Revista Brasileira de Entomologia 63 (2019) 356–362

SOCIEDADE BRASILEIRA DE ENTOMOLOGIA FUNDADA EM 1937

REVISTA BRASILEIRA DE
Entomologia
A Journal on Insect Diversity and Evolution

www.rbentomologia.com

Systematics, Morphology and Biogeography

Insect galls on *Bauhinia cupulata* (Fabaceae): morphotypes characterization and description of a new species of *Schizomyia* (Cecidomyiidae, Diptera)

Débora Santarém da Silva dos Santos[b], Valéria Cid Maia[b], Daniéla Calado[a,*]

[a] *Universidade Federal do Oeste da Bahia, Barreiras, BA, Brazil*
[b] *Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, Brazil*

ARTICLE INFO

Article history:
Received 24 April 2019
Accepted 19 July 2019
Available online 2 August 2019
Associate Editor: Marcia Souto Couri

Keywords:
Cerrado
Gall midge
Insect–plant interaction

ABSTRACT

Galls on *Bauhinia cupulata* (Fabaceae) were investigated in two physiognomies of the Cerrado, riparian and dry forest, in the municipality of Barreiras (Western Bahia, Brazil) from October 2012 to July 2014. Four insect gall morphotypes were found. They were characterized based on shape, color, indumentum, plant organ of occurrence and galling taxon. A new galling species, *Schizomyia barreirensis*, is described, illustrated (larva, pupa, male, female and gall) and compared to other Neotropical congeneric species.

Introduction

Many Brazilian inventories point out the Fabaceae as one of the plant families with the highest number of insect galls (Araújo et al., 2011, 2014, 2015; Coelho et al., 2009; Fernandes et al., 1988, 1997; Gonçalves-Alvim and Fernandes, 2001; Luz et al., 2012; Maia and Fernandes, 2004; Santos et al., 2012; Urso-Guimarães and Scareli-Santos, 2006).

Among this family, *Bauhinia* Plum. ex L. Plum. is a speciose pantropical genus, within 150–160 species (Vaz and Tozzi, 2003). It is more abundant in the Neotropics with around 110 species, 98 of them recorded in Brazil (Vaz and Tozzi, 2003). Only 13 species of this genus, *B. acuruana* Moric, *B. brevipes* Vogel, *B. cheilantha* (Bong.) Steud., *B. curvula* Benth., *B. forcicata* Link., *B. holophylla* (Bong.) Steud., *B. longifolia* (Bong.) Steud., *B. mollis* (Bong.), *B. cf. outimouta* Aubl., *B. pulchella* Benth., *B. rufa* Graham, *B. ungulata* L. and *Bauhinia cupulata* Benth. host insect galls in Brazil (Araújo et al., 2011, 2015; Coelho et al., 2009; Costa et al., 2014; Fernandes et al., 1988, 1997; Gonçalves-Alvim and Fernandes, 2001; Luz et al., 2012; Saito and Urso-Guimarães, 2012; Urso-Guimarães and Scareli-Santos, 2006; Urso-Guimarães et al., 2003; Lima and Calado, 2018). Additionally, morphotypes were recorded on undetermined species of *Bauhinia* (Araújo et al., 2012, 2015; Carneiro et al., 2009; Fernandes et al., 1997; Maia, 2014; Maia and Carvalho-Fernandes, 2016; Nogueira et al., 2016; Ribeiro et al., 2019; Santos et al., 2012; Silva et al., 2018). According to Silva et al. (2018), *Bauhinia* hosts a great diversity of insect galls, which probably is due to genus be very speciose. Nevertheless, only three galling species were identified: *Asphondylia micropillata* Maia, 2005, *Schizomyia macropillata* Maia, 2005 and *S. tuiuiu* Urso-Guimarães and Amorim, 2002. The other gallers were identified in order or family level.

In the present study, *Bauhinia cupulata* Benth. (Fabaceae), popularly known as "pata-de-vaca", was surveyed for insect galls. It is a native shrub or a small tree that occurs in the states of Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe, Goiás, Pará, Tocantins, Distrito Federal, Mato Grosso, and Mato Grosso do Sul and can be found in three phytogeographic domains: Amazon, Cerrado and Caatinga (Vaz and Tozzi, 2003). Galls on *Bauhinia cupulata* have been cited by Lima and Calado (2018).

