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Myrciamyia pterandrae (Diptera, Cecidomyiidae, Lopesiini), a new species of gall midge associated with *Pterandra pyroidea* A. Juss. (Malpighiaceae), an endemic plant in Brazilian Cerrado

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ABSTRACT

Myrciamyia pterandrae (Diptera, Cecidomyiidae), a new galling species associated with *Pterandra pyroidea* (Fabaceae), an endemic plant species in Brazilian Cerrado, is described based on larva, pupa, male and female. *M. pterandrae* galls were collected in the municipality of Quartel de São João, State of Minas Gerais, southeastern Brazil. Larvae were removed from the galls and pupae, and adults were obtained by rearing. The specimens were mounted on slides, and the diagnostic morphological characters were illustrated. *M. pterandrae* is compared to *Myrciamyia maricaensis* Maia, 1996 the unique, previously known species of the genus.

Introduction

Pterandra pyroidea A. Juss. (Malpighiaceae) (Fig. 1) is an evergreen shrub, 1–2 m long, with elliptical opposite leaves and inflorescences composed of pink flowers (Anderson, 1997). This plant is endemic in Brazilian Cerrado and has been recorded in the states of Mato Grosso, Goiás, Minas Gerais and São Paulo, and in the Distrito Federal (Mamede, 2017), in an altitudinal range from 650 to 1000 m (Anderson, 1997). A single gall morphotype was previously recorded on the leaves of this species. It was found in an area of stational semidecidual forest in the Serra dos Pireneus (Goiás). The gall was characterized as globoid, green and glabrous, and its inducer was not identified (Araújo et al., 2011).

We have found another leaf gall (Fig. 2) on this plant in Minas Gerais. It is globoid and green (as the previously one), micropubescent (whereas the former is glabrous) and one-chambered. We describe its inducer in the present study.

Material and methods

Study site. Collections were done in January 2009 by L.A.O., in the municipality of Quartel de São João (19°15′40.56″S/45°46′33.11″W), State of Minas Gerais, southeast region, Brazil. According to Drummond et al. (2005), this is a priority area for scientific researches, with five endangered bird species are under extreme threat from growing enterprises (Freitas et al., 2009; Moura et al., 2011).

Galled leaves of *P. pyroidea* were photographed in field, removed from the host plant, placed in labelled plastic bags and transported to the laboratory, where some galls were dissected under a stereoscopic microscope to obtain larva and pupa. Other galled leaves were kept in plastic pots with a thin layer of wet cotton at the bottom and covered by a slender screen until gallers' emergence. Then, these pots were put in a refrigerator to cause adults' lethargy, and the midges were collected using a 70% ethanol-soaked paintbrush. All specimens were first preserved in 70% ethanol and then mounted on microscope slides, following the methods outlined by Gagné (1994).

Samples of the host plant were pressed, dried, identified by Dr. Fernando Augusto de Oliveira e Silveira (UFMG) and kept in his laboratory as voucher material. The field and laboratory work were done by Lazaro Araújo Oliveira, while the description of the new species was made by Valéria Cid Maia and Ismael Cividini Flor.

Results

P. pyroidea is intensely attacked by the galler. Galls are arranged in groups or separately, on the abaxial surface of apical leaves, near

