonly known as marsh beetles. Many members of the family are saltatorial, with most of these jumping species currently placed in five genera: *Curtoscirtes* Pic, 1924, *Exochomoscirtes* Pic, 1916, *Ora* Clark, 1865, *Scirtes* Illiger, 1807, and *Sulcatoscirtes* Pic, 1952. Species in these genera can jump due to their enlarged metafemora and associated hind-leg musculature, enabling a rapid, muscle-driven jumping mechanism in the adult stage (Ruta & Yoshitomi 2010; Libonatti 2017; Nadein *et al.* 2022). In addition to these, two other closely related genera—*Mescirtes* Motschulsky, 1863 and *Prionoscirtes* Champion, 1897—include some saltatorial species, although they are usually grouped with scirtids bearing modified antennae (Ruta 2010). Only *Scirtes* and *Ora* have been recorded from the Neotropical region, nevertheless these well-known but likely non-monophyletic genera have not yet been comprehensively revised. In particular, the genera *Scirtes* (with approximately 460 valid species) and *Ora* (with over 90 species) require extensive taxonomic revision (Yoshitomi 2005; Ruta & Yoshitomi 2010; Libonatti 2014, 2015, 2017; Bradford *et al.* 2022; Benetti & Jorge 2025).

Larvae of five Scirtidae genera—*Contacyphon* Gozis, 1886, *Prionocyphon* Redtenbacher, 1858, *Sacodes* LeConte, 1853, *Scirtes*, and *Ora*—have long been reported from phytotelmata (such as bromeliads, tree holes, leaf bases, and bamboo internodes), in multiple countries including USA, Mexico, Dominica, Trinidad and Tobago, Costa Rica, Panama, Venezuela, Colombia, Ecuador, Brazil, Peru, and Argentina (Friedenreich 1883; Scott 1912; Knab 1913; Picado 1913; Klausnitzer 1980, 2012; Stribling & Young 1990; Louton *et al.* 1996; Yanoviak 1999; Greeney 2001; Mestre *et al.* 2001; Ospina-Bautista *et al.* 2004; Liria 2007; Muller *et al.* 2010; Montero *et al.* 2010; Campos & Fernández 2011; Lawrence 2016; Libonatti 2017). Despite being the most abundant family of coleopterans in these microhabitats (Campos & Fernández 2011), the taxonomy and biology of phytotelm-dwelling Scirtidae remain poorly understood.

Considering this gap, recent fieldwork in the Brazilian Amazon yielded Scirtidae larvae associated with phytotelmata, that, upon rearing under laboratory conditions, produced saltatorial adult males and females that could not be assigned to any known Scirtidae genus. Although the adults possess metacoxae with semi-square plates meeting along the entire median line—a trait characteristic of the genus *Scirtes*—the larvae exhibit distinct features such as three-segmented maxillary palpi, mandibles with a rounded apex, and peculiarly-shaped tergite IX, which clearly differentiate them from known *Scirtes* larvae.

Consequently, we describe this taxon as a new genus comprising three species, including two newly described and a new combination for *Scirtes championi* Picado, 1912, originally from Costa Rica. This work also includes descriptions of the last instar larvae of the new species, a redescription of *S. championi* with the first genitalia description, and the designation of the lectotype specimen housed at the Natural History Museum in London. Additionally, bionomic data for the newly described taxa are provided.

Material and methods

All specimens used for the description of the new species were collected by the team of the Laboratory of Cytotaxonomy and Aquatic Insects (LACIA; Manaus, Brazil). The specimens were collected in three municipalities of the Amazonas state: Manaus, Presidente Figueiredo, and Rio Preto da Eva (Fig. 1A). Larvae were collected in two types of phytotelmata: bromeliads (*Aechmea* sp.) (Fig. 1B) and wild banana trees (*Phenakospermum guyannense* (L. C. Rich) Endl., Strelitziaceae) (Fig. 1C–D), then they were transported alive to the laboratory for rearing until adult emergence. A specimen of *Scirtes championi* Picado, 1912, deposited in the Natural History Museum, London, United Kingdom, was dissected and studied in the facilities of this institution.

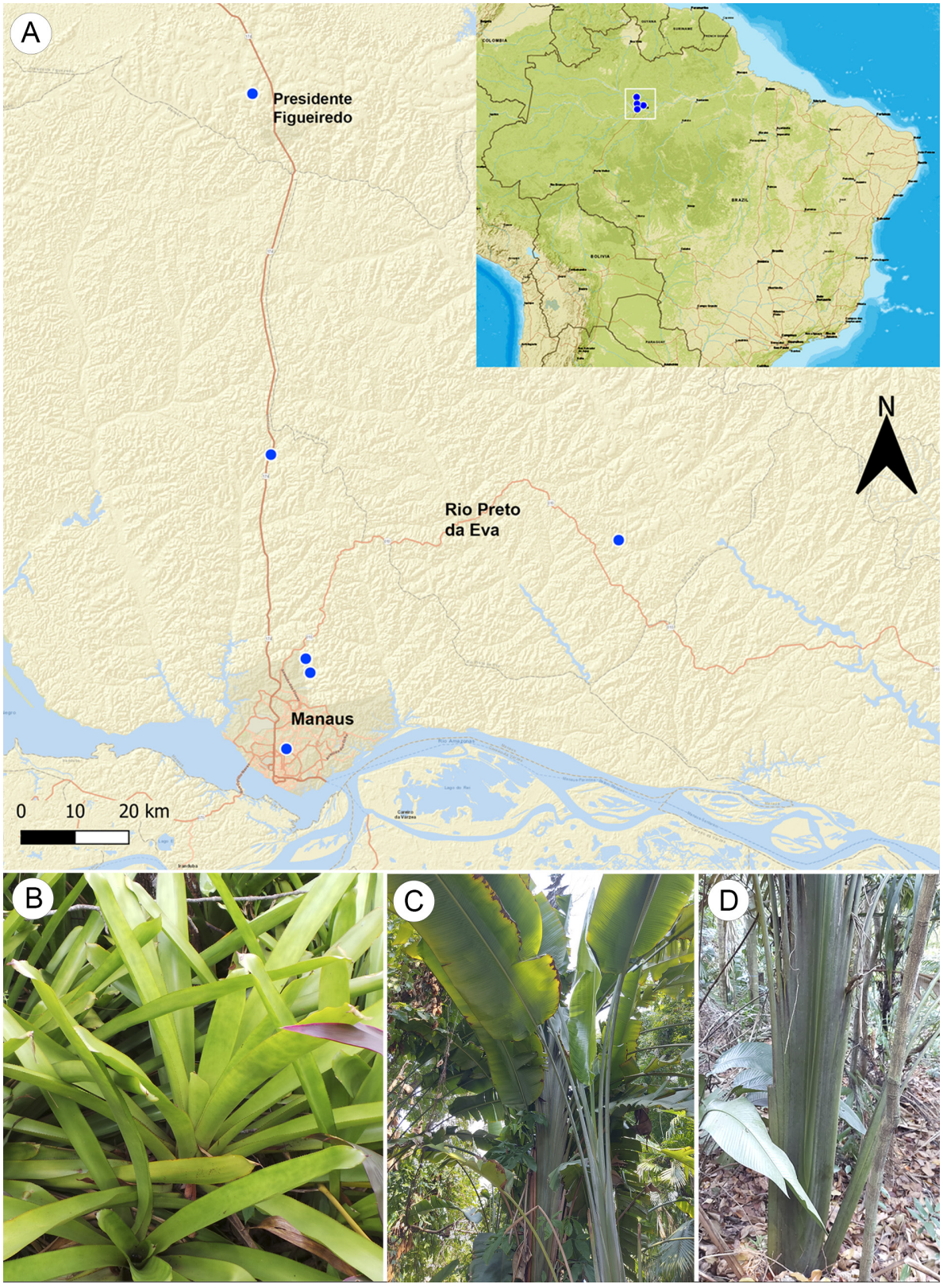

Fig. 1. Distribution and habitat of *Spumacinctus* gen. nov. **A**. Map representing the distribution of the species *Spumacinctus mindu* gen. et sp. nov. and *S. porcicaudalis* gen. et sp. nov., with location of the six sampling sites in the Brazilian Amazon. **B**. Bromeliad. **C–D**. Wild banana tree.

Collection in the bromeliads was carried out using a modified pipette, like a turkey baster (300 ml in capacity, 55 cm long, and 15 mm in diameter), which was employed to suck up water. The collected material was deposited into a white plastic tray, and the larvae were extracted using a brush with soft bristles. Collection from wild banana trees was done after cutting the pseudostem of the plant using a machete. The pseudostem leaves were separated from each other and the viscous liquid produced by the plant was deposited in a white plastic tray. Larvae were extracted using a brush with soft bristles (Jorge *et al.* 2025).

The rearing method recently described by Jorge *et al.* (2025) was used. In brief, each larva was placed in an 80 ml plastic container, with 20 ml of water and partially decomposed deciduous leaves, collected in a stream, to provide food and substrate. After emergence, the adult, last instar larval exuviae, and pupal exuviae were stored together. An adult specimen was collected using a lamp over a bucket (Jorge *et al.* 2025).

The pinned specimen of *Scirtes championi* was relaxed in boiling water before dissection. Specimens collected by LACIA and preserved in 80% alcohol did not require immersion in hot water. For terminalia and genitalia dissection, the abdomen was removed and submerged in 10% hot KOH for about 10 minutes in glass tubes on a 25-watt YSHI electric hot plate. It was subsequently rinsed with distilled water and 50% acetic acid and then dissected in glycerine. Detached structures were temporarily mounted in glycerine on a microscope slide. The description of the larva was based on the exuviae of the last larval instar, which was dissected in glycerine.

Specimens were photographed using a DFC420 camera coupled to a Leica M165C stereo microscope (with a Plan APO 1.0 × objective), LED illumination dome (Kawada & Buffington 2016) and a DFC295 camera coupled to a Leica DM5500B optical microscope. Final images were generated using photo stacking with Helicon Focus® software (6.7.1 Pro). Illustrations and plates were prepared using ®Adobe Illustrator CS6 and ®Adobe Photoshop CS6. The map was generated using QGIS (ver.3.16).

Measurements taken and their corresponding abbreviations used in the descriptions were: elytra length (EL), elytra width (EW), head width (HW), interocular space (IS), pronotum width (PW) and total length (TL). The proportion of the length of each antennomere was calculated by dividing each antennomere by the shortest antennomere, typically the third. The distance between the punctures was measured based on the diameter of the punctures. Nyholm (1972) and Yoshitomi (2005) were followed for male genitalia, Nyholm (2002) for female genitalia, Lawrence *et al.* (2021) for wing venation, and Hannappel & Paulus (1991), Zwick (2008) and Watts (2014), for larval morphology. Exact label data for the type specimen of *Scirtes championi* are cited in double quotation marks. Separate label lines are indicated by a simple slash (/), separate labels by a double slash (//).

Comparative analyses were conducted using published adult descriptions or keys of saltatorial genera—including *Curtoscirtes*, *Exochomoscirtes*, *Ora*, *Scirtes*, and *Sulcatoscirtes*—and published larval descriptions or keys where available (e.g., *Exochomoscirtes*, *Ora*, and *Scirtes*, including the type species *Scirtes hemisphaericus* (Linnaeus, 1767)) (Yoshitomi 2005; Klausnitzer 2009; Ruta & Yoshitomi 2010; Zwick 2011; Watts 2014; Libonatti *et al.* 2018; Jorge *et al.* 2019), as well as direct examination of available Brazilian and Argentine material currently under study. Larvae of *Curtoscirtes* and *Sulcatoscirtes* remain unknown. Particular attention was given to the type species of *Scirtes* (*S. hemisphaericus*) to ensure consistency with the current concept of the genus.