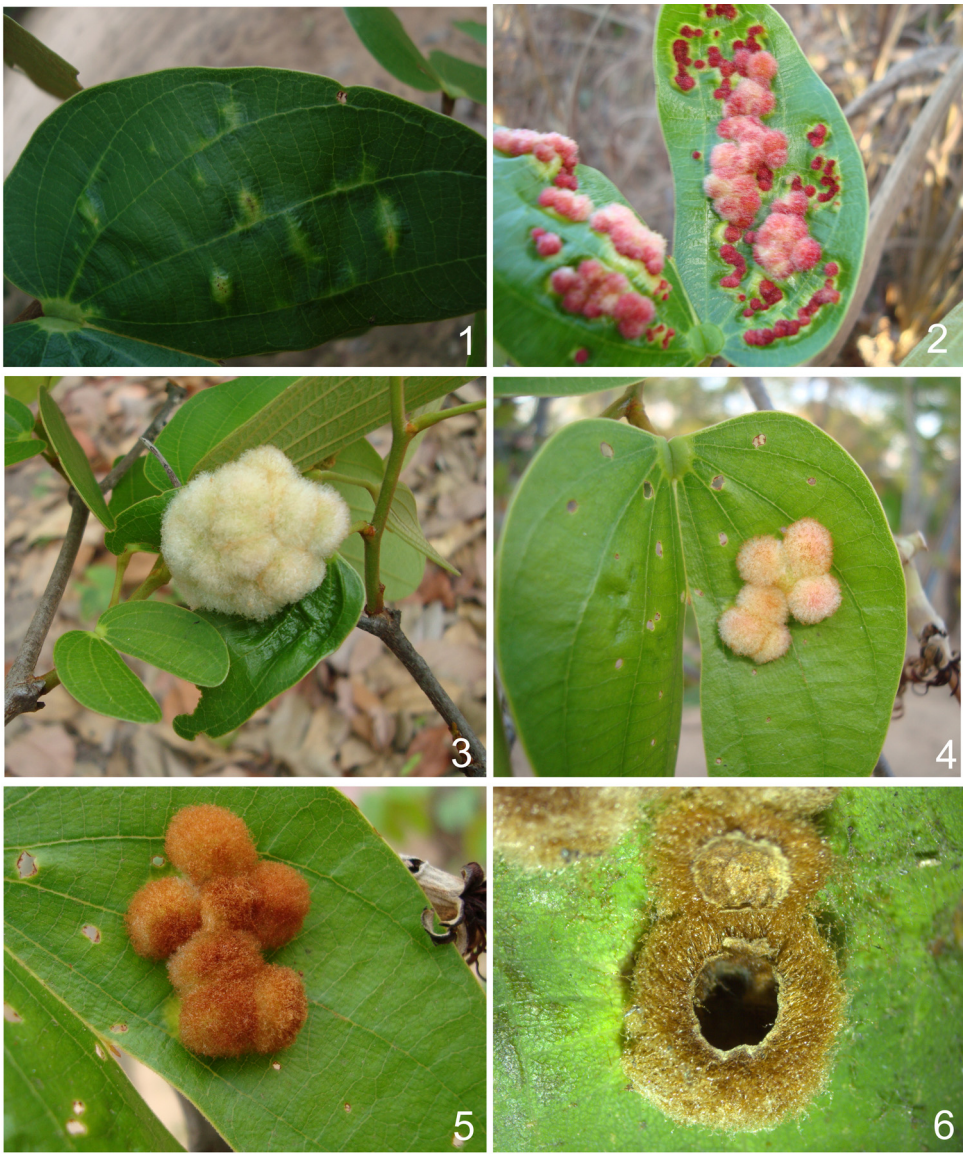
This study aims to characterize the insect galls in *Bauhinia cupulata* and describe a new species of *Schizomyia*, which induces a leaf gall on this host plant.

Material and methods

Studied area: Two physiognomies of Cerrado were investigated in the municipality of Barreiras (western portion of the state of Bahia, Brazil): a riparian forest area at Rio de Ondas in Fazenda do Gentil (45°14′35.17″W and 12°12′46.51″S) and a dry forest area in

* Corresponding author.
E-mail: daniccalado@gmail.com (D. Calado).

https://doi.org/10.1016/j.rbe.2019.07.002



Figs. 1–6. Different development stages of galls induced by *Schizomyia barreirensis*, sp. n. (1) First stage. (2) Second stage. (3) Third stage. (4) Fourth stage. (5) Fifth stage. (6) Last stage (gall cut open to show the larval chamber).

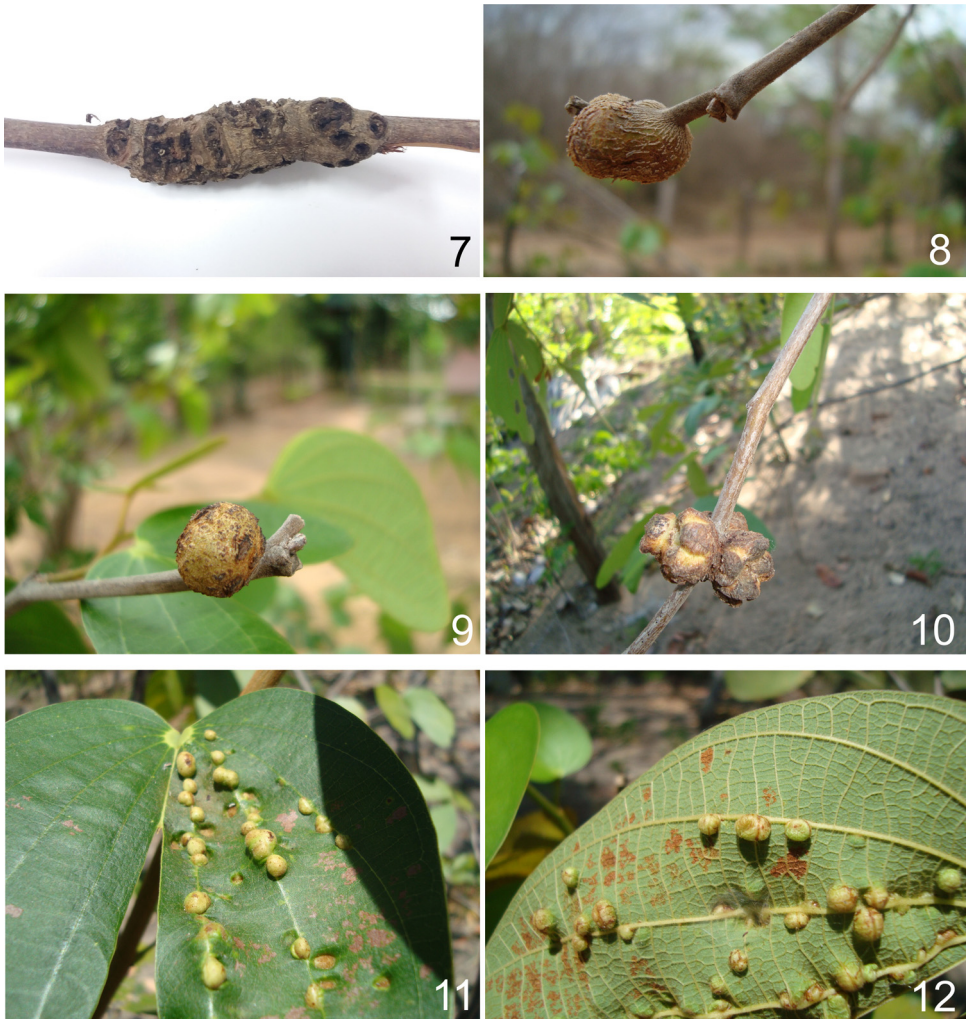
the Campus Reitor Edgard Santos, Universidade Federal do Oeste da Bahia – UFOB (45°01′06.54″W and 12°08′53.05″S).