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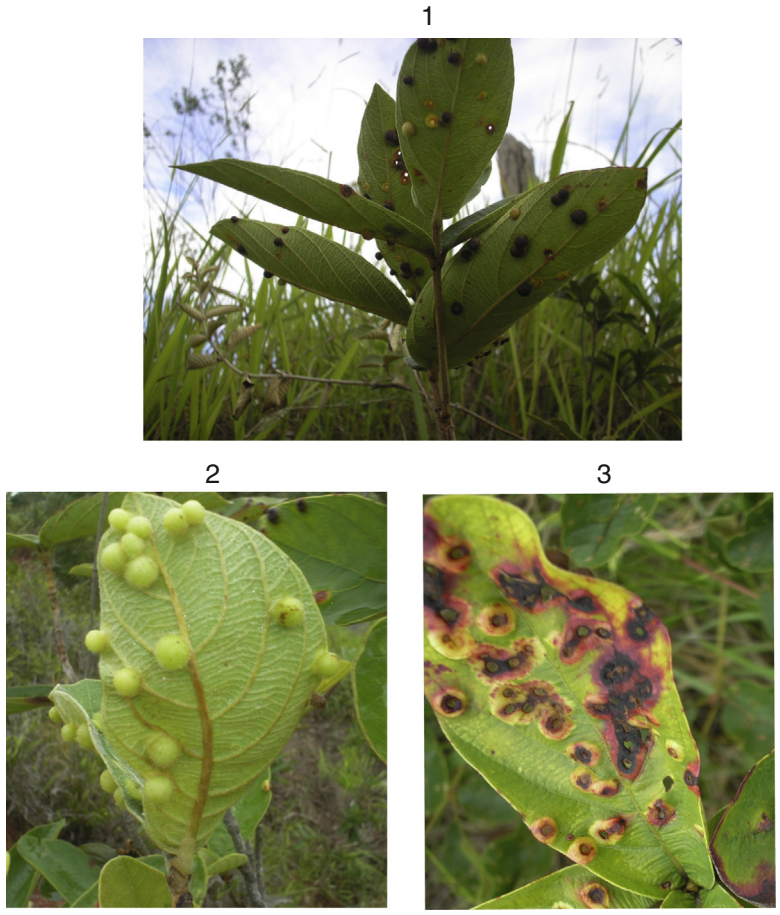


Figs 1–3. Host plant, *P. pyroidea* A. Juss. (Malpighiaceae). 1. General aspect. 2. Galled leaf (galls induced by *M. pterandrae* Maia & Flor, sp. nov.). 3. Plant reaction against the gall induction.

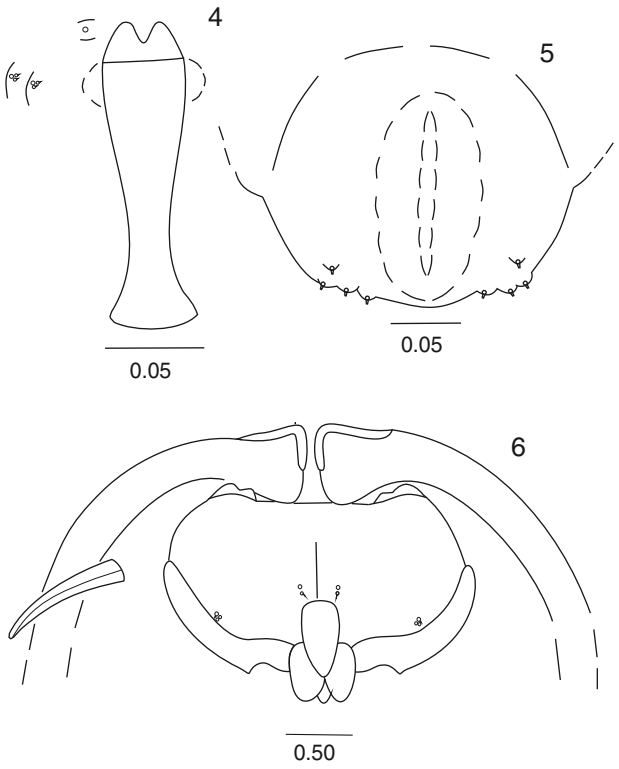
the leaf veins. A single galling larva is found in each gall, where the pupation occurs. Adults emerge by an opening situated adaxially.

Plant reactions against the galler attack were observed and photographed (Fig. 3). They are characterized as a round, red-brownish spot around the gall initiation site. In these reactions, morphological and histological changes cause the death of the attacked tissue, which culminate in the localization, containment and death of the galling larvae (Fernandes and Negreiros, 2001). Fernandes et al. (2003) stressed the importance of the hypersensitivity reaction, a mechanism by which the host plant identifies the attacked site, eliminates attempts to gall induction and protects itself against these insects.

