

Systematics, Morphology and Biogeography

## Description of the larva of *Lopesia spinosa* Maia (Diptera, Cecidomyiidae) and new occurrences of the species

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### ABSTRACT

The hitherto unknown larva of *Lopesia spinosa* Maia (Diptera: Cecidomyiidae) is described and the geographical distribution of the species is extended in Brazil to Delfinópolis in Minas Gerais; Altinópolis and Jundiá in São Paulo. Diagnostic characters of the species and illustration of the larva are presented.

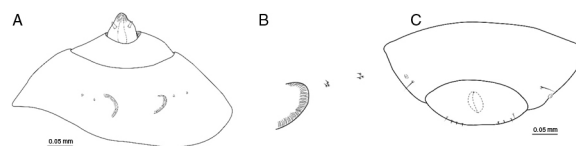
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Galls were found on leaf of *Croton floribundus* Spreng. (Euphorbiaceae) in São Paulo (Neves et al., 2019; Gomes et al., 2013) and Minas Gerais States (Urso-Guimarães et al., 2003) that appeared typical of *Lopesia spinosa* Maia, 2004 found in Tiradentes, Minas Gerais State (Maia and Fernandes, 2004, Fig. 34). The specimens are *L. spinosa* are recognized by the presence of the diagnostic characters of the species, sclerotized facial processes (Maia, 2004, Fig. 48) and 2-toothed antennal horn of pupa (Maia, 2004, Fig. 49). *C. floribundus* is a pioneer species with wide distribution in Brazil (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Distrito Federal, Mato Grosso, Mato Grosso do Sul, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, and Paraná) and Paraguay (Guadalupe) (Dos Santos et al., 2017).

I reared all stages of the life cycle of *L. spinosa*, including the third stage of the unknown larva. For completeness the description of this species, the larva is described and illustrated here with new records of geographical distribution.

### Material and methods

Branches of *C. floribundus* (Euphorbiaceae) with galls were collected in Altinópolis, State of São Paulo, Brazil (Neves et al., 2019, Fig. 1A). Additional material was collected in Delfinópolis, Minas Gerais State (Urso-Guimarães et al., 2003, Fig. 12) and in Serra do



**Fig. 1.** Larva of *Lopesia spinosa*. A. Cephalic and thoracic region, ventral view. B. Detail of the semicircular spatula and lateral papillae. C. Terminal segment, dorsal view.

Japi Reserve, Jundiá, São Paulo State (Gomes et al., 2013, Fig. 2). Data of collection and emergency are in the section “Examined material”. Some galls were opened to obtain immature specimens, and other galls were maintained in plastic pots for rearing of adults. The specimens were preserved in 80% ethanol. Part of the specimens was later mounted on slides following the methodology outlined by Gagné (1994), and identified using literature for comparison. Exsiccates are deposited in the Herbarium of UFSCar – Sorocaba (SORO). Specimens of gall makers are deposited in the Diptera collection of the Museu de Zoologia da Universidade de São Paulo/USP (MZSP).

### Results and discussion

*Lopesia* Rübsaamen, 1908

*Lopesia spinosa* Maia, 2004

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**Description – Third Instar Larva (Fig. 1A–C)**

Body length: 2.00–2.06 mm long ( $n = 5$ ). Fusiform and cylindrical body; integument rough with micro-spines. Cephalic and thoracic region (Fig. 1A): Antenna short; spatula replaced by two evident sclerotized semicircles (Fig. 1B) in the three thoracic segments ( $n = 5$ ), two groups of three lateral papillae on each side of spatula, three pairs setose in each group. Terminal segment round with four pairs of terminal papillae (Fig. 1C): three pairs corniform, and one setose, anus ventral in shaft.

**Examined material**

BRAZIL, São Paulo State: Altinópolis, Touristic Complex of Itambé (21°04'02.7"S 47°26'12.3"W, **new record**). Collection date, 15.iii.2000 – Slide mounted: 1 male – Emergency date, 20.iii.2000; 4 females – Emergency date, 21.iii.2000; 1 female – Emergency date, 22.iii.2000; 5 exuviae and 5 larvae. In vials: 1 female – Emergency date, 15.iii.2000; 7 females – Emergency date, 16.iii.2000; 18 females – Emergency date, 20.iii.2000; 13 females – Emergency date, 21.iii.2000; 46 exuviae; 4 pupae. Urso-Guimarães, M.V.; Balbi, M.I.P.A. & Mendes, H.F. col. **Additional material:** BRAZIL, São Paulo State: Jundiá, Serra do Japi Reserve (23°39'58.8"S, 46°53'08.7"W, **new record**): Slide mounted: Collection date, 08.ii.2011 – 1 male – Emergency date, 10.ii.2011; 1 male – Emergency date, 13.ii.2011; 1 female – Emergency date, 10.ii.2011; 1 female – Emergency date, 11.ii.2011; 1 female – Emergency date, 13.ii.2011; 1 exuvia. Gomes, G. C. col. BRAZIL, Minas Gerais State: Delfinópolis (20°12'44.4"S, 46°55'15.1"W, **new record**): Collection date, 29.vi.2000. Galls. Urso-Guimarães, M.V.; Bonifácio-Silva, A.C. & Scareli-Santos, C. col.

**Remarks of the larvae of *Lopesia spinosa***

The larvae of *Lopesia* species are characterized by short terminal setae, most of which are corniform and in a terminal projection (Gagné and Marohasy, 1993; Gagné, 1994). The *Lopesia* species presents a variation in the number of teeth of the spatula, sometimes with reduction of the number of teeth or lacking of the spatula. The cases of reduction of spatula are *L. aldinae* with one tooth and *L. niloticae*, *L. armata*, *L. quadrata*, and *L. singularis* which spatula is lacking. The larva of *L. spinosa* has two sclerotized semicircles replacing the spatula in the three thoracic segments, a unique case in *Lopesia*. The terminal segment of *L. spinosa* is round and presents four terminal papillae, three corniform of equal size and one setiform longer than the corniform. The other species with terminal segment round and unequal length of terminal papillae are *L. erythroxyli*, *L. licaniae*, and *L. niloticae* (Rodrigues and Maia, 2010), but in *L. niloticae* the spatula is lack and the terminal segment has reentrancy and in *L. erythroxyli* and *L. licaniae* the spatula has two teeth and a long shaft.

**Updated geographical distribution of *Lopesia spinosa***

Once the galls and specimens of the *Lopesia spinosa* were sampled in Altinópolis, São Paulo State (Neves et al., 2019), and additional material was sampled in Serra do Japi Reserve in São Paulo State (Gomes et al., 2013) and Delfinópolis in Minas Gerais State (Urso-Guimarães et al., 2003), the geographical distribution is herein extended from Tiradentes, Minas Gerais State (Maia and Fernandes, 2004) to these localities. As the host plant species is widely distributed in Brazil (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Distrito Federal, Mato Grosso, Mato Grosso do Sul, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, and Paraná) and Paraguay (Guadalupe) (Dos Santos et al., 2017), it is also expected that *Lopesia spinosa* occurs in other regions where the plant is distributed. Further investigation is needed to confirm this hypothesis.

**Conflicts of interest**

The author declares no conflicts of interest.

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