The identification key was constructed following the generic concept of Ruta & Yoshitomi (2010), and includes the Neotropical saltatorial genera treated therein. Genera not considered part of the *Scirtes*-like lineage in that framework, such as *Prionoscirtes*, were not included.

Institutional abbreviations

INPA = Instituto Nacional de Pesquisas da Amazônia, Manaus, AM, Brazil
MZUSP = Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil
NHMUK = Natural History Museum, London, United Kingdom

Results

Taxonomy

Class Insecta Linnaeus, 1758
Order Coleoptera Linnaeus, 1758
Suborder Polyphaga Emery, 1886
Superfamily Scirtoidea Fleming, 1821
Family Scirtidae Fleming, 1821
Subfamily Scirtinae Fleming, 1821

Genus ***Spumacinctus*** gen. nov.
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Type species

Spumacinctus mindu gen. et sp. nov. by present designation.

Diagnosis

Spumacinctus gen. nov. comprises small marsh beetles with an adult body length of TL 2.9–3.2 mm and completely yellow body colour. The metafemora are enlarged, like other saltatorial genera. *Spumacinctus* shares with *Scirtes*, *Sulcatoscirtes* and *Exochomoscirtes* the condition of the hind coxae being in contact along the entire length of the median line. In contrast, it differs from *Ora* and *Curtoscirtes* in which the hind coxae are either separated or only touching at the base, diverging posteriorly. While the prosternal process is entirely laminar and narrow in other saltatorial genera, in *Spumacinctus* it is distinguished by its ventral portion, which is dorsoventrally flattened, rhombus-shaped. The frontoclypeus is extended forward and laterally, with the lateral margins diverging forward, the anterior angles slightly rounded and the anterior margin very slightly notched medially, as in some *Scirtes* species. In the male genitalia, the tegmen is well sclerotized and bears a pair of parameres; the penis is well sclerotized, asymmetrical, elongate, and has at least one apical acute appendage.

Last instar larva. The body is 7.4–12.0 mm long and yellow in colour. The shape of tergite IX is unique in having two distinct lateral emarginations, each forming a lateral lobe (Fig. 6J). The hypopharynx bears a median sclerite with a pair of flattened lobes between the two rows of comb teeth (Fig. 6E), as in *Exochomoscirtes*, *Scirtes*, and *Ora*. Each of these lobes bears a single appendage, a condition also reported for *Exochomoscirtes*. In contrast, larvae of *Scirtes* (including the type species, *S. hemisphaericus*) and *Ora* possess multiple appendages on each lobe, forming hand-like structures. The mandibles have a very broadly rounded apex (Fig. 6D), even wider than in *Ora* (in contrast to pointed, bifid or multipointed in the other saltatorial genera). The maxillary palpi are three-segmented (Fig. 6C), unlike *Exochomoscirtes*, most *Scirtes* and *Ora*, in which they are four-segmented.

Etymology

The name of the new genus refers to the peculiar mode of pupation, in an air chamber surrounded by foam. From Latin '*spuma*' = 'foam', and '*cinctus*' = 'surrounded by'. Gender masculine.

Description

Adult

Body. Length 2.9–3.5 mm (n = 13), body oval, completely yellow, with many setae relatively short. Punctation on head, pronotum and elytra sparse, separated by 1.5–2.0 × diameter of a puncture.

Head. Wider than long (Fig. 2A); eyes relatively large, prominent; subgenal ridges arched, extending far beyond the point where buttonhole should be; subgenal ridges without buttonhole configuration. Frontoclypeus rectangular, extended forward and laterally, with lateral margins diverging forward,

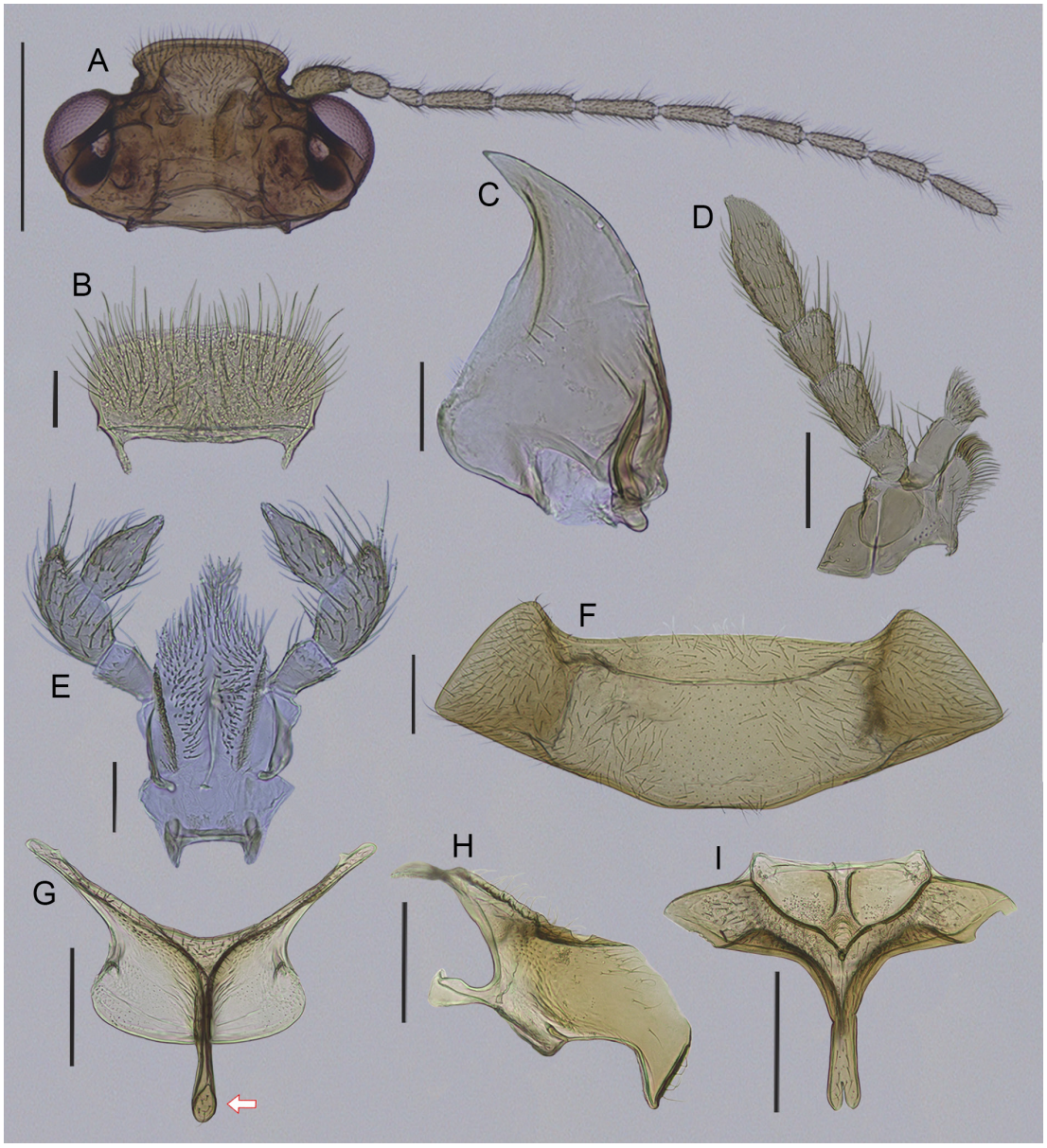

Fig. 2. General characteristics of *Spumacinctus* gen. nov., based on *Spumacinctus mindu* gen. et sp. nov., paratype, ♀ (INPA). **A**. Head and antenna, dorsal view. **B**. Labrum, dorsal view. **C**. Right mandible, ventral view. **D**. Left maxilla, dorsal view. **E**. Labium, ventral view. **F**. Pronotum, dorsal view. **G**. Prosternum, ventral view. Arrow indicating ventral portion of prosternal process. **H**. Prosternum, lateral view. **I**. Mesoventrite, ventral view. Scale bars: A–C, E–F = 0.5 mm; D = 0.1 mm; G–I = 0.2 mm.

anterior angles slightly rounded and anterior margin slightly notched medially (Fig. 2A). Antennae filiform, antennomeres relatively thin and long, scape cylindrical (Fig. 2A). Labrum rectangular with many long setae, anterior margin with a small central projection, lateral margins diverging forward, anterior angles rounded (Fig. 2B). Mandibles symmetrical, subtriangular, lacking denticles on inner margin, apex elongate curved and acute, dorsal surface with five strong setae (Fig. 2C). Maxillary palp with four palpomeres, last one longest, 2.5 × as long as the first palpomere (Fig. 2D). Labium with rectangular mentum, without bilobed paraglossa, third labial palpomere with an acute apex, originating from median part of inner margin of second palpomere (Fig. 2E).

Thorax. Pronotum almost as wide as elytral base, trapezoidal, anterolateral angles gently rounded, projecting forward, lateral margins rounded, posterolateral angles projecting outwards (Fig. 2F). Scutellar shield triangular, slightly wider than long. Elytra oblong oval, margins clearly visible in dorsal view; elytral epipleura wide, with flat surface. Hindwings fully developed, with two types of marginal setae: long, widely spaced setae and short, closely spaced ones; form 2 (sensu Yoshitomi 2005), medial field with CuA_1 long, connected to MP_{3+4} in posterior part; central field with well-marked r4 and r3 (Fig. 3A). Prosternal process laminar and narrow, ventral portion flattened dorsoventrally, rhombus-shaped and covered with setae (Fig. 2G–H). Mesoventral process elongate, thin, with apex clearly bilobed (Fig. 2I). Metacoxae with semi-square plates, meeting in parallel along full length of median line (Fig. 3B). Ventrite 5 with a V-shaped emargination on posterior margin.

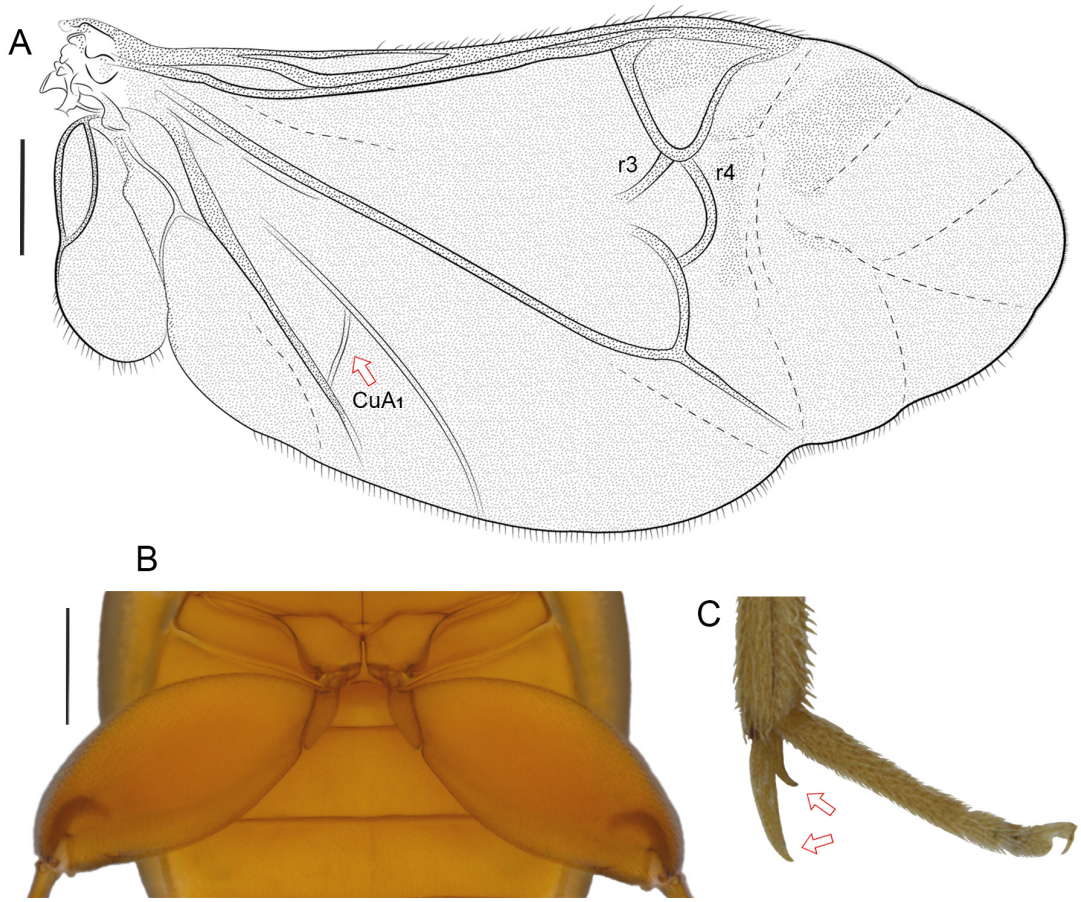

Fig. 3. General characteristics of *Spumacinctus* gen. nov. based on *Spumacinctus mindu* gen. et sp. nov., paratype, ♂ (INPA). **A**. Right metathoracic wing, dorsal view. **B**. Metacoxa and dilated metafemur. **C**. Metatibial spurs, dorsal view. Arrows indicating metatibial spurs. Scale bars: A–B = 0.5 mm.