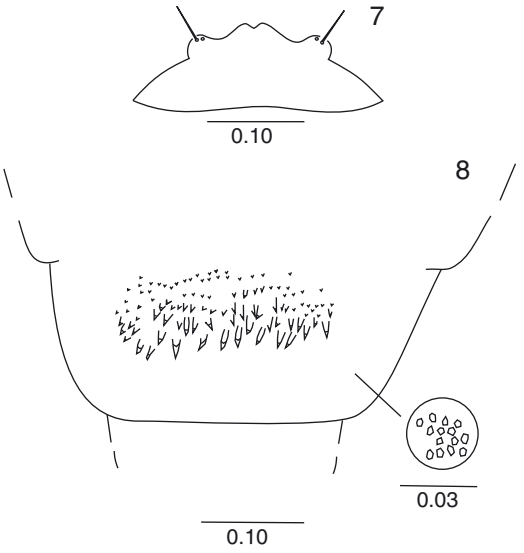
Myrciamyia pterandrae, sp. n. Maia & Flor (Figures 4–17)

Diagnosis. Larva—spatula with anchor-like basis and teeth relatively close to each other, pupa—apical seta short (0.04–0.05 mm long) and prothoracic spiracle of medium length (0.18–0.21 mm long), adults—female flagellomeres with setulose neck and male flagellomeres with bare neck, female circumfila sinuous, male circumfila with all loops similar in length, forelegs with two-toothed tarsal claws and mid and hindlegs with simple claws, male eighth tergite not sclerotized, with only basal pair of trichoid sensilla as vestiture.

Larva. Fusiform and cylindrical body; 2.20–2.51 mm long ($n = 3$). Integument spiny dorsally. Spatula (Fig. 4): 0.18–0.20 mm long ($n = 2$), well developed with basis laterally widened, stalk long, and two teeth relatively close to each other and rounded apically. Two groups of three lateral papillae on each side of spatula (two pairs of setose in each group) (Fig. 4). Terminal segment (Fig. 5): four



Figs. 4–6. *M. pterandrae* Maia & Flor, sp. nov., immature stages. 4–5. Larva. 4. Spatula and lateral papillae (ventral view). 5. Terminal segment with terminal papillae (dorsal view). 6. Pupal head and prothoracic spiracle (ventral view). Scale bars in mm.

