



Description of the larval instar of *Cerciplanus cipo* Garcia & Urso-Guimarães (Diptera: Cecidomyiidae) from Serra do Cipó, Minas Gerais, Brazil

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ARTICLE INFO

Article history:

Received 17 Abril 2024

Accepted 02 August 2024

Available online 27 September 2024

Associate Editor: Marcia Couri

Keywords:

adult-larva association

Cerrado

Ochnaceae

Ouratea

rupestrian field

ABSTRACT

Cerciplanus Garcia & Urso-Guimarães (Diptera, Cecidomyiidae) is a gall-inducing genus that hosts *Ouratea* species (Ochnaceae). The genus consists of three species, *Cerciplanus cipo* Garcia & Urso-Guimarães, *Cerciplanus tocantinensis* Garcia & Urso-Guimarães, and *Cerciplanus maricaensis* Maia, of which only *C. cipo* having an unknown larval stage. In the present study, we have described and illustrated the larvae of the 3rd instar of *C. cipo*.

Introduction

The genus *Cerciplanus* Garcia & Urso-Guimarães (Diptera: Cecidomyiidae), 2020 has three described species: *C. cipo* Garcia & Urso-Guimarães, 2020 and *C. tocantinensis* Garcia & Urso-Guimarães, 2020, both described in Garcia et al. (2020), and the most recent species *C. maricaensis* Maia, 2022 described in Maia (2022). Two of them had the larval stage described, except for *Cerciplanus cipo*. The larval morphology described by Garcia et al. (2020) was characterized by the presence of a conspicuous bifid spatula with short shaft and four terminal papillae of equal size, two setose, and loss of setae on the ventral papillae of the eight abdominal segments. The last characteristic is exclusive to the genus (Garcia et al., 2020). *Cerciplanus cipo* was described using adults (males and females), pupa, galls, and aspects of biology (Garcia et al., 2020).

During an expedition to the Serra do Cipó, a notable place from Brazilian biodiversity, presenting phytophysiology of rupestrian fields (Resende et al., 2013), we resampled galls induced by two endemic species

of cecidomyiids, *Cerciplanus cipo* (Garcia et al., 2020) and *Asphondylia cipo* (Urso-Guimarães, 2018). On this occasion, we obtained the larval third instar of *C. cipo*, which is described in this paper.

Material and methods

The sampling was conducted in a rupestrian field, a phytophysiology belonging to the Brazilian savannah (Cerrado) in the Vellozia Natural Reserve (-19.28089°S, -43.59013°W), and Pedra do Elefante (-19.28941°S, -43.53816°W) on Serra do Cipó, in the Municipality of Santana do Riacho, Minas Gerais, Brazil (Fig. 1).

Cerciplanus cipo was initially associated with *Heteropteris* sp. (Malpighiaceae) (Garcia et al., 2020). However, upon revisiting the type locality and collecting new host specimens, we identified the host plant as *Ouratea floribunda* (A.St.-Hil.) Engl. (Ochnaceae).

Gall-induced leaves were collected in branches of *O. floribunda* (Fig. 2). The collection was conducted between the 30th of October until the first of November 2023. We proceed an active search for host plants