Legs. Metafemora widened, saltatorial, 2 × as long as wide. Metatibial spurs well developed, gently curved and unequal in length; dorsal spur slightly longer than half length of tarsomere 1, ventral spur less than half length of dorsal one (Fig. 3C).

Male

Sternite VIII absent. Tegmen well sclerotized, with two parameres. Penis well sclerotized, asymmetrical, elongate, with at least one apical acute appendage.

Larva

Length 7.4–12.0 mm, body completely yellow (Fig. 4G). Clypeolabrum with two well-developed lobes. Mandibles symmetrical, wide, with broadly rounded apex; several fine bristles arranged in a single area on ventral surface, near inner edge; ventral surface with one bristle-field. Maxillary palpi three-segmented; third palpomere with rounded apex and a sensory area. Hypopharynx with fine and long toothed bristles, each bearing a few small teeth; a pair of basal pores located laterally; sclerite connecting inner pair of comb teeth present, composed of two finger-like structures (Fig. 6G). Tibiotarsal organ and swimming setae absent. Abdomen gradually tapered posteriorly; segments I–VII with fine, widely spaced setae on dorsal surface and several long setae along lateral margins of tergites and sternites; six long setae arranged horizontally on posterior margin of each tergite, three on each side. Tergite IX with two distinct lateral emarginations, each forming a lateral lobe; numerous anal papillae (Fig. 4H).

Distribution

Spumacinctus gen. nov. is known from Brazil and Costa Rica.

Spumacinctus mindu gen. et sp. nov.

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Figs 4–7

Diagnosis

Males of *Spumacinctus mindu* gen. et sp. nov. can be distinguished from those of *S. porcicaudalis* gen. et sp. nov. by the shape of the tegmen, which is spoon-shaped (vs rectangular with anterior emargination), and by the parameres, which are asymmetrical and possess a distinct external concavity on the right side (vs symmetrical and densely setose). The penis bears a left appendage with a thin and acute apex and a right appendage more robust and hook-shaped, while in *S. porcicaudalis* the appendage is helically twisted and pig-tail shaped. Females of *S. mindu* differ from those of *S. porcicaudalis* by having a pair of long lateral teeth on the bursal sclerite arranged in a U-shape, with an additional basal tooth (vs lateral teeth arranged in a V-shape, no basal tooth), and from *S. championi* (Picado, 1912) comb. nov. by the presence of three distinct teeth (vs only two parallel subtriangular teeth). The last instar larva of *S. mindu* is completely yellow and smaller (7.4–8.0 mm) than that of *S. porcicaudalis* (10.0–12.0 mm) and differs in having long antennae with at least 120 flagellomeres (vs short antennae in the other species). The number of basal setae on the clypeolabrum (three pairs) and the shallow emarginations of tergite IX also contrast with the larva of *S. porcicaudalis* (seven pairs; deep emarginations).

Etymology

This species was named after the type locality “Parque Municipal do Mindu” (Portuguese), an urban park in the city of Manaus, Amazonas, Brazil. This name is a noun in apposition.

Type material

All the specimens have a label with the following information: *Spumacinctus mindu* sp. nov. Jorge, Libonatti, Benetti & Hamada.

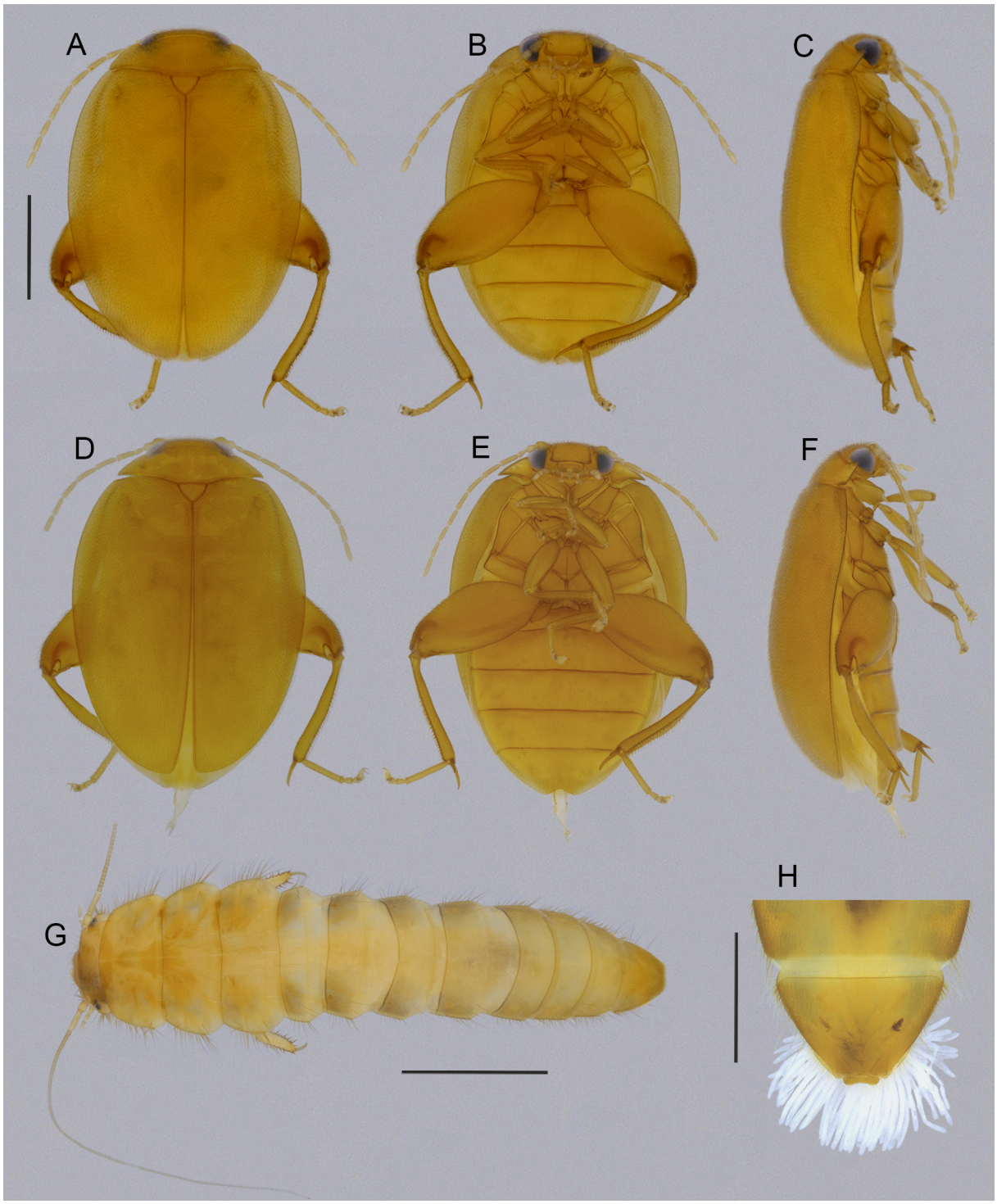

Fig. 4. *Spumacinctus mindu* gen. et sp. nov. **A–C**. Holotype, ♂ (INPA). **A**. Dorsal view. **B**. Ventral view. **C**. Lateral view. **D–F**. Paratype, ♀ (INPA). **D**. Dorsal view. **E**. Ventral view. **F**. Lateral view. **G–H**. Larva (INPA). **G**. Dorsal view. **H**. Larval anal papillae. Scale bars: A–F, H = 1.0 mm; G = 2.0 mm.

Holotype

BRAZIL – **Amazonas** • ♂; Manaus, Parque Municipal do Mindu; 3°4′48.61″ S, 60°0′19.7″ W; 18 Jan. 2017; G. Jorge and I. Marques leg.; larva collected in bromeliad; adult obtained by rearing larvae under laboratory conditions; INPA.

Paratypes

BRAZIL – **Amazonas** • 1 ♂, 1 ♀; same collection data as for the holotype; 10 Nov. 2016; INPA • 1 ♂, 1 ♀; same collection data as for preceding; MZUSP • 1 ♀; same collection data as for preceding; NHMUK • 1 ♂; Manaus, Reserva Biológica da Campina, BR 174 km; 2°35′21.2″ S, 60°01′52.8″ W; 5 Dec. 2016; G. Jorge, I. Marques, E.D. Ribeiro and J. Vidal leg.; larva collected in bromeliad; adult obtained by rearing larvae under laboratory conditions; INPA • 1 ♀; Presidente Figueiredo, Cachoeira de Iracema; 1°59′12.28″ S, 60°3′43.94″ W; 6 Jun. 2017; G. Jorge and R.B. Pinedo leg.; adult collected in bromeliad; manual collection; INPA • 1 ♀; Rio Preto da Eva, Ramal do Procopio; 2°43′54.8″ S, 59°27′01.6″ W; 10 Jun. 2017; G. Jorge, N. Hamada, C.J. Benetti, L.O. Santana and A. Short leg.; larva collected in bromeliad; adult obtained by rearing larvae under laboratory conditions; INPA.

Other material examined

BRAZIL – **Amazonas** • 17 larvae; Manaus, Parque Municipal do Mindu; 3°4′48.61″ S, 60°0′19.7″ W; 10 Nov. 2016; G. Jorge and I. Marques leg.; collected in bromeliad; INPA • 1 larva; Reserva Florestal Adolpho Ducke, AM 024 Km; 2°55′47.2″ S, 59°58′23.3″ W; 17 Apr. 2014; G. Jorge, R.B. Pinedo and A. Lopes leg.; collected in bromeliad; INPA • 3 larvae; same data as for preceding; trail L4-500m; 2°57′11.3″ S, 59°57′56.5″ W; 12 Jun. 2017; INPA • 2 larvae; Manaus, BR-174, Reserva Biológica da Campina; 2°35′21.2″ S, 60°01′52.8″ W; 18 Mar. 2017; G. Jorge, I. Marques, E.D. Ribeiro and J. Vidal leg.; collected in bromeliad; INPA.

Description

Males (Figs 4A–C, 5A–H)

Body. Oval, little convex, covered closely with many setae, coloration completely yellow (Fig. 4A–C).

