

New species of *Exetasis* (Diptera: Acroceridae) from Caparaó National Park, with a key to species of the genus

Nova espécie de Exetasis (Diptera: Acroceridae) encontrada no Parque Nacional do Caparaó, com chave de identificação para espécies do gênero

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Received 07/24/2023 | Accepted 10/20/2023 | Published 11/14/2023 | Edited by Rodrigo Gonçalves

Abstract

Exetasis caparaoensis Lovati sp. nov. (Acroceridae), based on males, is described from Caparaó National Park, Brazil. A dichotomous key to species of the genus is provided to include a new species.

Keywords: *Exetasis*, Caparaó, parasitoid, Acroceridae, new species.

Resumo

Exetasis caparaoensis Lovati sp. nov. (Acroceridae), baseada no macho, é descrita para o Brasil e uma chave de identificação dicotômica para o gênero é disponibilizada, incluindo a espécie nova.

Palavras-chave: *Exetasis*, Caparaó, parasitóide, Acroceridae, espécie nova.

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Introduction

The immatures of Acroceridae are obligatory parasitoids of up to 26 different families of spiders, which is why they are commonly called "spider flies" (Schlinger 1987; Gillung & Borkent 2017). The adults have long proboscises and feed on floral nectar (Borkent & Schlinger 2008), or in some species, they have reduced mouthparts and apparently do not feed. This group of Brachycera flies is widely distributed geographically, with species found in all biogeographic regions, although they are rarely seen in nature (Schlinger 1981; 1987).

The representatives of Acroceridae can be defined by the following synapomorphies: antennal flagellum composed of a single segment, enlarged lower calypters, folding of the wing membrane, and the presence of the crossvein 2r-m (Gillung and Winterton, 2019). Acroceridae contains 60 existing and extinct genera, with approximately 530 species (Schlinger et al., 2013).

Schlinger (1981) divided Acroceridae into three subfamilies: Philopotinae, Palpinae, and Acrocerinae. However, recent phylogenetic analyses suggest the addition of the subfamilies Ogcodinae and Cyrtinae to the group, recovering Acrocerinae as a polyphyletic group and the monophyly of Palpinae and Philopotinae (Gillung and Borkent 2017; Gillung et al. 2018; Gillung and Winterton 2019).

Exetasis was described by Walker (1852) and currently comprises six species: *Exetasis brasiliensis* Carrera (1947), *Exetasis calida* Wiedemann (1830), *Exetasis eickstedtae* Schlinger (1972), *Exetasis longicornis* Erichson (1840), *Exetasis tumens* Walker (1852), *Exetasis jujuyensis* Gillung (2013), with only the last mentioned species not occurring in Brazil (Gillung, 2023).

In this article, a new species of *Exetasis* found in Caparaó National Park is described.

Material and methods

Collection

The specimens were collected in Caparaó National Park, at an altitude of 1465 meters above sea level, using a Malaise trap. The trap was exposed from March 7th to March 14th, 2013. The collection point coordinates are 20°30'05"S 41°49'16"W.

After 7 days of exposure, all insects captured in the Malaise traps were transferred to labeled containers containing 100% ethanol.

Sorting, Mounting, and Identification

The sorting of the material was carried out at the Insect Biodiversity Laboratory of the Department of Biological Sciences at the Federal University of Espírito Santo (DCBIO/UFES). The flies were mounted on entomological pins, labeled, and subsequently deposited in the Entomological Collection of the Federal University of Espírito Santo (UFES).

For genus-level identification, the key by Gillung & Carvalho (2009) was used. The identification key for *Exetasis* species, included in this article, is an adaptation of the key by Barneche et al. (2013). Morphological terminology for flies followed Cumming & Wood (2009).

Measurements were made using a 1 mm precision ruler on the objective lens of a Leica MZ 125 microscope. The total length of the specimen was measured from the head to the end of the terminal abdominal tergite. The wing length was measured from the base to the apex of the wing.