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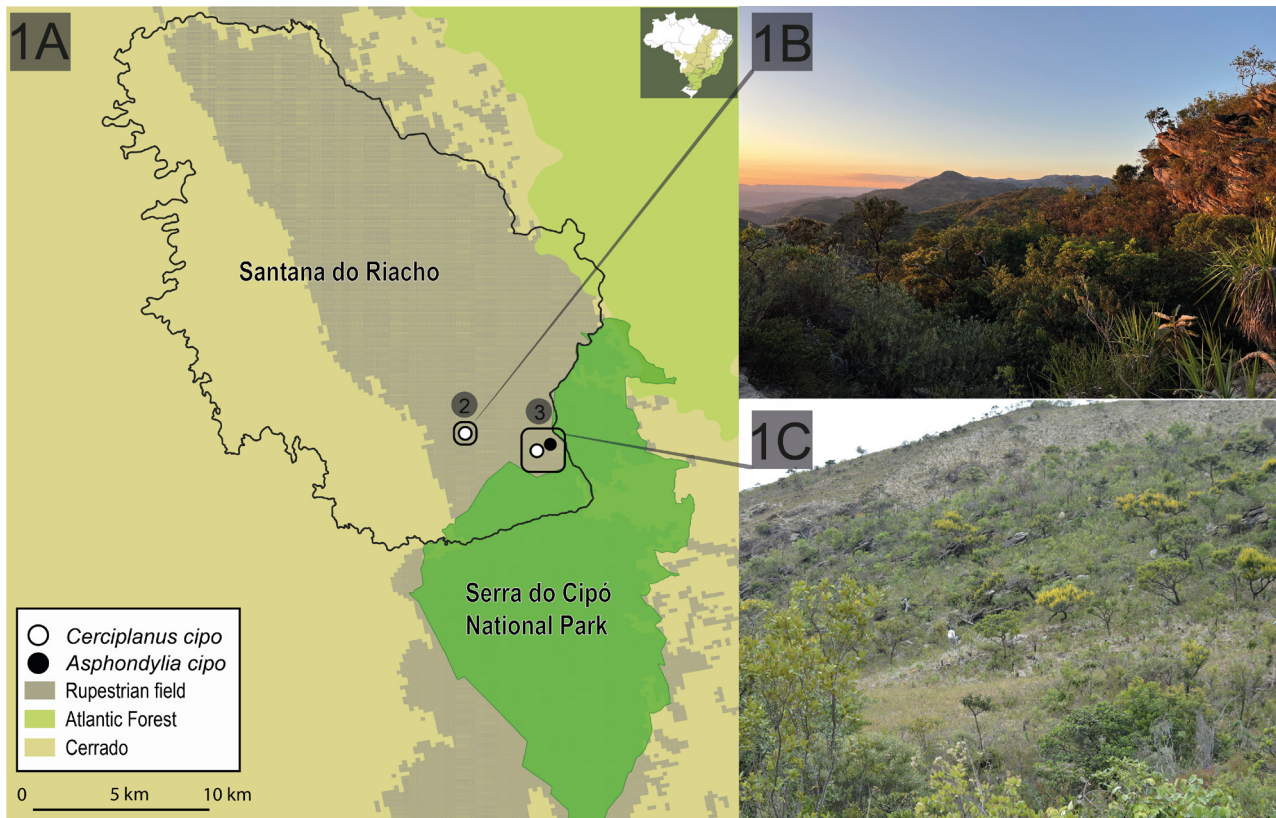


Figure 1 (A) Santana do Riacho, Serra do Cipó, Minas Gerais State, Brazil; (B) Vellozia Natural Reserve; (C) and Morro do Elefante, sample localities of *Cercioplanus cipo* Garcia & Urso-Guimarães, 2020 and *Asphondylia cipo* Urso-Guimarães, 2018, respectively.

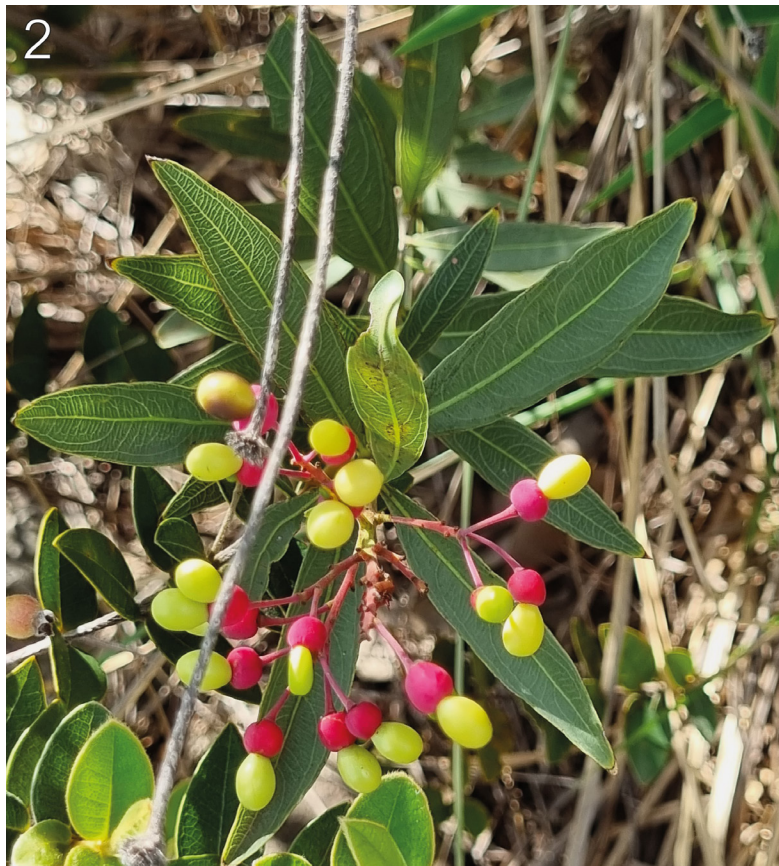


Figure 2 Branch of the host plant *Ouratea floribunda* (A.St.-Hil.) Engl. (Ochnaceae).

with galls from being dissected under a stereomicroscope to obtain the immature stage. The resulting material was preserved in ethanol 80%. Microscopic slides of the third larval instar were made following the methods outlined by Gagné (1994). Garcia et al. (2020) was used for the identification process and terminology of *Cercioplanus* larvae. The material was deposited at the Laboratório de Sistemática de Diptera of Universidade Federal de São Carlos (UFSCar), Campus Sorocaba. The exsiccates of *Ouratea floribunda* (Ochnaceae) were deposited in the herbarium of UFSCar, Campus Sorocaba (SORO).