Head. Proportional length of antennomeres (n = 4): 2.0–3.2: 1.3–1.5: 1.0: 2.1–3.0: 2.3–3.8: 2.3–3.8: 2.1–3.2: 2.0–3.5: 1.7–3.0: 1.7–3.2: 1.8–4.0. Interocular space ca 2.6 × as long as maximum diameter of eye.

Abdomen. Covered with many setae, except for anterolateral glabrous areas on ventrites 1–3 and in posteromedial area on ventrite 3 (Fig. 5A). Ventrite 3 bearing an anterior row of 13 setae with dark alveoli. Ventrites 4–5 with longer setae, ventrite 5 with a conspicuous V-shaped emargination on posterior margin (Fig. 5A). Tergite VII semicircular, with slightly arched apodemes that project beyond anterior margin for approximately ¼ of its total length; mid-posterior area well marked with distinct setae, more robust and longer than other setae; posterior margin rounded (Fig. 5B). Tergite VIII with semicircular plate, six robust lateral setae and several fine apical setae; pair of long, straight and well sclerotized apodemes (Fig. 5C). Tergite IX elongate, with two paired semi-rectangular plates and relatively long and thin apical setae; a pair of long, well sclerotized apodemes, diverging anteriorly (Fig. 5D). Sternite IX elongated, 2.5 × as long as wide, with posterior margin bilobed bearing several setae (Fig. 5E). Tegmen asymmetrical, well sclerotized, elongated with spoon-shaped basal part; parameres long, gradually dilated posteriorly, then abruptly narrowing, with short setae; right-handed paramere with a distinct external concavity, forming a semi-rectangular apex (Fig. 5F), left-handed paramere with margin rounded in natural condition (slight concavity seen in Fig. 5F is an artifact caused by coverslip pressure). Penis asymmetrical, well sclerotized, elongate; pala concave in ventral surface, elongate; appendages almost the same length; left-handed appendage elongate, thin, ending in an acute apex, right-handed appendage more robust than left-handed, ending in a hook-shaped apex (Fig. 5G–H). Measurements

(n = 4): TL 3.1–3.4 mm; HW 0.9–1.3 mm; IS 0.5–0.6 mm; PL 0.4 mm; PW 1.4–1.5 mm; EL 2.7–2.9 mm; EW 2.3–2.8 mm.

Female (Figs 4D–F, 5I–L)

Body. Externally similar to male, without apparent sexual dimorphism (Fig. 4D–F).

Abdomen. Covered with many setae (Fig. 5I). Ventrite 5 with a conspicuous V-shaped emargination on posterior margin (Fig. 5I). Tergite VII semicircular, with slightly arched apodemes that project beyond anterior margin for approximately ½ of their total length; mid-posterior area well marked with

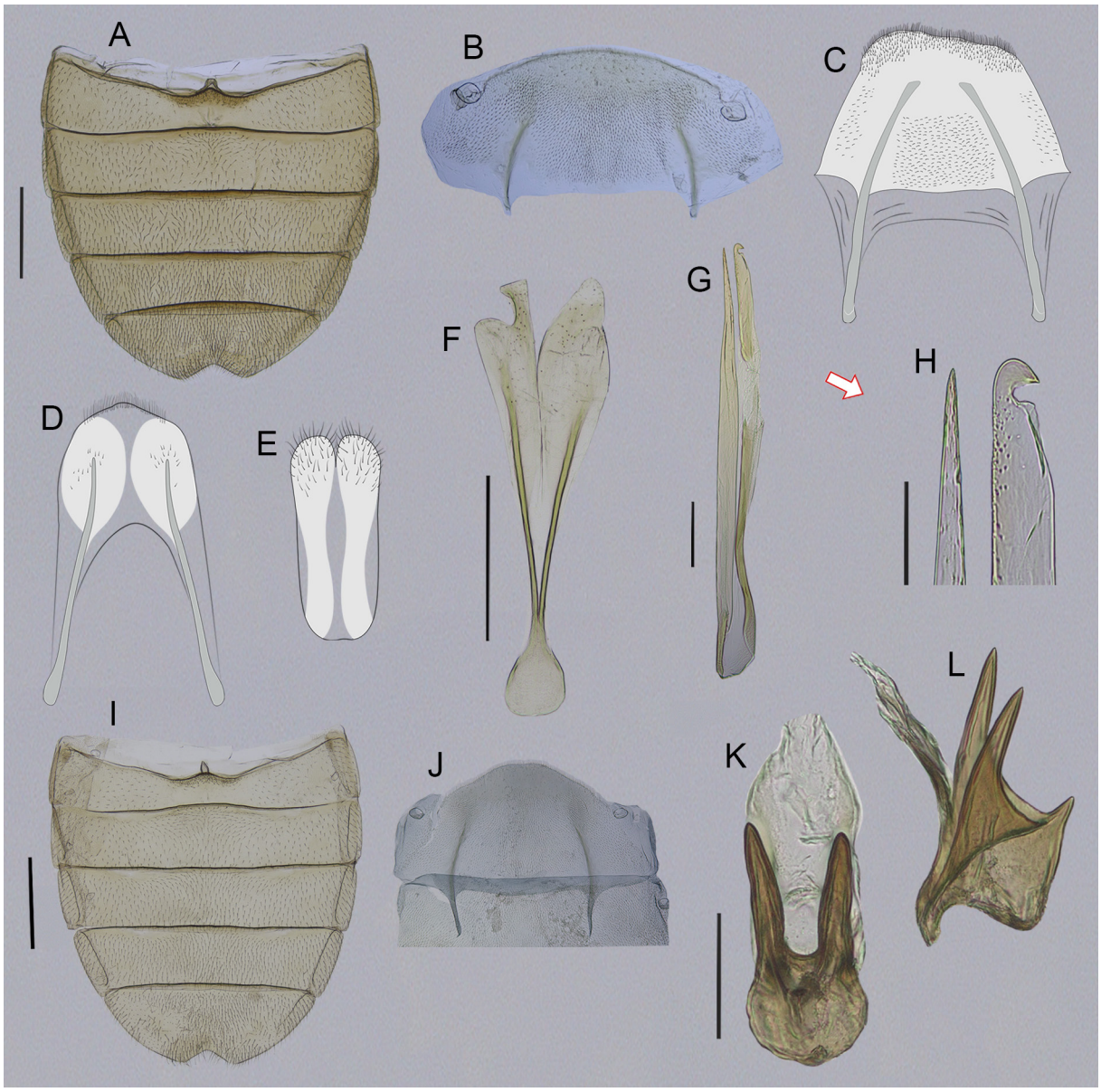

Fig. 5. *Spumacinctus mindu* gen. et sp. nov. **A–H**. Holotype, ♂ (INPA). **A**. Abdomen, ventral view. **B**. Tergite VII. **C**. Tergite VIII. **D**. Tergite IX. **E**. Sternite IX. **F**. Tegmen, dorsal view. **G**. Penis, ventral view. **H**. Apex of the penis, ventral view. **I–L**. Paratype, ♀ (INPA). **I**. Abdomen, ventral view. **J**. Tergite VII. **K**. Bursal sclerite, anterior view. **L**. Bursal sclerite, lateral view. Scale bars: A, F, I = 0.5 mm; G = 0.05 mm; H, K = 0.1 mm.

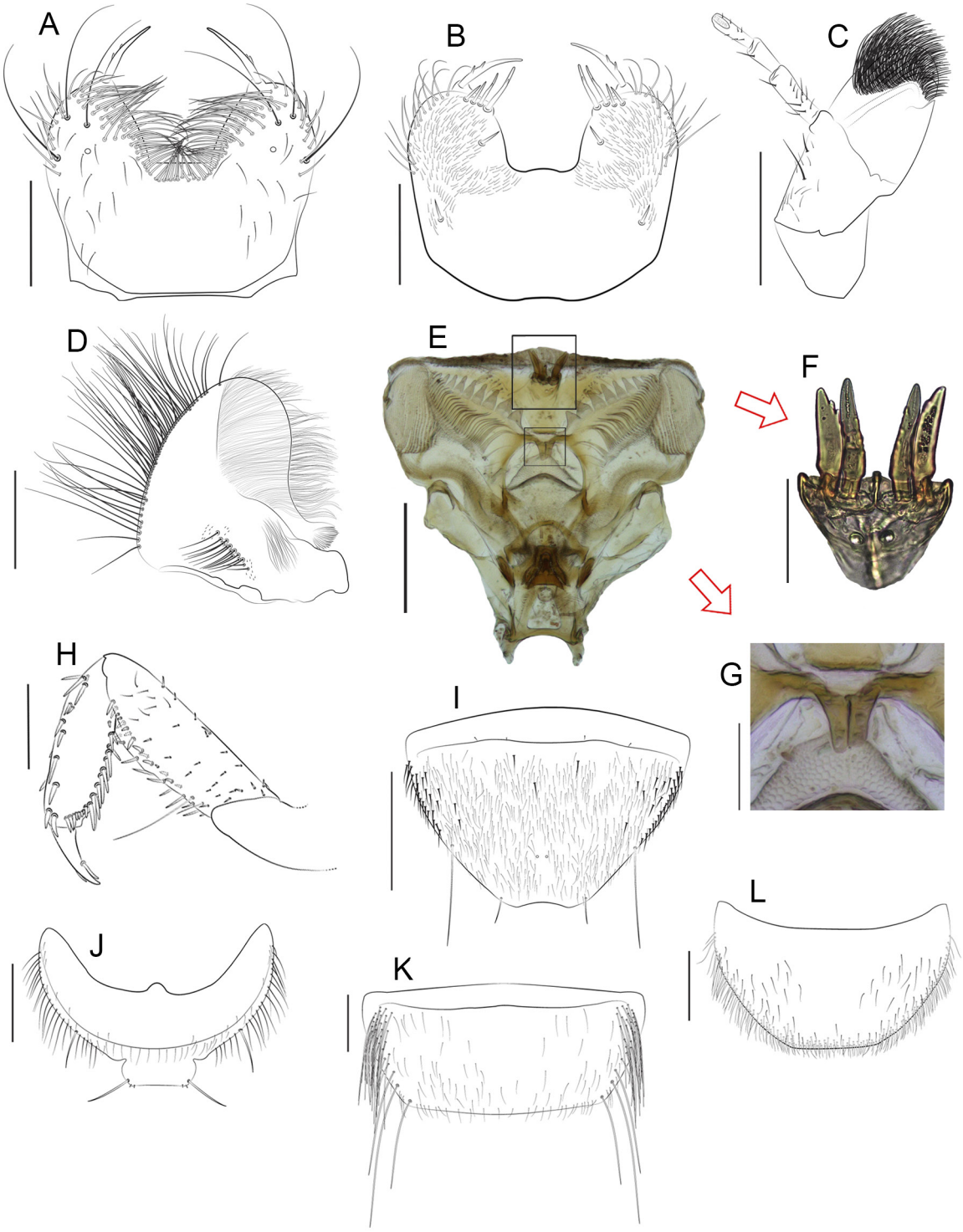

Fig. 6. *Spumacinctus mindu* gen. et sp. nov., last instar larva (INPA). **A**. Clypeolabrum, dorsal view. **B**. Clypeolabrum, ventral view (epipharynx, cone teeth and microtrichia omitted from the illustration). **C**. Left maxilla, dorsal view. **D**. Left mandible. **E**. Hypopharynx. **F**. Tooth bristles of hypopharynx. **G**. Detail of finger-like structures in hypopharynx. **H**. Right foreleg, dorsal view. **I**. Tergite VIII. **J**. Tergite IX. **K**. Sternite VIII. **L**. Sternite IX. Scale bars: A–B, D–E, I–K = 0.2 mm. C, H = 0.5 mm. F–G = 0.05 mm.

distinct setae, more robust and shorter than other setae; posterior margin oval, more projected than that of male (Fig. 5J). Bursal sclerite well sclerotized, middle part with a pair of long lateral teeth arranged in a U-shape; with a basal tooth at least 5 × as small as the lateral ones (Fig. 5K–L). Prehensor undistinguishable. Measurements (n = 5): TL 3.1–3.5 mm; HW 0.8–1.0 mm; IS 0.5–0.6 mm; PL 0.4 mm; PW 1.3–1.5 mm; EL 2.7–2.9 mm; EW 2.1–2.4 mm.