Male terminalia were extracted and clarified using the terminalia dissection protocol described below. Detailed images of the specimens were captured using a ZEISS AXIOCAM 305 Color digital camera. Vectorized drawings were created using Adobe Illustrator CC 2017 software, and photos of each species were processed using Adobe Photoshop 2020.

Terminalia Dissection Protocol

The male terminalia was removed from the abdomen and placed in a 10% KOH solution heated in a water bath for 5-10 minutes for cleaning and bleaching. Then, it was washed with acetic acid. Next, the KOH was neutralized through washing steps with 70%, 80%, and 100% ethanol, respectively. Subsequently, the abdomen was placed in a small plastic tube containing glycerin. The tube was added to the pin of the specimen from which the abdomen was extracted. With proper care, the terminalia pieces were separated and mounted in glycerin on a dissected slide and analyzed under a Carl Zeiss binocular microscope, series 021145.

Results

Identification key for *Exetasis* species

1. M3 not fused with CuA1, m3 cell absent (Fig. 1A) 2
-. M3 fused with CuA1, m3 cell present (Fig. 1B, C, and D) 6
2. Veins M1 and M2 reaching the wing margin, or veins M1 and M2 not reaching the wing margin 3
-. Vein M1 not reaching the wing margin, only vein M2 reaching the wing margin (Fig. 1D) (Brazil) *E. caparaoensis* Lovati sp. nov.
3. Globular abdomen; veins M1 and M2 reaching the wing margin 4
-. Conical abdomen; veins M1 and M2 not reaching the wing margin (Brazil) *E. longicornis* Erichson
4. Vein M3 reaching the wing margin (Brazil) *E. eickstaedtae* Schlinger
-. Vein M3 not reaching the wing margin 5
5. Antenna longer than the height of the head (Brazil) *E. brasiliensis* Carrera
-. Antenna as long as the height of the head (Brazil) *E. tumens* Walker
6. Vein R4+5 fused with M1 (Fig. C) (Brazil) *E. calida* Wiedemann
-. Vein R4+5 not fused with M1 (Fig. B) (Argentina) *E. jujuyensis* Gillung