Field works were developed monthly from October 2012 to July 2014. Fertile branches of the host plant were collected and dried. The exsiccate was identified by Juliana Ribas de Menezes (UFOB) as *Bauhinia cupulata* and the voucher material was deposited in the herbarium of UFOB. Fifty individuals of the host plant were surveyed for insect galls. Each gall morphotype was photographed and characterized by shape, color, organ plant, presence/absence of trichomes, number of internal chambers and galling insect. For leaf galls, the occurrence in the adaxial or abaxial surface was observed.

To obtain the adults, two galled branches of each individual of the host plant were randomly bagged in the field with "voil" until the galls putrefaction. The bags were weekly checked. Other samples were taken to the laboratory, where they were dissected to obtain larvae and pupae of each galling insect. Adults and immature stages were fixed in 70% alcohol in labeled tubes. Later, they were mounted on slides, following the methodology outlined by Gagné (1994). Keys present in Gagné (1994) were used to identify the genera. Part of the material is deposited in the Entomological Colletion of Museu Nacional, Rio de Janeiro (MNRJ) and part in the Entomological Collection of the UFOB. Morphological terminology for adults and immature stages follows that of Gagné (1994).

Results

Four gall morphotypes were found on *Bauhinia cupulata*. One is globoid, one-chambered, on the leaf adaxial surface. It is induced by *Schizomyia* sp. (Diptera, Cecidomyiidae). This gall suffers morphological changes during its development. In the early stage, it is green and glabrous. Later, it becomes entirely covered with red trichomes. Then, the trichomes become white and finally brown in the mature gall (Figs. 1–6). The other is fusiform, brown, glabrous, one-chambered, on stems. Its inducer was not determined, as the galls were already empty when collected, presenting several emergence holes (Fig. 7). The third morphotype is globoid, brown, glabrous, one-chambered, on stems. It is induced by *Asphondylia* sp. (Diptera, Cecidomyiidae) (Figs. 8–10). The fourth is globoid, greenish or yellowish, with trichomes, projected simultaneously on the leaf adaxial and abaxial surfaces. It is induced by Alycaulini (Diptera, Cecidomyiidae) (Figs. 11 and 12). Considering the high specificity