Last instar larva (Figs 4G–H, 6)

Habitus (Fig. 4G). TL 7.4–8.0 mm (n = 5). Coloration uniformly light yellow in dorsal and ventral surfaces.

Head. Transverse oval, length 0.7–0.8 mm, width 1.1–1.2 mm (n = 5); lateral margins with a series of long, thin setae. Antennae long, reaching approximately up to fourth abdominal segment; flagellum with at least 120 flagellomeres. Clypeolabrum with two well-developed lobes bearing setae at oval apices; dorsal surface with few fine, short, widely spaced setae; three pairs of basal setae; palisade setae numerous, thin and long; a pore-like sensillum on each lobe base; each lobe with an apical elevation bearing a strong spine with two very small spines on outer margin; ventral surface with five thin inner setae, anterior four tightly grouped and separate from posterior one, the two largest setae each bearing a very small spine; ventral surface densely covered with short and fine setae, particularly on lobes (Fig. 6A–B). Mandible with a row of 53 long setae on outer margin, dorsal surface with a group of microtrichia near base and 14 medium-sized setae next to field of microtrichia (Fig. 6D). Maxilla elongate; galea with oval apex and dense brush bristles; triangular lacinia lacking teeth on inner margin; maxillary palp long, three palpomeres; first palpomere 3 × as long as wide, longer and more robust than the others, with some small bristles and others larger; second palpomere twice as long as wide, with only one seta; third palpomere with apex rounded, twice as long as wide, with few spaced setae on dorsal surface and an oval area of sensory organs arranged longitudinally on ventral surface at apex of palpomere (Fig. 6C). Hypopharynx as long as wide, socket and keel sclerite contiguous; basal pair of small pores arranged horizontally; small, elongate tooth bristles with 2–3 teeth; stiff plate with fine bristles; comb plate with 8–9 pairs of teeth; 36 pairs of long claw teeth; rounded cushion area (Fig. 6E–G).

Thorax. Several long and thin setae on lateral margins and a few short and thin setae on dorsal surface; prothorax longer than meso- and metathorax, twice as long as wide; mesothorax and metathorax of similar length. Legs short, with robust and strong setae; front leg shortest and thinnest; femur with a long seta on inner margin; femur and tibia with robust and strong setae; tarsal claw with two robust, short setae (Fig. 6H).

Abdomen. Tergite VIII trapezoidal; posterior margin concave; dorsal surface densely covered with fine setae; middle portion with a pair of strong setae; a pair of horizontally arranged pore-like sensilla, situated between pair of strong setae and posterior margin; lateral margins covered with several strong setae similar to pair of setae of middle portion; a long, thin setae on each lateral margin; a pair of thin setae at each lateral corner (Fig. 6I). Tergite IX arch-shaped; anterodorsal margin produced medially; anteroventral margin with simple setae; lateral margins each with a row of several hair-like setae; one strong seta on each lateral margin; posterior margin straight, with one seta on each lateral corner; one shallow emargination forming a lobe on each lateroposterior margin (Fig. 6J). Sternite VIII trapezoidal, 3 × as wide as long; dorsal surface with a few short setae; lateral margin with several thin, elongate setae (Fig. 6K). Sternite IX semicircular; dorsal surface with fine setae; posterior margin straight, with a well-defined row of simple setae and several additional setae alternated along it (Fig. 6L).

Distribution

Spumacinctus mindu gen. et sp. nov. is known from Brazil, state of Amazonas, Manaus municipality.

Spumacinctus porcicaudalis gen. et sp. nov.
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Figs 7–9

Diagnosis

Spumacinctus porcicaudalis gen. et sp. nov. differs from *S. mindu* gen. et sp. nov. in having a rectangular tegmen with a conspicuous anterior emargination (vs spoon-shaped), symmetrical parameres with numerous short setae (vs asymmetrical, less setose), and a penis bearing a robust, pig-tail-shaped appendage (vs hook-shaped right appendage and acute left one). Females of *S. porcicaudalis* are distinguished from those of the other species by having a pair of lateral teeth on the bursal sclerite arranged in a V-shape and no basal tooth (vs teeth arranged in a U-shape with an extra basal tooth in *S. mindu*; parallel teeth in *S. championi* comb. nov.). The last instar larva is the largest among the three species (10.0–12.0 mm), with dark yellow coloration and lighter thoracic areas (vs uniformly yellow in *S. mindu*, and patterned abdomen in *S. championi*), and is characterized by seven pairs of basal setae on the clypeolabrum and deep lateral emarginations on tergite IX (vs three pairs and shallow emarginations in *S. mindu*).

Etymology

The name of this species refers to the shape of the penis that is twisted in a spiral resembling the tail of a pig. From Latin: '*porci*' = 'pig' and '*caudalis*' = 'pertaining to the tail'.

Type material

All the specimens have a label with the following information: *Spumacinctus porcicaudalis* sp. nov. Jorge, Libonatti, Benetti & Hamada.

Holotype

BRAZIL – **Amazonas** • ♂; Manaus, Reserva Florestal Adolpho Ducke, AM 024 km; 2°57′11.3″ S, 59°57′56.5″ W; 12 Jun. 2017; G. Jorge, R.B. Pinedo and A. Lopes leg.; larva collected in wild banana tree; adult obtained by rearing larvae under laboratory conditions; INPA.

Paratypes

BRAZIL – **Amazonas** • 1 ♀; same collection data as for the holotype; INPA • 1 ♂; Manaus, BR-174, Ramal da Vila Cuieiras; 2°35′21.2″ S, 60°01′52.8″ W; 12 May 2017; G. Jorge and J.O. Silva leg.; larva collected in wild banana tree; adult obtained by rearing larvae under laboratory conditions; INPA • 1 ♂; Manaus, stream near Eduardo Gomes Airport; 3°02′31.4″ S, 60°04′13.9″ W; 25 May 2022; G. Jorge, J.O. Silva and E.A. Cortês leg.; larva collected in wild banana tree; adult obtained by rearing larvae under laboratory conditions; INPA • 1 ♂; Manaus, Instituto Nacional de Pesquisas da Amazônia (INPA); 15–16 May 2024; G. Jorge and E.S. Pereira leg.; adult collected using a lamp over a bucket; INPA.

Other material examined

BRAZIL – **Amazonas** • 66 larvae; Reserva Florestal Adolpho Ducke, AM 024 km, trail L4-500; 2°57′11.3″ S, 59°57′56.5″ W; 12 Jun. 2017; G. Jorge, R.B. Pinedo and A. Lopes leg.; collected in wild banana tree; manual collection; INPA.

Description

Males (Figs 7A–C, 8A–H)

Body. Oval, convex, covered closely with many setae, coloration completely yellow (Fig. 7A–C).

Head. Proportional length of antennomeres (n = 2): 1.8–2.4: 1.2; 1.0: 2.0–2.6: 2.2–2.6: 2.2–2.6: 2.0: 2.0–2.2: 1.8: 2.0: 2.2–2.4. Interocular space ca 2.9 × as long as maximum diameter of eye.

Abdomen. Covered with many setae, except for anterolateral glabrous areas on ventrites 2–4 and posteromedial area on ventrite 1 (Fig. 8A). Ventrite 2 bearing an anterior row of 7 setae with dark alveoli. Ventrite 5 with a marked emargination on posterior margin (Fig. 8A). Tergite VII semitrapezoidal, with slightly arched apodemes that project beyond the anterior margin for approximately ¼ of its total length; mid-posterior with distinct setae, more robust and smaller than other setae; posterior margin almost straight (Fig. 8B). Tergite VIII with semicircular plate, with several fine apical setae; pair of long apodemes, slightly arched and well sclerotized (Fig. 8C). Tergite IX elongate, with two paired

Fig. 7. *Spumacinctus porcicaudalis* gen. et sp. nov. **A–C**. Holotype, ♂ (INPA). **A**. Dorsal view. **B**. Ventral view. **C**. Lateral view. **D–F**. Paratype, ♀ (INPA). **D**. Dorsal view. **E**. Ventral view. **F**. Lateral view. **G**. Larva (INPA), dorsal view. Scale bars: A–F = 1.0 mm; G = 2.0 mm.

semi-rectangular plates and relatively long and thin apical setae, a pair of long apodemes, arched and well sclerotized (Fig. 8D). Sternite IX oval with bilobed posterior margin, almost as long as wide, with relatively long apical setae (Fig. 8E). Tegmen symmetrical, well sclerotized, elongate and wide (Fig. 8F); basal part rectangular, with an emargination on anterior margin; parameres with many short setae, dilated in median portion and acuminate apex (slight asymmetry seen in Fig. 8F is an artifact caused by coverslip pressure). Penis asymmetrical, well sclerotized, elongate; pala concave in ventral surface and elongate; an appendage well sclerotized, with a helically twisted apex, like the tail of a pig (Fig. 8G–H). Measurements: (n = 2): TL 2.9–3.0 mm; HW 1.1–1.2 mm; IS 0.6 mm; PL 0.4 mm; PW 1.5–1.6 mm; EL 2.5–2.6 mm; EW 2.4–2.6 mm.