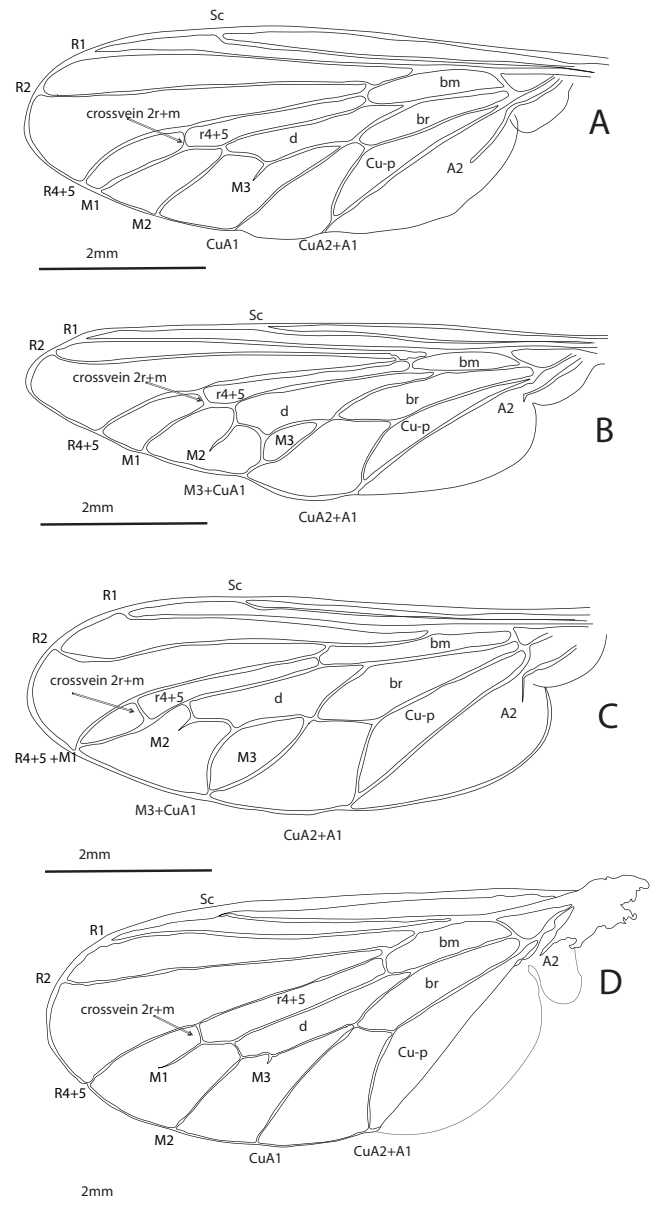


Figure 1. A-D *Exetasis* wings. (A) *E. brasiliensis* Carrera; (B) *E. jujuyensis* Gillung; (C) *E. calida* Wiedemann; (D) *Exetasis caparaoensis* Lovati sp. nov.. (Wings A, B, and C taken from Barneche et al. 2013). Scale = 2 mm.

Taxonomy

Exetasis Walker, 1852

(Figures 1–3)

Diagnosis

Body not arched; non-metallic coloration; hemispherical head, much smaller than the width of the thorax; two ocelli present; eyes densely hairy; antennae inserted at the top of the head, adjacent to the ocellar tubercle; eyes not contiguous above the antennae, contiguous below; palpus absent; short proboscis; elongated flagellum, slightly tapered; scape separated; small subscutellum, not enlarged, barely visible; circumambient costa; straight costal margin of the wing; straight radial veins; R1 not inflated at the pterostigma; R3+2 present; R4+5 appears as a single vein, usually reaching the wing margin; R4+5 cell present, narrowly elongated, closed; crossvein 2r-m present; M1, M2, and M3 present; M3 separate at the margin or fused with CuA1, M3 cell usually absent (except in *E. calida* and *E. jujuyensis*); median veins usually reaching the wing margin; discal cell completely closed; CuA2 fused to A1 before the wing margin, cup-p cell petiolate; alar microtrichia present at least in the costal cell; smooth, rounded abdominal tergites; rounded, cylindrical abdomen with similar width to the thorax.

Comments

In the description of the genus, Walker (1852) only described the venation of the wing and no other characters. *Exetasis* has been considered a synonym of *Ocnaea* Erichson by some authors, but Schlinger (1968) says that these two genera are similar but may be separated by the distribution of the microtrichia on the wing membrane and the absence of the vein R4 in *Exetasis*. A species revision for both genera is probably necessary for better understanding of the units.

Exetasis caparaoensis Lovati sp. nov.

(Figures 1D, 2–3)

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Diagnosis

Body size: 7.8 mm in length; wing measuring 7.2 mm in length; holoptic eyes, black and hairy; Antenna as long as the height of the head; reduced mouthparts; upper calypter lighter than the lower calypter; brown lower calypter, with darker edges; R2+3 and R4+5 reaching the wing margin; veins M1 and M3 terminating before the wing margin; M2 reaching the wing margin; M3 and CuA1 not fused; absence of m3 cell formation; CuA2 fused with A1 very close to the wing margin, CuA2+A1 vein almost imperceptible; A2 short, ending before the alular incision; Conical abdomen covered by yellow bristles; phallic complex with long and tubular sclerotized aedeagus.