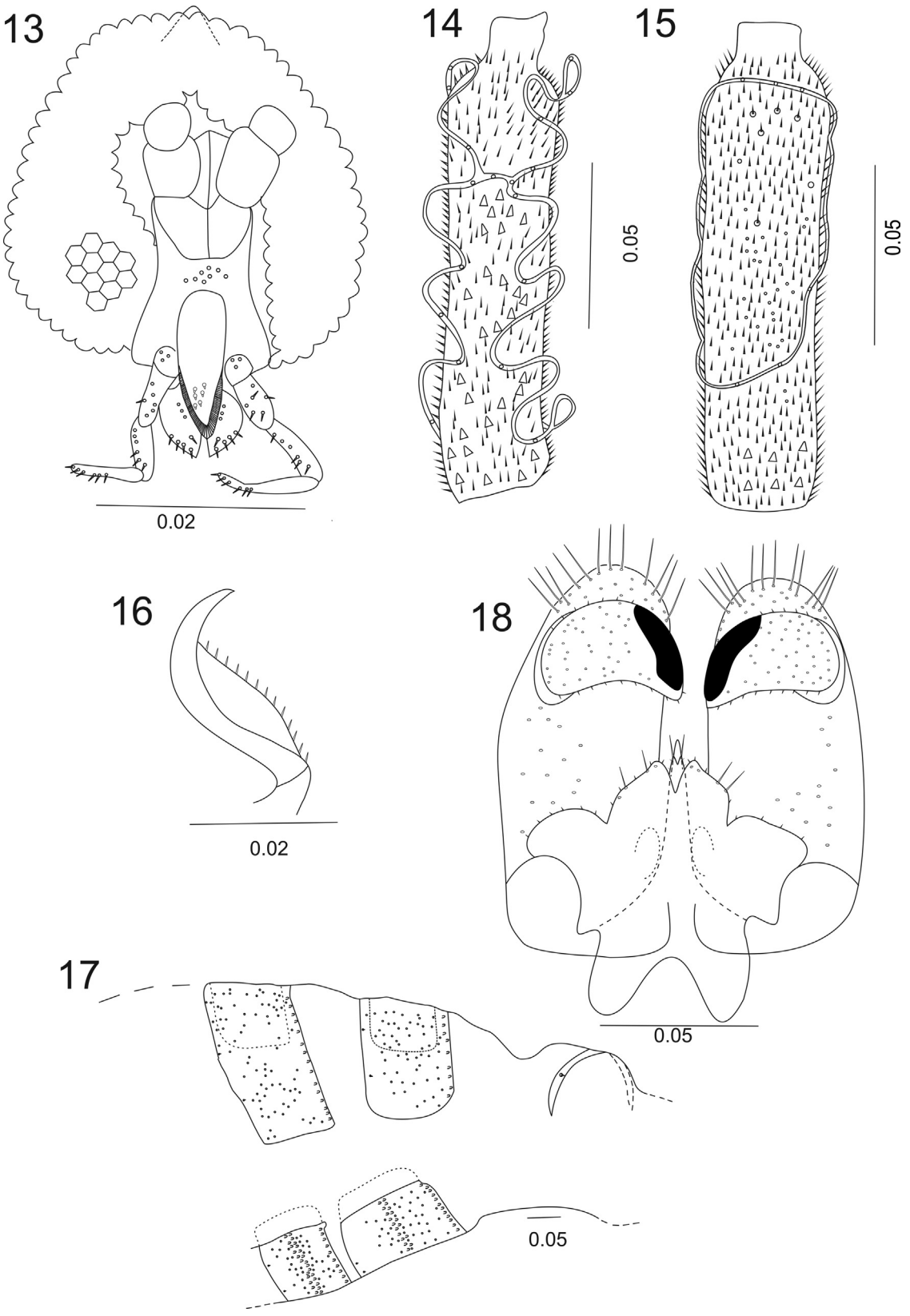
Figs 7–12. General view of galls in *Bauhinia cupulata* (Fabaceae). (7) Fusiform stem gall, inducer not determined; (8–10) Globoid stem gall induced by *Asphondylia* sp.; (11–12) Globoid leaf galls induced by Alycaulini on the adaxial and abaxial surfaces, respectively.

of the galling species, these inducers are probably new, as there is no described gall midge species in association with *Bauhinia cupulata*.

A more detailed morphological study of *Schizomyia* sp. confirmed that it belongs to a new species, which is described herein. *Schizomyia* Kieffer, 1889 is characterized by presenting needlelike ovipositor, four-segmented palpi, and larva with four pairs of terminal papillae (Gagné, 1994). This is a cosmopolitan genus with 55 species, eleven Neotropical, namely: *S. ipomoeae* Felt, 1910; *S. loroco* Gagné, 2008; *S. manihoti* Tavares, 1925; *S. maricaensis* Souza and Maia, 2007; *S. microcapillata* Maia, 2005; *S. rivinae* Felt, 1908; *S. santosi* Maia and Araújo, 2009; *S. serjaniae* Möhn 1960; *S. spherica* Maia and Oliveira, 2007; *S. stachytarphetae* Barnes 1932; and *S. tuiuiu* Urso-Guimarães and Amorim 2002 (Gagné and Jaschhof, 2017).