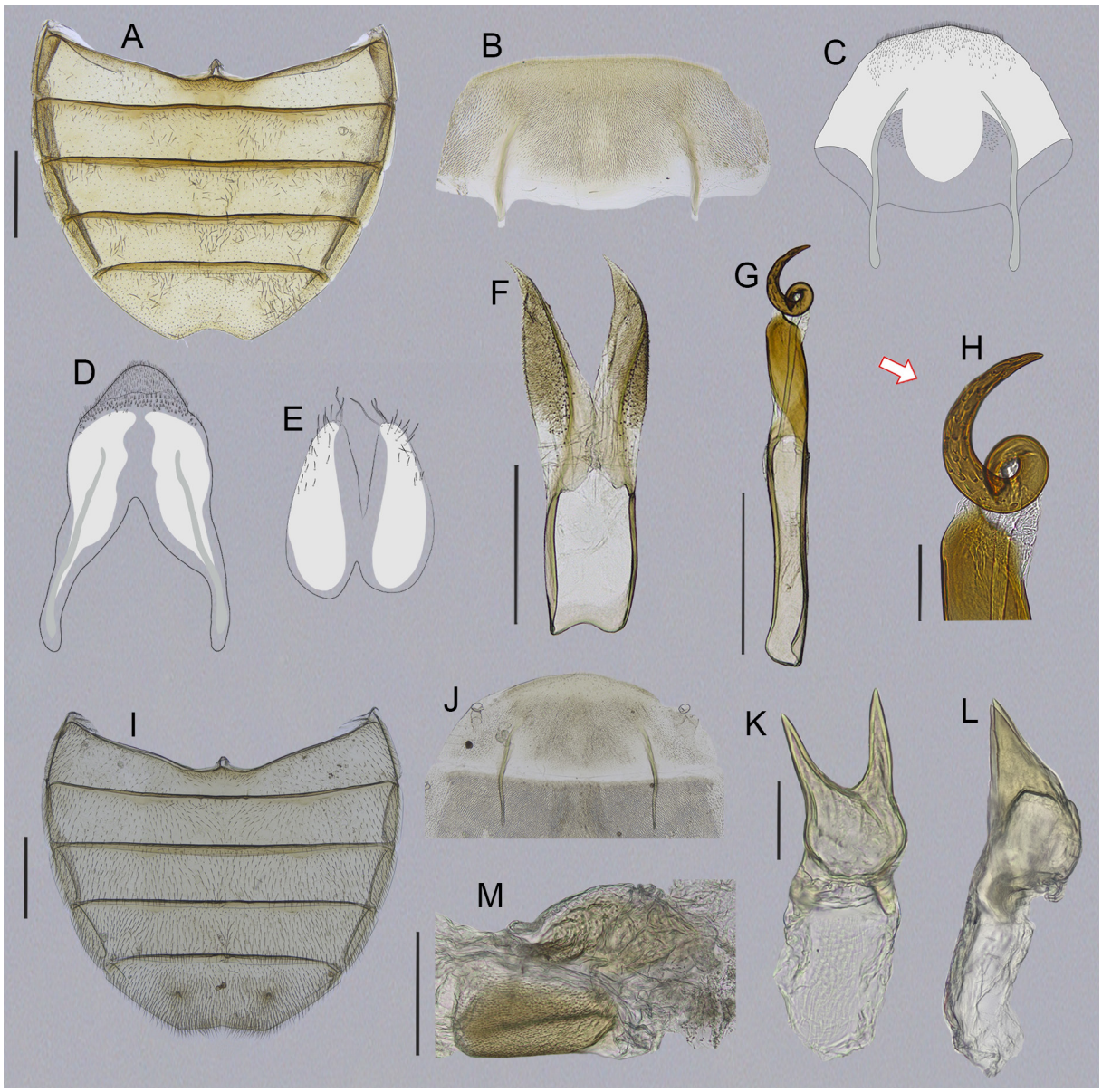

Fig. 8. *Spumacinctus porcicaudalis* gen. et sp. nov. **A–H**. Holotype, ♂ (INPA). **A**. Abdomen, ventral view. **B**. Tergite VII. **C**. Tergite VIII. **D**. Tergite IX. **E**. Sternite IX. **F**. Tegmen, dorsal view. **G**. Penis, ventral view. **H**. Apex of the penis, ventral view. **I–M**. Paratype, ♀ (INPA). **I**. Abdomen, ventral view. **J**. Tergite VII. **K**. Bursal sclerite, anterior view. **L**. Bursal sclerite, lateral view. **M**. Prehensor. Scale bars: A, F–H = 0.5 mm; I = 0.1 mm; K = 0.2 mm; M = 0.05 mm.

Female (Figs 7D–F, 8I–M)

Body. More oval than in male, maximum elytra width (EW) located more posteriorly in relation to male (Fig. 7D–F). Elytral epipleura narrower than in male (Fig. 7E).

Abdomen. Covered with many setae (Fig. 8I). Ventrite 5 with an almost straight posterior margin, with much less marked emargination than in male (Fig. 8I). Tergite 7 semicircular, with slightly arched apodemes that project beyond anterior margin for approximately ½ of their total length; mid-posterior area well marked with distinct setae, more robust and longer than other setae; posterior margin rounded (Fig. 8J). Bursal sclerite well sclerotized, middle part with a pair of long lateral teeth arranged in a V-shape, without basal tooth (Fig. 8K–L). Prehensor cylindrical, well sclerotized, composed of two oval and rough plates arranged in parallel (Fig. 8M). Measurements (n = 1): TL 3.0 mm; HW 1.2 mm; IS 0.6; PL 0.4 mm; PW 1.5 mm; EL 2.5; EW 2.3 mm.

Last instar larva (Figs 7G, 9)

Habitus (Fig. 7G). TL 10.0–12.0 mm (n = 5). Coloration dark yellow with lighter areas in the central region of the thorax, in dorsal view.

Head. Transverse rectangular, length 0.8–1.0 mm, width 1.2–1.5 mm (n = 5); lateral margins with a series of long, thin setae. Antennae short, reaching approximately up to prothorax; flagellum with at least 40 flagellomeres. Clypeolabrum V-shaped with two well-developed lobes with setae at oval apices; dorsal surface with fine, short, widely spaced setae; seven pairs of basal setae; palisade setae numerous, thin and long; a pore-like sensillum on each lobe base; each lobe with an apical elevation bearing a strong spine with three very small spines on outer margin; ventral surface with five thin inner setae, anterior four tightly grouped and separate from posterior largest one; ventral surface densely covered with short and fine setae, particularly on lobes (Fig. 9A–B). Mandible with a row of 42 long setae on outer margin, dorsal surface with a group of microtrichia near base; 13 medium-sized setae next to field of microtrichia (Fig. 9D). Maxilla elongate; galea with oval apex and dense brush bristles; triangular lacinia lacking teeth on inner margin; maxillary palp long, three palpomeres; first palpomere 3 × as long as wide, longest and more robust than others, with some small bristles and others larger; second palpomere twice as long as wide with only one seta; third palpomere with apex rounded, twice as long as wide, with few spaced setae on dorsal surface and an oval area of sensory organs present longitudinally on ventral surface at apex of palpomere (Fig. 9C). Hypopharynx as long as wide, socket and keel sclerite contiguous; basal pair of small pores arranged horizontally; small, elongate tooth bristles with 3–4 teeth; stiff plate with fine bristles; comb plate with 8 pairs of teeth; 32 pairs of long claw teeth; rounded cushion area (Fig. 9E–F).

Thorax. Several long and thin setae on lateral margins and a few short and thin setae on dorsal surface; prothorax more expanded than meso-metathorax, twice as long as wide; mesothorax and metathorax of similar length. Legs short, with robust and strong setae; front leg shortest and thinnest, femur with a long seta on inner margin; femur and tibia with robust and strong setae; tarsal claw with two robust, short setae (Fig. 9G).

Abdomen. Tergite VIII trapezoidal; posterior margin concave; dorsal surface densely covered with fine setae; middle portion with a pair of strong setae; a pair of horizontally arranged pore-like sensilla, situated between pair of strong setae and posterior margin; lateral margins covered with strong setae similar to pair of setae of middle portion, a long, thin setae on each lateral margin; a pair of thin, short setae at each lateral corner (Fig. 9H). Tergite IX arch-shaped; anterodorsal margin produced medially; anteroventral margin with simple setae; lateral margins each with a row of several hair-like setae of variable length; posterior margin concave, with one seta on each lateral corner; one deep emargination forming a lobe on each lateral margin (Fig. 9I). Sternite VIII trapezoidal, 3 × as wide as long; dorsal

surface with a few short setae; lateral margin with several thin, elongate setae; three thin and long setae at each lateral corner (Fig. 9J). Sternite IX semicircular; dorsal surface with fine setae; posterior margin with a row of simple setae (Fig. 9K).

Distribution

Spumacinctus porcicaudalis gen. et sp. nov. is known from Brazil, state of Amazonas, Manaus municipality.

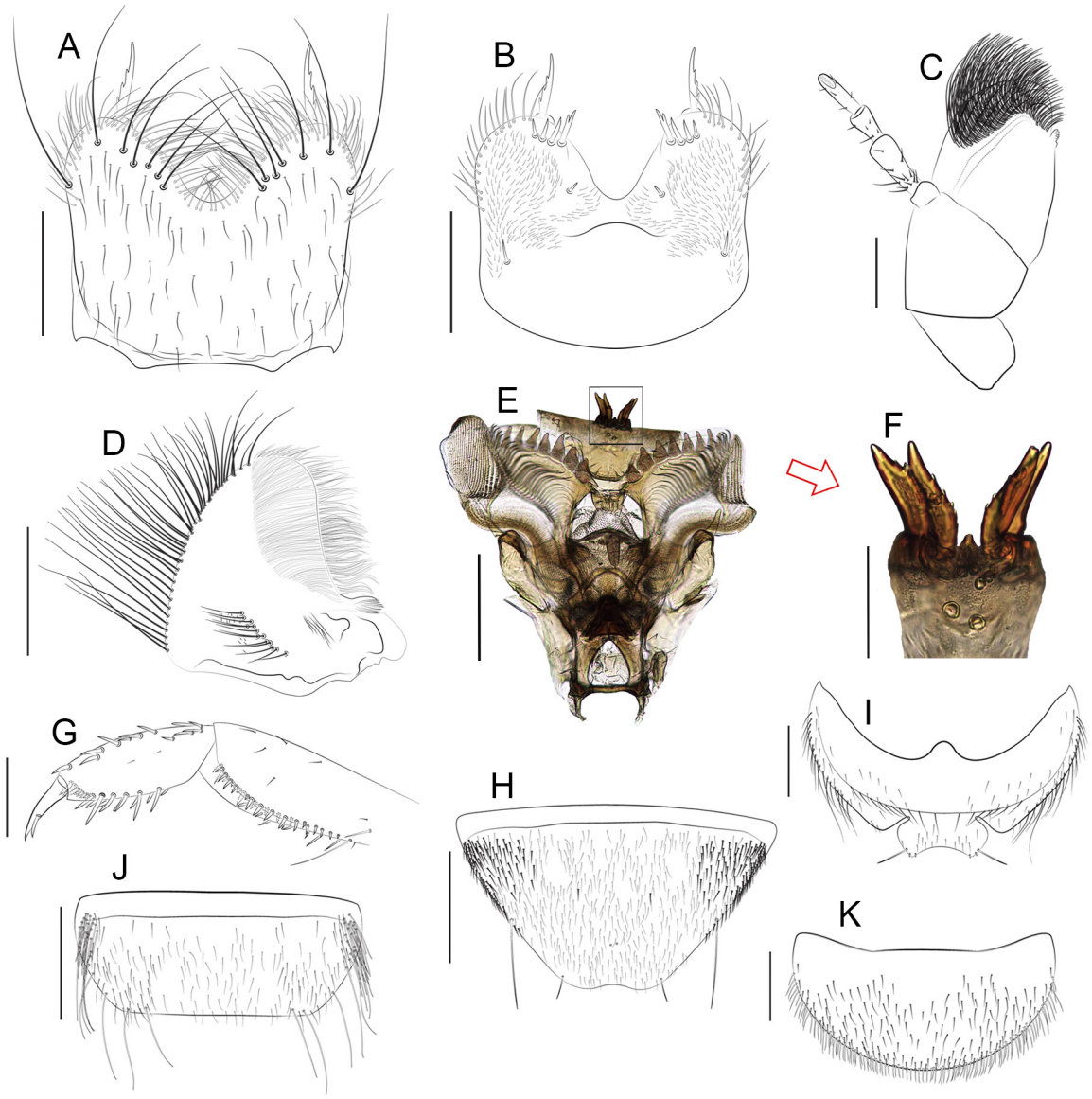

Fig. 9. *Spumacinctus porcicaudalis* gen. et sp. nov., last instar larva (INPA). **A**. Clypeolabrum, dorsal view. **B**. Clypeolabrum, ventral view (epipharynx, cone teeth and microtrichia omitted from the illustration). **C**. Left maxilla, dorsal view. **D**. Left mandible. **E**. Hypopharynx. **F**. Tooth bristles of hypopharynx. **G**. Right foreleg, dorsal view. **H**. Tergite VIII. **I**. Tergite IX. **J**. Sternite VIII. **K**. Sternite IX. Scale bars: A–E, G, I, K = 0.2 mm; F = 0.05 mm; H, J = 0.5 mm.

Spumacinctus championi (Picado, 1912) comb. nov.
Fig. 10

Scirtes championi Picado, 1912: 318.