Description

Male: Head (Fig. 3 B and C). Antenna, as long as the height of the head; scape twice the size of the pedicel, dark brown, cylindrical; pedicel cylindrical, bicolored, with a yellow distal portion (same color as the flagellum) and a dark brown proximal portion (same color as the scape); flagellum yellow, longitudinally excavated, covered with microtrichia except at the apical margin, long, approximately four times larger than the scape and pedicel combined; reduced frontal area, black; ocellar tubercles black; two ocelli present; reduced mouthparts, consisting of a tiny proboscis, smaller than half of the antennal pedicel, yellow (same color as the antennal flagellum), with an apical tuft of bristles. Thorax (Fig. 3 A and F). Thorax wider than the head; dark brown (same color as the antennal scape), covered with yellow bristles; postpronotal lobe light yellow; coxae, trochanters, and femora light yellow; tibiae and tarsi dark brown (Fig. 3 B, D, and E); upper calypter lighter than the lower calypter; lower calypter brown, with darker edges. Wing (Fig. 1 D and 2 A). Wing membrane light brown, covered with microtrichia; subcostal vein terminating beyond the middle of the wing; R2+3 and R4+5 reaching the wing margin; veins M1 and M3 terminating before the wing margin; M2 reaching the wing margin; M3 and CuA1 not fused; no formation of cell m3; CuA2 fused with A1 very close to the wing margin, vein CuA2+A1 almost imperceptible; A2 short, terminating before the alular incision. Abdomen (Fig. 3 A, B, D, and E). Conical, covered with yellow bristles; tergites and sternites dark brown with horizontal yellow stripes on