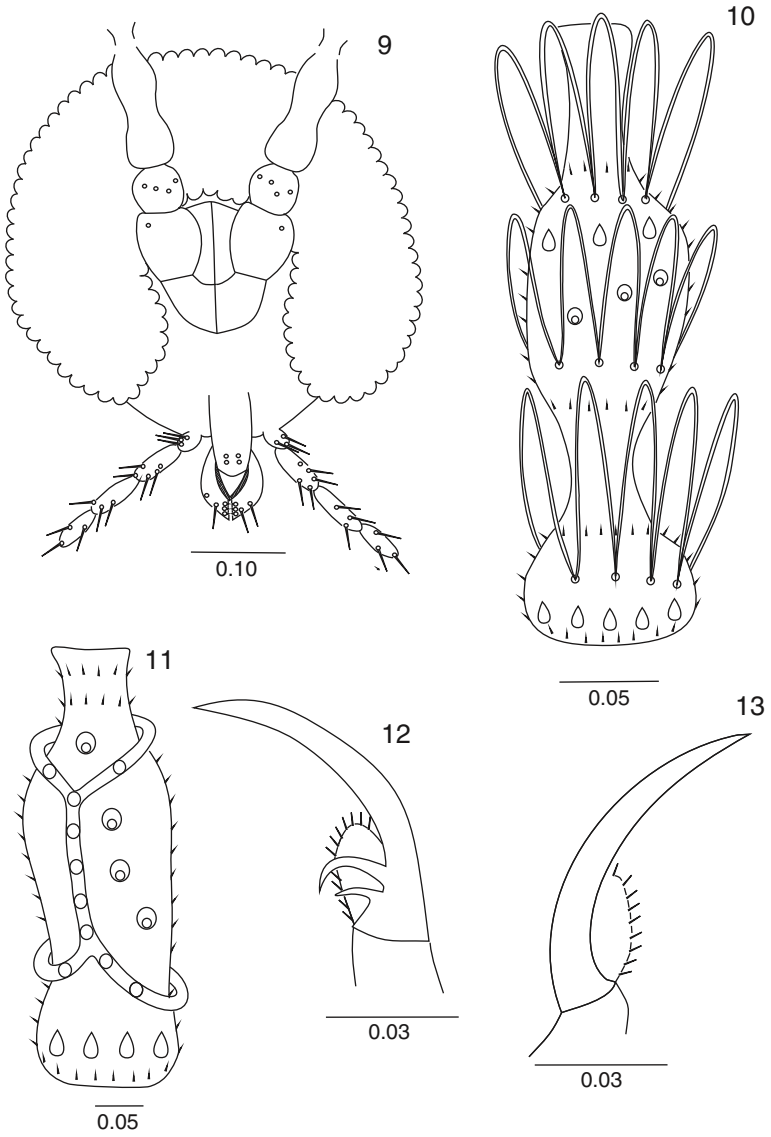


Figs. 7–8. *M. pterandrae* Maia & Flor, sp. nov., pupa. 7. Apical setae (dorsal view). 8. Eighth abdominal segment (dorsal view). Scale bars in mm.

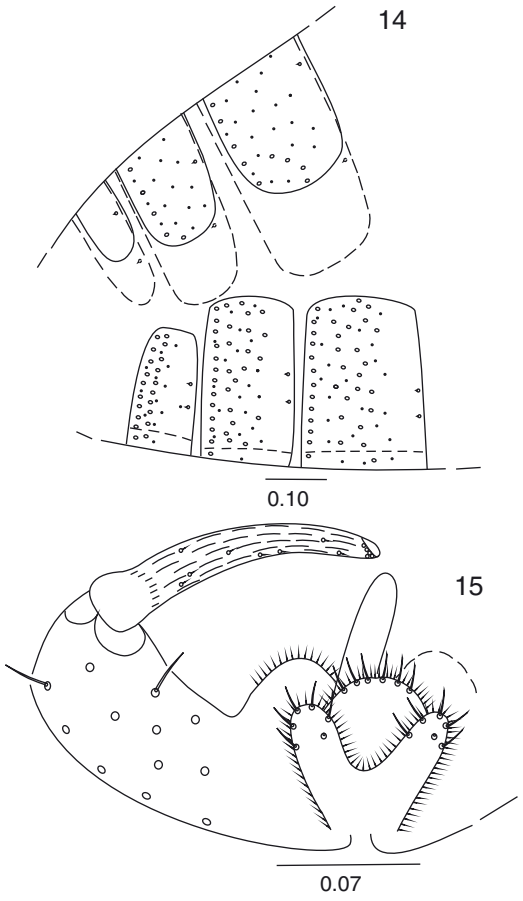
pairs of corniform papillae similar in length, each on a terminal projection.

Pupa. Body length: 2.00–2.86 mm ($n = 4$). Integument slightly sclerotized. Head (Fig. 6): apical setae 0.04–0.05 mm long ($n = 4$) (Fig. 7), antennal bases rounded, slightly produced and differentially sclerotized, upper cephalic margin thickened laterally, face smooth, two pairs of lower facial papillae (one pair asetose and other setose), three pairs of lateral facial papillae, one pair setose and two without seta. Prothoracic spiracle (Fig. 6) elongate 0.18–0.21 mm long ($n = 4$), setiform, strongly sclerotized. Abdomen: 2nd–8th segments with rows of spines, basal rows with spines shorter than those of distal rows. Integument with sculptures (Fig. 8).