Emended diagnosis

Females of *Spumacinctus championi* comb. nov. is readily distinguished from those of both *S. mindu* gen. et sp. nov. and *S. porcicaudalis* gen. et sp. nov. by the morphology of the bursal sclerite, which bears two parallel subtriangular teeth with slightly arched apices. The larva (based on Picado 1913) is smaller (6 mm) than that of the other two species; the coloration pattern consisting of a light-yellow background with dark transverse abdominal bands, except on segment 8, is unique among the three.

Type material

Picado (1912) described the species based on two adult specimens, stating that one was deposited in the British Museum and the other in the Evolution Laboratory in Paris. However, we were only able to locate and examine the specimen deposited in the former institution (Fig. 10B), despite having conducted a search in the Paris Museum with the assistance of the curator. The specimen deposited in NHMUK is hereby designated as lectotype to clarify assignment of this name with this species.

Lectotype

COSTA RICA • ♀; "Costa Rica. / ex C. Picado." // "1913–83" // "Scirtes / championi / Picado" // "NHMUK015011773" // "♀"; NHMUK.

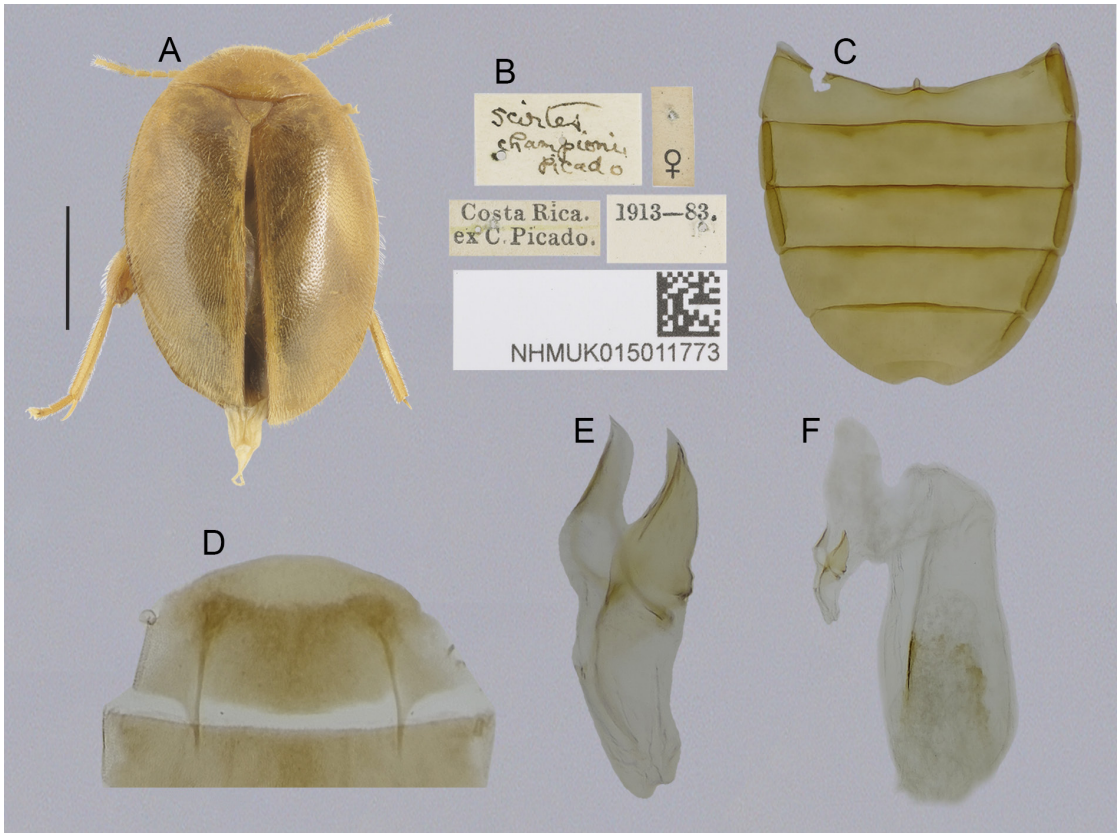

Fig. 10. *Spumacinctus championi* (Picado, 1912), comb. nov., lectotype, ♀ (NHMUK). **A**. Dorsal view. **B**. Labels. **C**. Abdomen, ventral view. **D**. Tergite VII. **E**. Bursal sclerite, anterior view. **F**. Bursal sclerite and prehensor. Scale bar A =.1 mm; B–F = Not to scale.

Redescription

Female lectotype (Fig. 10)

Body oval, little convex, covered closely with many setae, coloration completely yellow (Fig. 10A). Hindleg with tibial spurs well developed, gently curved with different sizes; dorsal one a bit longer than half length of tarsomere 1; ventral one smaller than half length of dorsal one. Abdomen covered with many setae, except for anterolateral glabrous areas on ventrites 2–4 (Fig. 10C). Ventrite 5 with a marked emargination on posterior margin. Tergite VII semicircular, with slightly arched apodemes that project beyond anterior margin for approximately ¼ of its total length; mid-posterior with distinct setae, more robust and smaller than other setae; posterior margin rounded (Fig. 10D). Bursal sclerite weakly sclerotized, with two parallel subtriangular teeth, each ending in a slightly arched apex (Fig. 10E–F). Prehensor little sclerotized, semi-rectangular (Fig. 10F). Measurements: (n = 1): TL 3.1 mm; PW 1.3 mm; EW 1.9 mm.

Male

Unknown.

Larva

Described by Picado (1913).

Distribution

Spumacinctus championi is known from Costa Rica, only from type locality.

Key to adults of the saltatorial genera of Scirtidae from Neotropical region

Adapted from Epler (2010).

1. Metacoxae with subtriangular plates, median line of plates not parallel, diverging along the full length (Fig. 11A)..... ***Ora*** Clark, 1865
– Metacoxae with semi-square plates, median line of plates in parallel along the full length, posterior margin truncated (Fig. 11B–C)..... 2

2. Prosternal process entirely laminar, flattened laterally in a keel shape (Fig. 11D)..... .....***Scirtes*** Illiger, 1807
– Prosternal process in anterior portion flattened laterally, laminar, and in ventral portion flattened dorsoventrally, rhombus-shaped (Fig. 11E).....***Spumacinctus*** gen. nov.

Key to larvae (last instar) of the saltatorial genera of Scirtidae from Neotropical region

Adapted from Epler (2010) and Watts (2014).

1. Mandible with a single point at the apex (Fig. 11F).....***Scirtes*** Illiger, 1807
– Mandible with a rounded apex (Fig. 11G–H)..... 2

2. Maxillary palp with 4 palpomeres (Fig. 11I). Mandible in ventral surface with 2 bristle-fields (Fig. 11G). Tergite IX without lateral emarginations (Fig. 11K)..... ***Ora*** Clark, 1865
– Maxillary palp with 3 palpomeres (Fig. 11J). Mandible in ventral surface with 1 bristle-field (Fig. 11H). Tergite IX with 2 lateral emarginations, each forming a lateral lobe (Fig. 11L).....***Spumacinctus*** gen. nov.

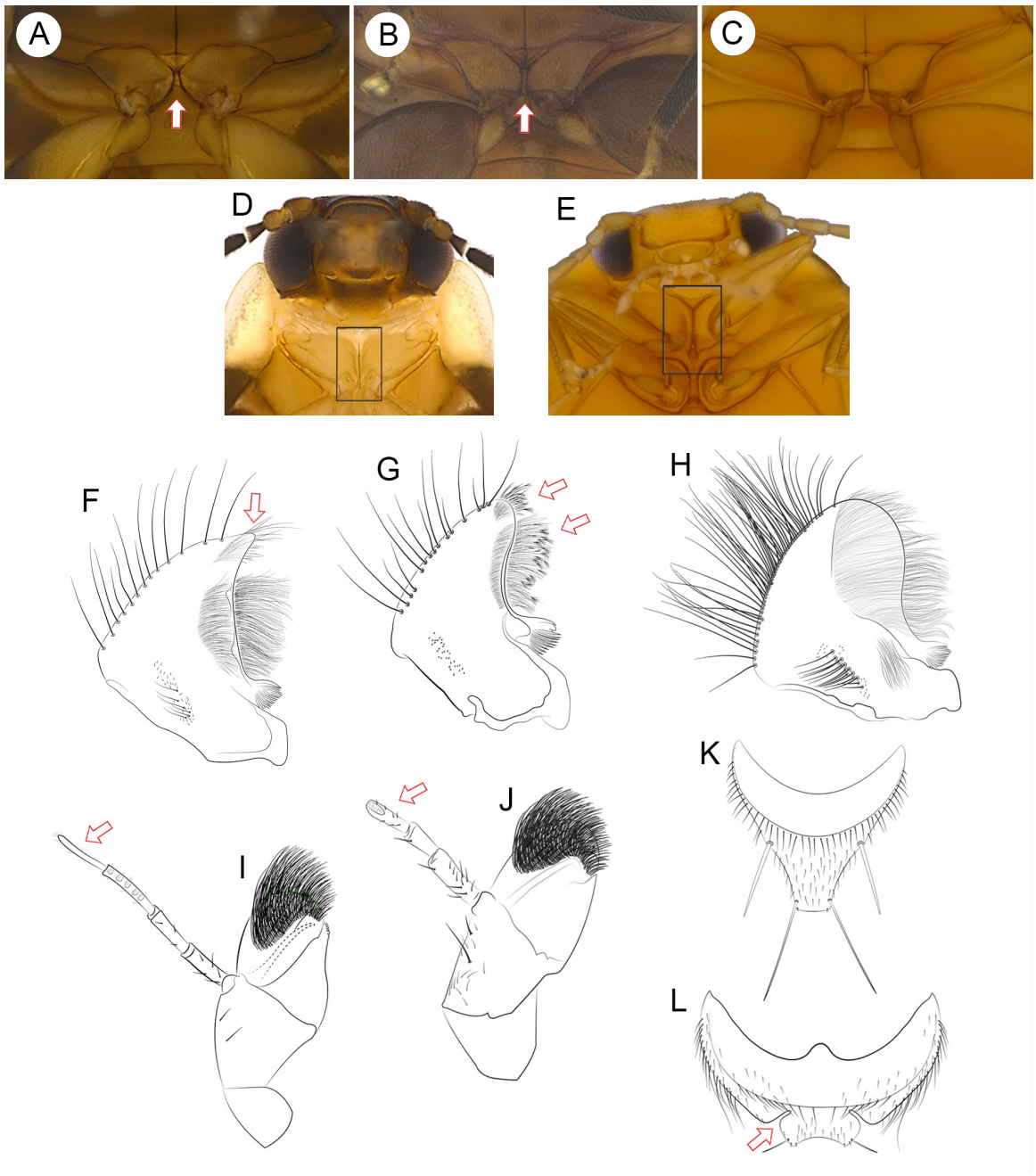

Fig. 11. Structures present in the identification key of saltatorial genera of Scirtidae Fleming, 1821, from the Neotropical region. **A–E**. Adult. **A**. Metacoxae with subtriangular plates (*Ora* Clark, 1865) (median line indicated by the arrow). **B**. Metacoxae with semi-square plates (*Scirtes* Illiger, 1807) (median line indicated by the arrow). **C**. Metacoxae with semi-square plates (*Spumacinctus* gen. nov.). **D**. Prosternal process entirely laminar (*Ora* and *Scirtes*) (delimited by the rectangle). **E**. Prosternal process laterally laminar and in ventral portion flattened dorsoventrally (*Spumacinctus* gen. nov.) (delimited by the rectangle). **F–L**. Larva**. F**. Left mandible (*Scirtes*) (apex indicated by the arrow). **G**. Left mandible (*Ora*) (bristle-fields indicated by the arrows). **H**. Left mandible (*Spumacinctus* gen. nov.). **I**. Left maxilla (*Ora*) (4^{th} palpomere indicated by the arrow). **J**. Left maxilla (*Spumacinctus* gen. nov.) (3^{th} palpomere indicated by the arrow). **K**. Tergite IX (*Ora*). **L**. Tergite IX (*Spumacinctus* gen. nov.) (emargination indicated by the arrow).