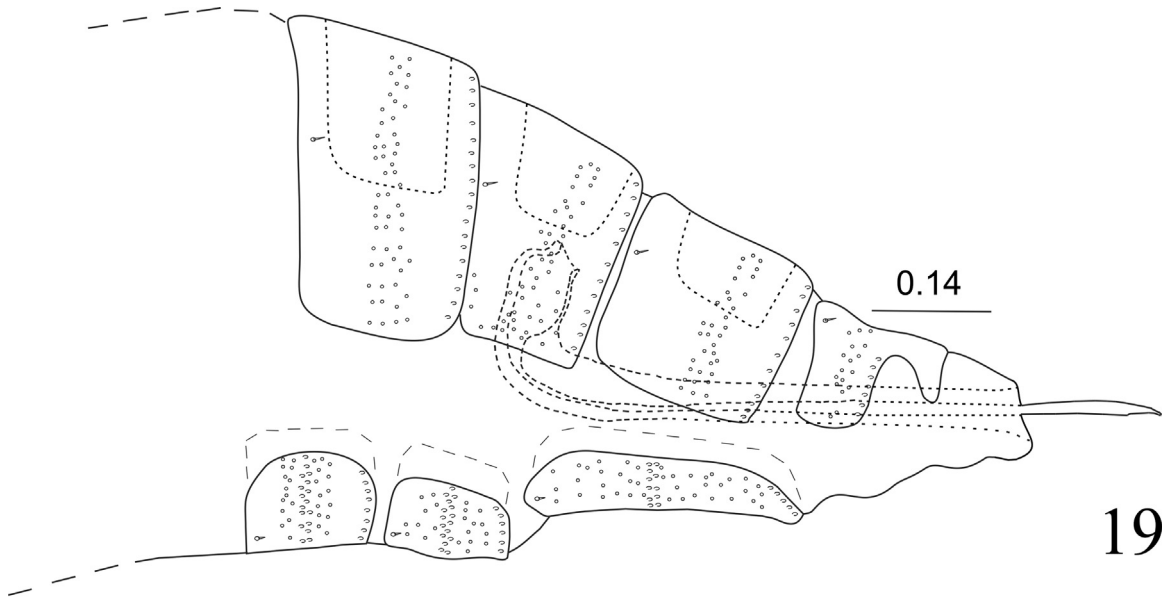
Schizomyia barreirensis *sp. nov.*

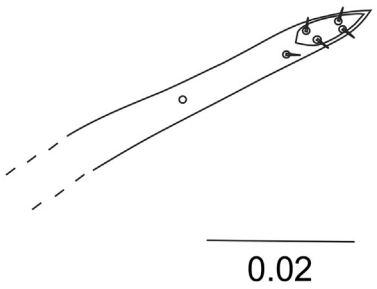
Description. *Adult.* Body length, 1.36–1.80 mm in male ($n = 12$); 1.72–2.0 mm in female ($n = 11$). **Head** (Fig. 13). Occipital process present. Eyes facets hexagonal. Antennae: scape cylindrical and setose; pedicel globular setose; 12 flagellomeres banded in both sexes (yellowish on proximal 1/2 to 1/3 and fuscous on distal 1/2), all cylindrical with bare neck. Circumfila sinuous in male (Fig. 14) and linear in female (Fig. 15). Frontoclypeus with 8–9 setae per side ($n = 5$). Labrum triangular with 3 pairs of setae. Labellae elongated and convex in frontal view, each with 5 lateral setae and three short mesal setae ($n = 3$). Palpus 4-segmented; the first segment ovoid and others cylindrical, increasing in length, all setose. Length of palpus: segment I: 0.03 mm; II: 0.05–0.06; III: 0.07–0.08 and IV: 0.09 ($n = 2$). Hypopharynx similar to the labrum and setulose apically. **Thorax.** Scutum with 2 longitudinal central rows of setae with a few scales intermixed, 2 longitudinal lateral rows of setae along most of scutal length with a few scales intermixed; scutellum with single posterior row of setae, some scattered setae at midlength and few scales; anepimeron with a longitudinal single row of setae, except anteriorly, where the setae are more numerous, other pleura bare. Wing. Length (from arculus to the apex): male, 1.36–1.92 mm ($n = 10$); female, 1.72–2.32 mm ($n = 8$). Tarsal claws simple in all legs, 7.5 times as long as pulvilli, empodium long and well developed not exceeding the curvature of claws (Fig. 16).
Male abdomen (Fig. 17): First through sixth tergites entire, rectangular, each with single, uninterrupted, posterior row of setae, no lateral setae, a pair of trichoid sensilla on anterior margin, and otherwise evenly covered with scales. Seventh tergite entire, rectangular with more numerous posterior setae, irregularly distributed, not forming a row, no lateral setae, a pair of trichoid sensilla on anterior margin, and otherwise evenly covered with scales. Eighth tergite pigmented, narrow, with only the anterior pair of trichoid sensilla. Second through sixth sternites rectangular, more strongly pigmented at midlength and posteriorly, with single posterior row of setae, separated from a horizontal group of



Figs. 13–18. *Schizomyia barreirensis* sp. n. (13) Male, head (frontal view); (14) Male, flagellomere 3; (15) Female, flagellomere 2; (16) Tarsal claws and empodium; (17) Male, abdominal segments 3–8 (lateral view); (18) Male, terminalia (dorsal view). Scale bars in mm.

setae at midlength, lateral setae, a anterior pair of closely approximated trichoid sensilla, and otherwise evenly covered with scales. Seventh and eigth sternites similar to preceding except for its uniform pigmentation and more numerous setae near midlength, and the anterior pair of the trichoid sensilla of the eigth sternite widely separated from one another. **Male terminalia** (Figs. 18). Gonocoxite narrow and setose, elongated, about 2.3 times longer than wide, produced posteroventrally, proximomedial lobe setose, gonostylus