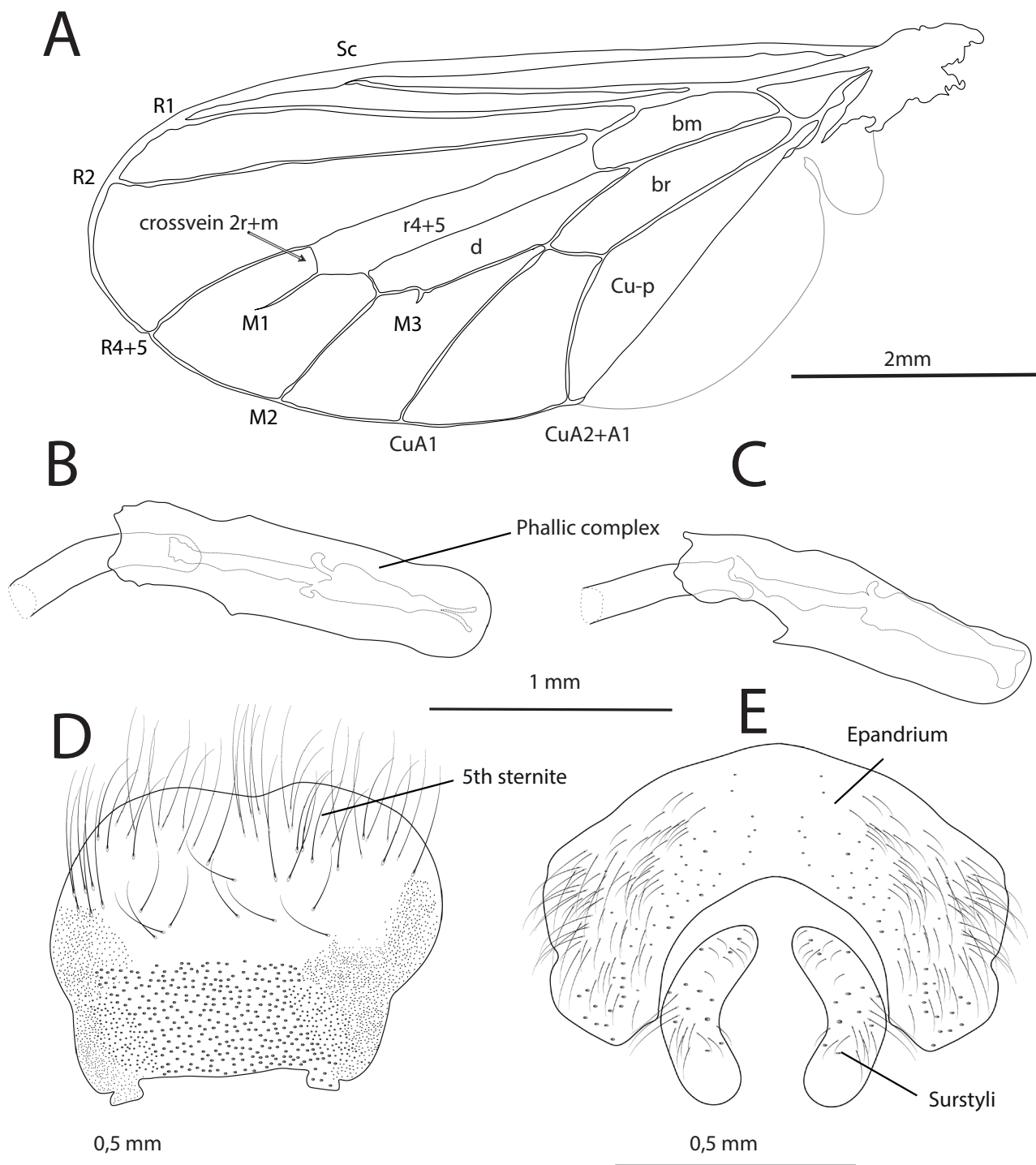


Figure 2. A-E Wing and terminalia of the *Exetasis caparaoensis* Lovati sp.nov.. **(A)** Wing; **(B)** Phallic complex in dorsal view; **(C)** Phallic complex in lateral view; **(D)** 5th sternite in dorsal view; **(E)** Epandrium and surstyli in dorsal view. Scales in millimeters.

the distal portion. Terminalia. Dark brown epandrium with yellow spots, wider than long and with a strong median incision near the junction of the surstyli, long bristles not widely spaced throughout the epandrium (Fig. 2 E); yellow surstyli, longer than wide with a

slight curvature on the anterior median margin, long and medium bristles along the entire length, reniform (Fig. 2E); fifth sternite smaller than the epandrium, with slight projections on the posterior margins and a slight indentation on the anterior median margin,