Biology of *Spumacinctus gen. nov.*

Larvae and pupae *Spumacinctus* gen. nov. were found in phytotelmata; in particular, those of *S. mindu* gen. et sp. nov. and *S. championi* comb. nov. associated with bromeliads, and those of *S. porcicaudalis* gen. et sp. nov. with wild banana trees. Under laboratory conditions, larvae that reached the adult stage spent six months to over one year in the larval stage. Younger larvae showed the highest mortality, probably due to the greater number of moults required before pupation, which may have reduced their chances of survival, as previously observed in other scirtid genera (Libonatti, unpublished data). Just before pupation, the last instar larva of *Spumacinctus* rises to the surface of the water and produces a dense foam chamber (Fig. 12A).

The pupa develops surrounded by foam and remains in this life stage for four to five days. After the emergence, the adult stays inside the chamber for about 24 hours before breaking through the bubbles and exiting (Fig. 12B–E). Unfortunately, we were unable to obtain pupae for morphological description, as all individuals successfully completed development and emerged as adults. It is not possible to describe the pupa based solely on the exuviae, as its characteristics become difficult to define once vacated by the adult.

In the field, we found the pupa of *S. mindu* gen. et sp. nov. developing in the axillary part of bromeliad leaves, where the foam adhered to the leaves and in contact with water (Fig. 12F–G). The pupa of *S. porcicaudalis* gen. et sp. nov. was observed in a dry location on the leaf sheath of a wild banana tree, where the foam also adhered (Fig. 12H–I).

Discussion

Scirtes is a highly species-rich and taxonomically challenging genus, for which the larval morphology remains unknown for the majority of species. It is likely that additional monophyletic lineages remain hidden within the current concept of *Scirtes*, particularly given its broad morphological diversity and incomplete larval documentation. At the same time, awaiting a comprehensive revision of such a large and poorly known genus would unnecessarily delay the recognition of clearly diagnosable lineages.

Our comparisons were based on described larvae of *Scirtes*, including the type species *S. hemisphaericus*, as well as on examined Brazilian and other Neotropical material currently under study. Based on these comparisons, a substantial proportion of the examined Neotropical larvae conform, at least in their main diagnostic traits, to the currently recognized larval morphology of *Scirtes*, and are therefore provisionally retained within that genus. The distinctive characters observed in *Spumacinctus* gen. nov., however, do not match this pattern and supports its recognition as a separate lineage.

In this context, the present study describes *Spumacinctus* gen. nov., a new genus of Scirtidae distinguished by several unique morphological features and a novel life-history trait: pupation within a foam mass, that was first reported for the family Scirtidae by Picado (1913) based on observations of *Scirtes championi*, which is herein transferred to the new genus *Spumacinctus*. Potential phylogenetically informative characters for *Spumacinctus* include several morphological traits observed in both adult and larval stages. Among these, the shape of the prosternal process in adults and the broadly rounded mandible, three-segmented maxillary palpus, and the distinctive shape of tergite IX in larvae stand out as possible synapomorphies. Notably, the unique foam-based pupation observed in this genus represents a behavioural character and may hold phylogenetic significance.

Comparisons with other genera reveal intriguing similarities and differences. Larvae of *Spumacinctus* gen. nov. share with the studied larvae of *Exochomoscirtes*, *Ora*, and *Scirtes* (including the type species, *Scirtes hemisphaericus*) the presence of a larval hypopharyngeal sclerite bearing paired prong-, finger- or hand-like structures (between the two rows of claw teeth), as documented in previous larval descriptions

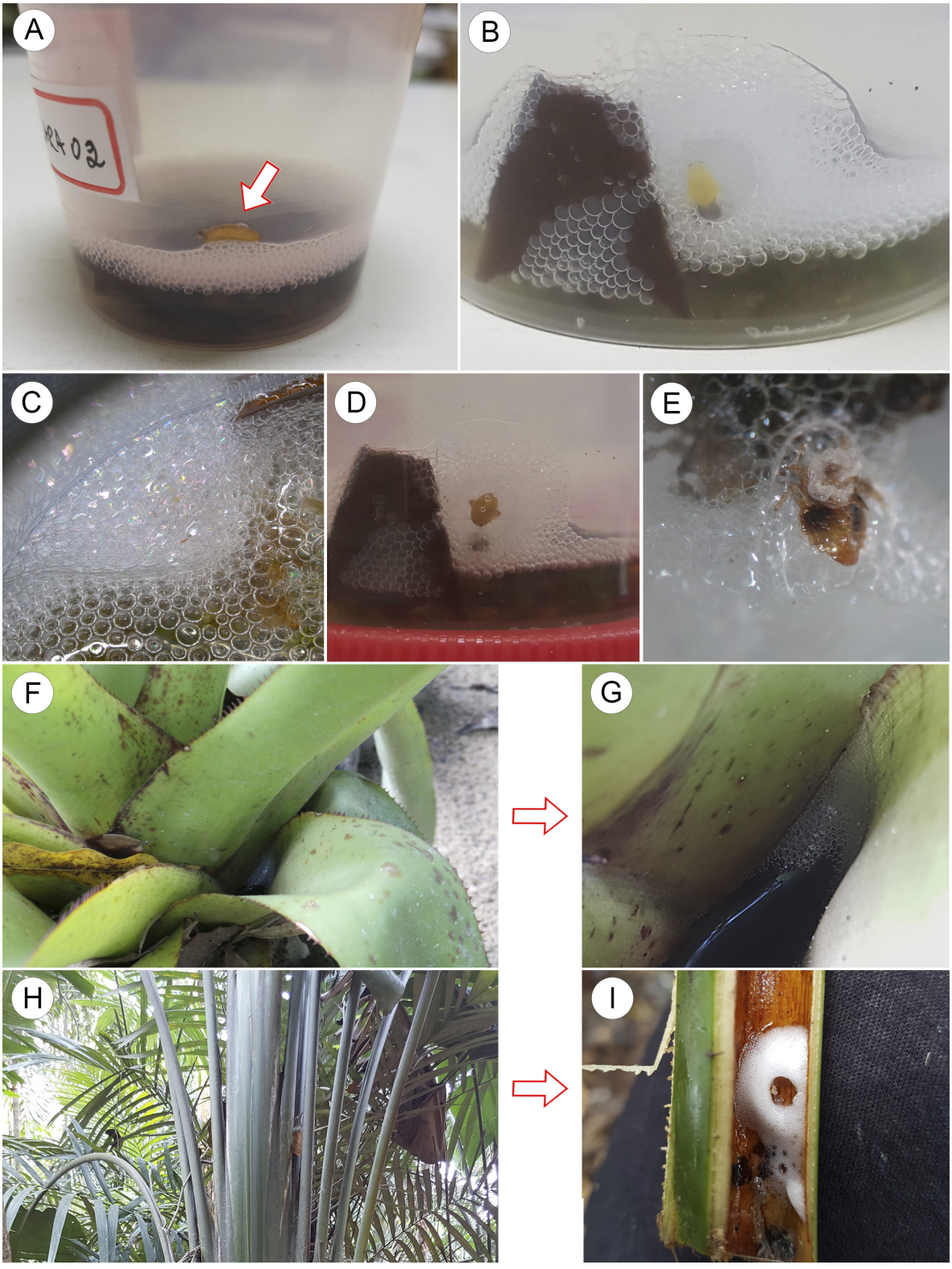

Fig. 12. Biology of *Spumacinctus* gen. nov. **A**. Larva producing foam. **B**. Pupa inside silk chamber surrounded by foam. **C**. Foam seen from above. **D**. Newly emerged adult still inside the foam chamber. **E**. Exuviae of the larva and pupa left by the adult after emergence. **F**. Bromeliad. **G**. Foam in the armpit of the bromeliad. **H**. Wild banana leaves. **I**. Foam on wild banana leaves.

(Yoshitomi 2005; Klausnitzer 2009; Zwick 2011; Watts 2014; Libonatti *et al.* 2018; Jorge *et al.* 2019). *Exochomoscirtes*, *Ora*, and *Scirtes* form a distinct monophyletic group in recent molecular studies for the Australian fauna (Cooper 2014; Watts *et al.* 2017); therefore, the presence of this hypopharyngeal sclerite potentially represents a synapomorphy of saltatorial genera. However, larval descriptions remain scarce for most taxa, and further studies are needed to confirm whether this character is consistently present across this assemblage. Furthermore, the shape of the hypopharyngeal sclerite in *Spumacinctus* is similar to that in *Exochomoscirtes*; however, the appendages that bear the sclerite of *Spumacinctus* are contiguous, while those of *Exochomoscirtes* are separated (Zwick 2011: figs 13–18 for details on sclerite shape).

A similar habitat preference for phytotelmata is also observed between these two genera, although *Exochomoscirtes* markedly differs in adult habitus and genital morphology, underscoring their distinctiveness (Ruta & Yoshitomi 2010; Zwick 2011; Kovac & Klausnitzer 2020). Additionally, the rounded shape of the larval mandible in *Spumacinctus* gen. nov. resembles that of *Ora*, as do the wide epipleura of adults also found in some Neotropical *Ora* species (Libonatti 2014, 2015); however, *Ora* larvae differ by possessing a four-segmented maxillary palpus (Watts 2004; Yoshitomi 2005; Libonatti *et al.* 2018; Jorge *et al.* 2019), suggesting the rounded mandible may be a case of convergent evolution. These characters collectively provide a basis for hypothesizing phylogenetic relationships and warrant further integrative analysis.

An important issue that deserves consideration is the marked difference in antennal length observed in the larvae of *Spumacinctus* gen. nov., which appears to be unusual within Scirtidae. In Australian taxa, whose larval morphology is comparatively well documented (Watts 2014), antennal length tends to be relatively stable within genera, with the notable exception of *Pseudomicrocara*, in which differences in body size are associated with variation in antennal length and number of flagellomeres. The degree and pattern of differentiation observed in *Spumacinctus* do not appear to follow a simple size-related trend and seems to exceed what has been reported for other well-studied lineages. Additional comparative data from other regions will be necessary to determine whether this condition represents a lineage-specific trait or a more widespread but previously overlooked source of variation within the family.

The capacity to produce foam observed in *Spumacinctus* gen. nov. larvae is not unique among insects. Examples of other foam producing insects are the long-studied spittlebug nymphs of certain leafhoppers (Hemiptera: Aphrophoridae, Cercopidae; Balzani *et al.* 2023; Hoch *et al.* 2024) and a recently described fly larva (Diptera: *Atherigona culicivora* Kovac, Pont & Deeming, 2023), which inhabits water-filled bamboo stumps and, as in *Spumacinctus*, also produces foam when leaving the water for pupation on the bamboo wall (Kovac *et al.* 2023). Since no special glands have been found in Scirtidae larvae (Guilbeau 1908; Picado 1913), the foam may be produced similarly to Hemiptera, where the foam is secreted by the anus or Malpighian tubules. And probably, the main functions of the foam in Scirtidae are similar to those in Hemiptera: protection against predators, thermoregulatory function, and prevention of dehydration (Whittaker 1970; Del Campo *et al.* 2011; Cornara *et al.* 2017).

The present study expands taxonomic, biological, and ecological knowledge about Scirtidae in Brazil and provides valuable information for understanding the group throughout the Neotropical region. The number of genera in the country increases from five to six, and from 15 to 16 in the Neotropical region. The number of species recorded from Brazil comes to 58 (Benetti & Jorge 2026).

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