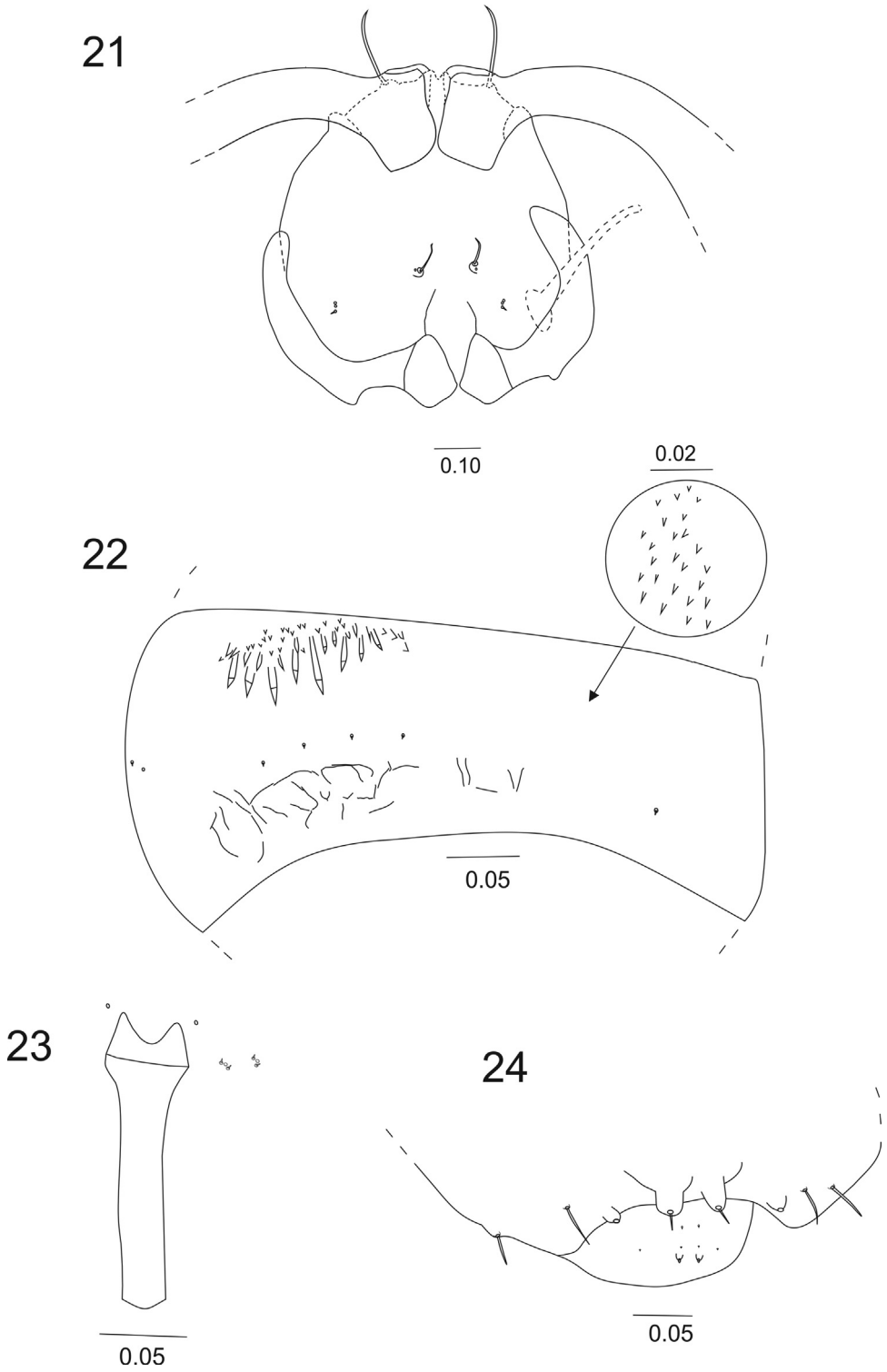
Figs. 19 and 20. *Schizomyia barreirensis*, sp. n. (19) Female, abdominal segments 7–8 (lateral view); (20) Ovipositor (ventral view). Scale bars in mm.

rectangular, about twice as longer than wide, setose, apical tooth covering almost all apical edge; cercus wide, setose, with triangular lobes, approximately as long as hypoproct; hypoproct narrow, approximately as wide as aedeagus, apically divided into two lobes each with an apical with seta; aedeagus gradually tapering from wide base to narrow, acute apically, longer than hypoproct. **Female abdomen** (Fig. 19): tergites 1–7 as in male, tergite 8 sclerotized, with a lateral reentrance, a basal pair of trichoid sensilla, caudal rows of setae, some lateral setae and scattered scales. First through sixth tergites as for male. Seventh tergite with single, full row of posterior setae and several lateral setae. Eighth tergite with anterior pair of trichoid sensilla as the only vestiture, posterior margin deeply concave on lateral third and shallowly concave medially, the concavity accommodating pair of small dorsal lobes between tergite and ovipositor. Second through sixth sternites as for male. Seventh sternite enlarged, more strongly sclerotized than preceding and completely covered with setae.

Ovipositor (Figs. 19 and 20). Elongate, protrusible, needle part about 1.8 times length of seventh sternite; cerci separate, with setae at midlength and apically.

Pupa. Weakly sclerotized with light brown color. Body length 1.84–2.2 mm ($n = 3$). **Head** (Fig. 21): base of antenna obtusely quadrangular at apex in ventral view, cephalic setae 0.09 mm long ($n = 1$), tegument grainy, 3 pairs of lateral facial papillae (1 pair with short seta and the others asetose); 2 pairs of lower facial papillae (1 pair with long setae, and other asetose). **Thorax:** Prothoracic spiracle elongate, setiform, 0.16–0.19 mm long ($n = 4$) (Fig. 21). Wing sheath reaching the distal margin of the third abdominal segment; foreleg, midleg and hindleg sheaths reaching, respectively the distal 1/5 of the fifth abdominal segment, the distal 1/4 of the sixth abdominal segment and perpassing slightly the 1/2 of the seventh abdominal segment. **Abdomen** (Fig. 22): Segments 2–7 with dorsal spines of the varying sizes in the basal half, only on the disk, followed by many tiny spinules throughout the rest of the segment, except in the distal quarter, where there are soft sculptures. Segment 8 with at least four dorsal short spines in the basal half, on the disc, many tiny spinules elsewhere.

Larva. Color orange. Body elongate and fusiform. Length: 2.73–3.6 mm ($n = 15$). Integument completely grainy. Spatula (Fig. 23) robust with 2 teeth, with 0.18–0.20 mm ($n = 9$). Apical teeth spaced out, stalk striated and elongated. Lateral papillae into two groups of three papillae each, one bare and the other with seta. Abdominal segment 8 with medial projection bearing pair of



Figs. 21–24. *Schizomyia barreirensis*, sp. n., immature stages. (21–22) Pupa. (21) Head pupal (frontal view). (22) Abdominal segment 6 (dorsal view); (23–24) Larva. (23) Prothoracic spatula, sternal and lateral papillae (ventral view). (24) Terminal segment with terminal papillae (dorsal view). Scale bars in mm.

papillae setose. Terminal segment convex with four pairs of papillae: one recurved and corniform and three with short setae (one of them with seta longer than the others) (Fig. 24).