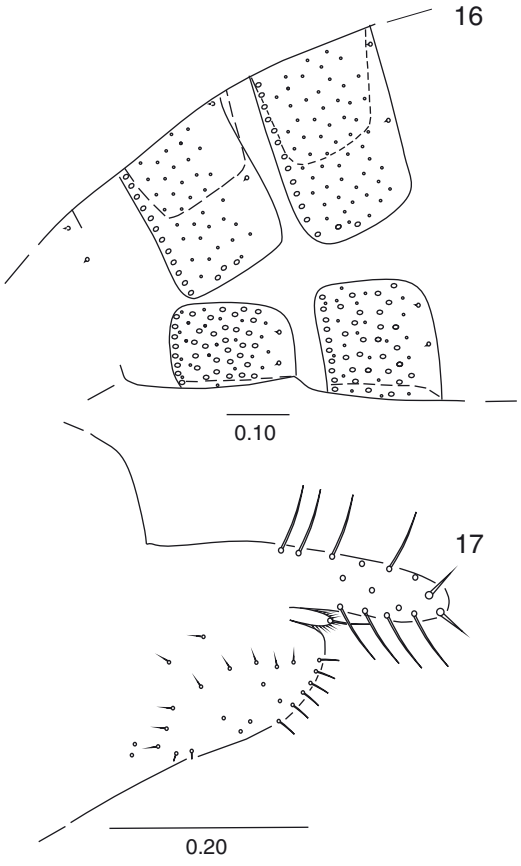
Adult. Male: body length 1.15–2.33 mm in male ($n = 6$) and 3.06–3.66 mm in female ($n = 8$). Head (Fig. 9): Eye facets circular, all closely approximated. Antenna ($n = 5$): scape trapezoid with a single seta ($n = 7$), pedicel hemiglobose with 4–6 setae ($n = 9$), first and second flagellomeres connate, male flagellomeres binodal and tricircumfilar with neck bare (Fig. 10), female flagellomeres cylindrical with two complete circumfilar rings connected by a vertical strand and neck setulose (Fig. 11), 12th flagellomere with apical



Figs. 9–13. *M. pterandrae* Maia & Flor, sp. nov., adults. 9. Male head (frontal view). 10. Fifth male flagellomere. 11. Fifth female flagellomere. 12. Foreleg, tarsal claw and empodium (lateral view). 13. Hindleg, tarsal claws and empodium (lateral view). Scale bars in mm.



Figs. 14–15. *M. pterandrae* Maia & Flor, sp. nov., male. 14. Abdomen (from sixth segment to end) (lateral view). 15. Terminalia (dorsal view). Scale bars in mm.



Figs. 16–17. *M. pterandrae* Maia & Flor, sp. nov., female. 16. Abdomen (from sixth segment to end) (lateral view). 17. Ovipositor (lateral view). Scale bars in mm.

fusiform process entirely setulose in both sexes. Frontoclypeus with 4–6 setae ($n = 12$). Labrum long-attenuate, with three pairs of ventral sensory setae. Hypopharynx longer than labrum and apically setulose. Labella with a sharp apex, each with long lateral setae and three short mesal sensory setae ($n = 13$). Palpus ($n = 8$) with four segments, all cylindrical with setae, first segment shorter than the others, 0.02–0.03 mm long, 2nd–4th segments similar in length, second segment 0.05–0.007 mm long, third segment 0.05–0.08 mm long, and fourth segment 0.06–0.07 mm long.

Thorax. Wings: length: 1.65–1.80 mm in males ($n = 6$). 2.25–2.55 mm in females ($n = 8$). Scutum with four longitudinal rows of setae with a few scales intermixed, the two dorsocentral rows broadest anteriorly, forming a single row posteriorly, and the two lateral as a double row at basal half and forming a single row at distal half. Scutellum with several setae. Anepisternum bare. Anepimeron with setae. Tarsal claws bent near basal third, forelegs with tarsal claws two-toothed (Fig. 12), mid- and hindlegs with tarsal claws simple (Fig. 13); empodium short, not reaching bent in claws (Figs. 12 and 13).