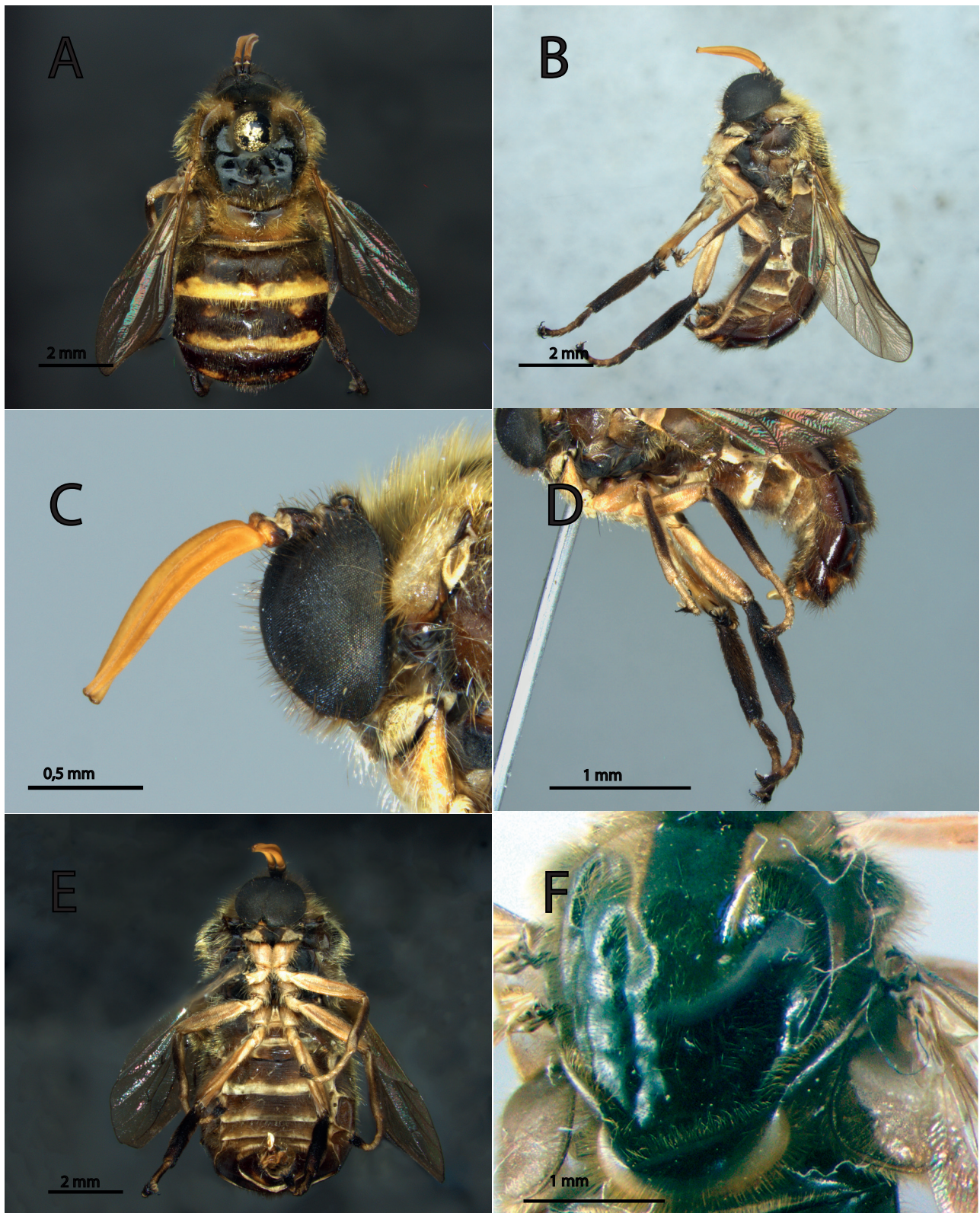


Figure 3. *Exetasis caparaensis* Lovati sp. nov.. (A) Dorsal view; (B) Lateral view; (C) Head in lateral view; (D) Legs in lateral view; (E) Ventral view; (F) Thorax in dorsal view. Scales in millimeters

and with many long bristles on the anterior surface (Fig. 2D); phallic complex with a long and tubular sclerotized aedeagus (Fig. 2B and C).

Type material

Holotype: Male, with the absence of one of the forelegs, labeled with the following information: BRASIL, MG, Alto Caparaó, Par. Nac. do Caparaó, Alt 1465m, 20°30'05"S 41°49'16"W, arm.18, 07-14.iii.2013, arm. Malaise, C. O. Azevedo & F. B. Fraga coll., (UFES N.01786). Paratypes: Sixteen males labeled with the following information: BRASIL, MG, Alto Caparaó, Par. Nac. do Caparaó, Alt 1465m, 20°30'05"S 41°49'16"W, arm.18, 07-14.iii.2013, arm. Malaise, C. O. Azevedo & F. B. Fraga coll. (UFES N.01786).

Etymology

The species is named *Exetasis caparaoensis* in reference to the Caparaó National Park, where the fly was collected.

Comments

Only the male is known.

Discussion

The discovery and description of *Exetasis caparaoensis* Lovati sp. nov. further contribute to our understanding of the diversity and distribution of Acroceridae flies. The collection of this new species within the Caparaó National Park highlights the importance of protected areas for the preservation of biodiversity and the discovery of new species. Future studies should continue to explore the Acroceridae family, including its taxonomy, biology, and ecological interactions.

In conclusion, the description of *Exetasis caparaoensis* Lovati sp. nov. expands our knowledge of the Acroceridae family and emphasizes the need for further research on these fascinating "spider flies." The study underscores the importance of taxonomic studies and biodiversity conservation efforts, particularly within protected areas like the Caparaó National Park.

Acknowledgments

We would like to thank Prof. Dr. Marcelo T. Tavares and Me. Ricieri Campo Dall'Orto, technician of the Entomological Collection DCBIO/UFES, for lending us the material. We extend our gratitude to Dr. Julia Calhau who, during the material screening, identified the fly as a new species and revised the previous version of this manuscript. We are also grateful to Prof. Dr. Rodrigo Feitosa and Dr. Rodney Cavichioli for providing us with the equipment for capturing the photos. Our heartfelt appreciation goes to our advisor, Prof. Dr. Andressa Paladini, who guided us in the use of the equipment and provided valuable comments and suggestions on the previous version of this manuscript.

Conflicts of interest

The authors declare no conflicts of interest.

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