Results

Larval description of *Cercioplanus cipo*

Larva of 3rd instar (Fig. 3A). Whitish. Body length, 1.73 mm, width 0.8 mm (n=3). Integument weakly sclerotized. Spatula bidentate 0.12 mm length, width 0.08 mm, inner incision wide and U-shaped, teeth 0.04 mm apart from each other (n=2). Spatula strongly sclerotized in the anterior portion; shaft short and large; lateral papillae in one group of three papillae, two setose and one asetose (Fig. 3B). Terminal

segment with four papillae of equal size per side, two setose and two asetose, ventral anus in shaft (Fig. 3C).

Material examined

3 larvae: BRAZIL, Serra do Cipó, Reserva Vellozia (-19.28089°S, -43.59013°W), Morro do Elefante (-19.28941°S, -43.53816°W). 30-X-2023 until 1-XI-2023, Urso-Guimarães 2023 leg., 3 larvae.

Remarks

The larvae from *Cercioplanus cipo* is compatible with the diagnostic characters of *Cercioplanus* larvae, being morphologically closer to *C. tocantinensis*

Gall and biology

The leaf galls of *Ouratea floribunda* (Ochnaceae) (Fig. 4) are green when immature, turning brown when mature or senescent. Galls have a conical format and develop on the abaxial surface of the leaf, normally