Male abdomen (Fig. 14): 1st–7th tergites sclerotized, rectangular, with rounded lateral margins, a single distal row of setae, few setae laterally, basal pair of trichoid sensilla, and scattered scales; eighth tergite not sclerotized, with basal pair of trichoid sensilla as vestiture; 2nd–7th sternites sclerotized, rectangular, with a single distal row of setae, many setae mesally and laterally, basal pair of trichoid sensilla, and scattered scales; eighth sternite sclerotized, shorter, with scattered setae at half distal, lateral setae, basal pair of trichoid sensilla and scattered scales. Terminalia (Fig. 15): gonocoxite setose, 0.17–0.18 mm long, 0.06–0.07 mm wide ($n = 4$), with setulose rounded mesobasal lobe; gonostylus setulose basally, striated beyond basis, 0.16–0.17 mm long, 0.02–0.03 mm wide ($n = 4$); cerci apically rounded with setae and setulae, cercal lobes divergent; hypoproct almost simple, rounded apically, with setae and setulae; hypoproct much longer than cercus; aedeagus long, tapered to apex, rounded apically, much longer than hypoproct.

Female abdomen (Fig. 16): 1st–8th tergites and 2nd–7th sternites as in male; eighth sternite not sclerotized, with only basal pair of trichoid sensilla as vestiture. Ovipositor (Fig. 17) barely protrusible, 0.18–0.19 mm long (from basal margin of 10th segment to cerci apex) ($n = 6$), cerci separate elongate-ovoid, 0.09–0.10 mm long ($n = 6$) and setose, hypoproct bilobed wide with setae and setulae.

Etymology. The name *pterandrae* is the genitive of the host plant genus.

Material examined. Holotype male. Brazil, Minas Gerais: Quartel São João, I.2009, *L. oliveira* col., MNRJ. Paratypes, same locality, data and collector—5 males, 18 females, 2 pupal exuviae, 2 pupae and 3 larvae, MNRJ.

Comments. *Myrciamyia* Maia, 1996 is the unique genus of Lopesiini whose males have hypoproct almost simple. As the new galler presents this same character, it was included in *Myrciamyia*. Other generic characters are: adults—eyes with facets circular, occipital process absent, flagellomeres binodal in male and cylindrical in female, flagellomere necks setulose in female, 12th flagellomere with apical process in both sexes, palpus four-segmented, tarsal claws toothed, bent near basal third, male terminalia: gonocoxites with broad mesobasal lobe, cercal lobes ovoid, female—ovipositor barely protrusible, cerci separate; pupa—antennal bases with a short projection, rounded apically; 2nd–8th abdominal segments

with dorsal spines, larva—prothoracic spatula elongate and two-toothed, four pairs of corniform terminal papillae (Maia, 1996).

Myrciamyia was previously known by a single species, *Myrciamyia maricaensis* Maia, 1995, an inducer of galls on *Myrcia ovata* Cambess. (Myrtaceae) from restingas in the State of Rio de Janeiro. So, the geographic distribution of the genus is extended to the State of Minas Gerais and Cerrado phytophysiognomy. The new species differs from *M. maricaensis* in several characters: (1) larva—spatula with wider basis and teeth more close to each other in the new species than in *M. maricaensis*; (2) pupa—apical seta 0.04–0.05 mm long in *M. pterandrae* (0.19 mm in *M. maricaensis*), prothoracic spiracle 0.18–0.21 mm long in *M. pterandrae* (0.15 mm in *M. maricaensis*); (3) adults—male flagellomeres with bare neck in *M. pterandrae* and setulose in *M. maricaensis*, female circumfila almost straight in *M. pterandrae* and sinuous in *M. maricaensis*, male circumfila with loops of regular length in *M. pterandrae* and irregular in *M. maricaensis*, forelegs with two-toothed tarsal claws and mid- and hindlegs with simple claws tarsal in *M. pterandrae* and toothed in all legs of *M. maricaensis*, and gonocoxites and gonostylus more slender in the new species than in *M. maricaensis*.

A new host plant, *P. pyroidea* (Malpighiaceae), is added to the genus *Myrciamyia*.

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgments

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