Material examined. Holotype male. BRAZIL, Bahia: Barreiras, 11.XI.2013. D. Santos col. (MNRJ). Paratypes: same data, 1 male (MNRJ), 1 female (MNRJ); same locality and collector: 3 males, 26.X.2013 (MNRJ); 2 females and 4 pupal exuviae, 10.X.2013 (MNRJ); 1 female, 03.XI.2012 (UFOB); 1 female and 1 male, 11.XI.2013 (UFOB); 1 male, 26.X.2013 (UFOB); 2 pupal exuviae, 13.VII.2014 (MNRJ); 2 pupal exuvia, 13.II.2014 (MNRJ); 1 larva, 19.VI.2013 (MNRJ); 2 larvae, 20.VI.2013 (MNRJ); 1 larva, 14.VI.2013 (MNRJ); 1 larva, 03.VII.2013 (MNRJ); 1 larva, 18.V.2014 (MNRJ). Additional material: BRAZIL, Bahia: Barreiras, same locality and collector, 4 males, 2 females, 10.X.2013, 1 pupal exuvia, 28.X.2012; 1 larva, 20.VI.2013; 1 larva, 18.II.2014; 2 larvae, 23.II.2014; 2 larvae, 18.V.2014 (MNRJ).

Etymology. The specific epithet "*barreirensis*" refers to the type-locality: Barreiras, Bahia, Brazil.

Remarks. The *Schizomyia* species known from the Western Hemisphere can be divided into two groups based on acropod features, one with falcate claws and empodia no more than 1/3 the length of the claws and the other with hook-like tarsal claws and empodia nearly as long as the claws. The new species belongs to the second group, which also includes *S. ipomoeae* Felt, 1910, *S. maricaensis* Souza & Maia, 2007, *S. macrocapillata* Maia, 2005, *S. santosi* Maia & Araújo, 2009, *S. serjaniae* Möhn, 1960, *S. spherica* Maia & Oliveira, 2007, *S. stachytarphetae* Barnes, 1932, and *S. tuiuiu* Urso-Guimarães & Amorim, 2002. Only two of them, *S. macrocapillata* and *S. tuiuiu*, induce galls on the same plant family and same plant genus of those of *S. barreirensis*, but in different host species: *B. brevipes* Vogel, *B. rufa* (Bong.) Steud., and *B. cupulata* respectively. These three species were collected in Cerrado areas.

Among the second group of species, *S. barreirensis* presents more morphological similarities to *S. macropillata* regarding the adults' characters. The number of frontoclipeal setae is 14–18 in *S. barreirensis*, 14–16 in *S. macropillata*, 53 in *S. maricaensis*, 13–24 in *S. santosi*, 20 in *S. spherica*, 14 in *S. tuiuiu*, no data on *S. serjaniae*). The gonostyli are rectangular to ovoid in *S. barreirensis*, *S. macropillata*, *S. maricaensis* and *S. macropillata*, conical in *S. santosi*,; claviform in *S. spherica*, bifid in *S. ipomoeae*; the males of *S. tuiuiu* and of *S. serjaniae* are unknown. The needle part of the ovipositor is 1.8 times as long as the 7th sternite in *S. barreirensis*, 1.9 in *S. macropillata*, 2.6 in *S. spherica*, 2.8 in *S. maricaensis*, 5.0 in *S. tuiuiu*, 5.8 in *S. santosi*, no data on *S. serjaniae*). Immature phases of *S. barreirensis* and those of *S. macropillata* also present morphological similarities, such as: length of the apical seta (pupa) – 0.09 mm long in *S. barreirensis*, 0.09–0.10 mm in *S. tuiuiu*, 0.02–0.04 mm in *S. maricaensis*, 0.07 mm in *S. santosi*, 0.12 mm in *S. spherical*, 0.08 mm in *S. tuiuiu*, no data on *S. serjaniae*), length of the prothoracic spatula (pupa) – 0.18–0.20 mm in *S. barreirensis*, 0.20 mm in *S. macropillata*, 0.14 mm in *S. santosi*, 0.17 mm in *S. spherical*, 0.28–0.58 mm in *S. serjaniae*, the larvae of *S. maricaensis* and of *S. tuiuiu* are unknown.

Many of these characters were not described for *S. serjaniae*, whose pupa and male are unknown. Nevertheless, the following characters can be used to distinguish the new species from *S. serjaniae*: shape and proportions of the last two flagellomeres (11th and 12th cylindrical and gradually shorter than the precedent in *S. barreirensis*; 11th ovoid, 12th globoid, both conspicuously shorter than the precedent in *S. serjaniae*), shape of the tarsal claws (almost straight in *S. barreirensis* and accentually curved in *S. serjaniae*), and shape of the spatula (anterior teeth with concave outer margin in *S. barreirensis*; anterior teeth with convex outer margin in *S. serjaniae*).