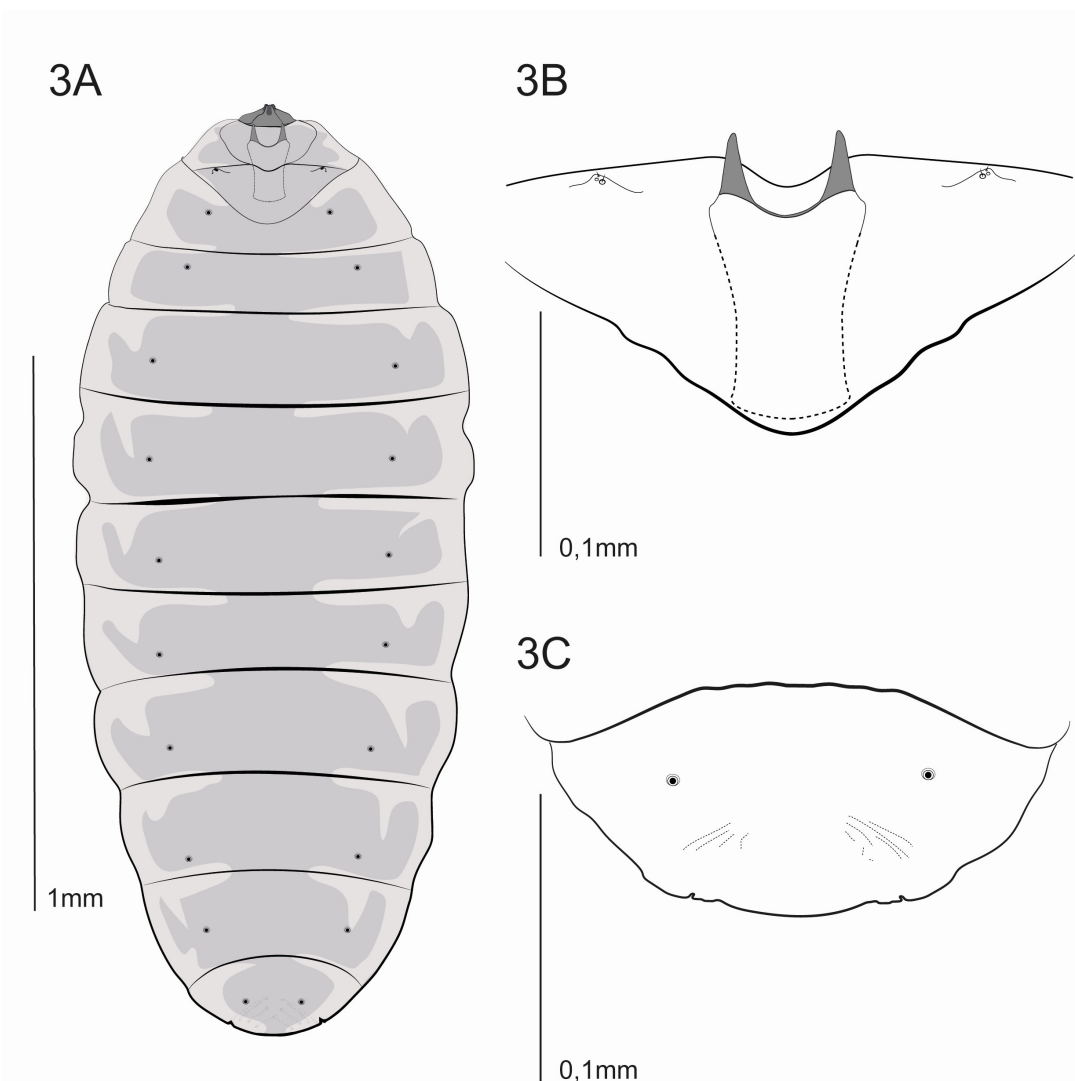


Figure 3 (A) *Cercioplanus cipo* Garcia & Urso-Guimarães, 2020 larval habitus; (B). prothoracic spatula (ventral view); (C). larval terminal segment (dorsal view).



Figure 4 Conical leaf galls on the leaves of the host plant *Ouratea floribunda* (A.St.-Hil.) Engl. (Ochnaceae).

attached to the main vein. Pupation of *Cerciplanus cipo* occurred in the gall and has been recorded as a leaf gall inducer in distinct species of Ochnaceae (in Garcia et al., 2020 it was erroneously identified as *Heteropterys* sp., Malpighiaceae). With the new samples containing reproductive organs, it was possible to re-identify the host plant of *C. cipo* as an *Ouratea floribunda* of the family Ochnaceae, like the other inducers of this *Cerciplanus* described so far.

Funding

This study was financed by the Pró-Reitoria de Pós-Graduação of Universidade de São Paulo (USP), edital PRPG 06/2023 (disciplina 5925787 - Ecologia de insetos Galhadores). The authors thanks to Almili Cruz, Antônio Bruno Farias, Esau Osapina, Gabriela Fraga for

valuable contributions on field efforts, to Prof. Dr. Geraldo Wilson for allowed the collection at Vellozia Natural Reserve, and Renata Cavallari for the organization and support of the fieldwork. We thank Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) [Finance Code 001]; Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) [CNPq grants 316489/2021-2 for J.C.S]; and Programa de Pós-Graduação em Entomologia of FFCLRP/USP, Ribeirão Preto, São Paulo.

Conflicts of interest

The authors declare no conflict of interest. The funders had no role in the design of the study, in the collection, data, in the writing of the manuscript, or in the decision to publish the results.

Author contribution statement

FHDL Writing – original draft, Investigation, Data collection, Visualization. MVUG Methodology, Data collection, Identification, Curation, Writing – review & editing. JCS Writing – review & editing.

References

- Gagné, R. J., 1994. The Gall Midges of the Neotropical Region. Cornell University Press, Ithaca, 352 pp.
- Garcia, C. A., Scareli-Santos, C., Oliveira, F. G. S., Silva, M. D., Urso-Guimarães, M. V., 2020. A New Genus and Two New Species of Cecidomyiini (Diptera: Cecidomyiidae) from Brazil. *Ann. Zool.* 70 (2), 263-271. <http://doi.org/10.3161/00034541ANZ2020.70.2.006>.
- Maia, V. C., 2022. A new species of gall midge (Diptera, Cecidomyiidae) on *Ouratea cuspidata* (A.St.-Hil.) Engl. (Ochnaceae), a plant endemic to Brazil. *Rev. Bras. Entomol.* 66 (3), e20220034. <http://doi.org/10.1590/1806-9665-rbent-2022-0034>.
- Resende, F. M., Fernandes, G. W., Coelho, M. S., 2013. Valoração econômica do serviço de estocagem da diversidade de plantas fornecido pelos ecossistemas de campos rupestres brasileiros. *Braz. J. Biol.* 73 (4), 709-716. PMID:24789385. <http://doi.org/10.1590/S1519-69842013000400005>.
- Urso-Guimarães, M. V., 2018. A new species of *Asphondylia* (Diptera: Cecidomyiidae) and a key to separate species of the genus associated with Asteraceae from Neotropical region. *Pap. Avulsos Zool.* 58, 1-7. <http://doi.org/10.11606/1807-0205/2018.58.53>.