The new species differs from *S. macropillata* in the following characters: in adults – palpi with first segment obconical (spherical in the latter), labellae with acuminate apex (rounded edge in the latter), longer gonocoxites, in pupae – longer prothoracic spiracle (0.16–0.19 mm in *S. barreirensis* and 0.06–0.09 mm in *S. macropillata*) and dorsal spines from the 2nd to 7th abdominal segments (from the 3rd to 9th abdominal segments in *S. macropillata*).

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgments

VCM thanks to Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) (Process. 301481/2017-2) for the financial support. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

References

Araújo, W.S., Santos, B.B., Gomes-Klein, V.L., 2011. Insetos galhadores na Serra dos Pirineus, GO, Brasil. Biota Neotrop. 11 (2), 57–365.
Araújo, W.S., Santos, B.B., Gomes-Klein, V.L., 2012. Relationship between host plant diversity and gall-inducing insects richness in the Brazilian Cerrado. Neotrop. Biol. Conserv. 7, 41–47.
Araújo, W.S., Sobral, F.L., Maracahipes, L., 2014. Insect galls of the Parque Nacional das Emas (Mineiros, GO, Brazil). Check List 10, 1445–1451.
Araújo, W.S., Porfírio Júnior, E.D., Ribeiro, B.A., Silva, T.M., Silva, E.C., Guilherme, F.A.G., Scareli-Santos, C., Santos, B.B., 2015. Checklist of host plants of insect galls in the state of Goiás in the Midwest Region of Brazil. Biodivers. Data J. 3, 1–21.
Carneiro, M.A.A., Branco, C.S.A., Braga, C.E.D., Almada, E.D., Costa, M.B.M., Maia, V.C., Fernandes, G.W., 2009. Are gall midge species (Diptera, Cecidomyiidae) host–plant specialists? Rev. Bras. Entomol. 53 (3), 365–378.
Coelho, M.S., Almada, E.D., Fernandes, G.W., Carneiro, M.A.A., Santos, R.M., Quintino, A.V., Sanchez-Azofeifa, A., 2009. Gall inducing arthropods from a seasonally dry tropical forest in Serra do Cipó, Brazil. Rev. Bras. Entomol. 53 (3), 404–414.
Costa, E.C., Carvalho-Fernandes, S.P., Santos-Silva, J., 2014. Galhas de insetos em uma área de transição caatinga-cerrado. Sitientibus Ser Ciênc. Biol. 14, 1–9.
Fernandes, G.W., Araújo, R.C., Araújo, S.C., Lombardi, J.A., Paula, A.S., Loyola-Júnior, R., Cornelissen, T.G., 1997. Insect galls from savanna and rocky fields of the Jequitinhonha Valley, Minas Gerais, Brazil. Naturalia 22, 221–244.
Fernandes, G.W., Tameirão-Neto, E., Martins, R.P., 1988. Ocorrência e caracterização de galhas entomógenas no Campus-Pampulha da Universidade Federal de Minas Gerais. Rev. Bras. Zool. 5, 11–29.
Gagné, R.J., 1994. The Gall Midges of the Neotropical Region. Cornell University Press, Ithaca, pp. 352.
Gagné, R.J., Jaschhof, M., 2017. A Catalog of the Cecidomyiidae (Diptera) of the World, 4th ed. Digital.
Gonçalves-Alvim, S.J., Fernandes, G.W., 2001. Biodiversity of galling insects: historical, community and habitat effects in four neotrpical savanas. Biodivers. Conserv. 10, 79–98.
Lima, V.P., Calado, D., 2018. Morphological characterization of insect galls and new records of associated invertebrates in a Cerrado area in Bahia State, Brazil. Braz. J. Biol 78 (4), 636–643.
Luz, G.R., Fernandes, G.W., Silva, J.O., Neves, F.S., Fagundes, M., 2012. Insect galls in xeric and mesic habitats in a Cerrado-Caatinga transition in northern Minas Gerais, Brazil. Neotrop. Biol. Conserv. 7, 171–187.
Maia, V.C., 2014. Insect galls of Itamonte (Minas Gerais, Brazil): characterization and occurrence. Biota Neotrop. 14 (1), e20133839.
Maia, V.C., Carvalho-Fernandes, S.P., 2016. Insect galls of a protected remnant of the Atlantic Forest tableland from Rio de Janeiro State (Brazil). Rev. Bras. Entomol. 60 (1), 83–629, 40–56.
Maia, V.C., Fernandes, G.W., 2004. Insect galls from Serra de São José (Tiradentes, MG, Brazil). Braz. J. Biol. 64, 423–445.
Saito, V.S., Urso-Guimarães, M.V., 2012. Characterization of galls, insect galls and associated fauna of Ecological Station of Jataí (Luiz Antônio, SP). Biota Neotrop. 12, 99–107.
Nogueira, R.M., Costa, E.C., Carvalho-Fernandes, S.P., Santos-Silva, J., 2016. Insect galls from Serra Geral, Caetité, BA, Brazil. Biota Neotrop. 16 (1), e20150035.
Ribeiro, A.N., Balbi, M.I.P.A., Urso-Guimarães, M.V., 2019. Characterization of insect galls from a vegetation area in Altinópolis, São Paulo State, Brazil. Papéis Avulsos Zool. 59, e20195904.
Santos, B.B., Ribeiro, B.A., Silva, T.M., Araújo, W., 2012. Galhas de insetos em uma área de cerrado sentido restrito na região semi-urbana de Caldas Novas (Goiás, Brasil). Rev. Bras. Biol. 10, 439.
Silva, E.C., Santos, B.B., Araújo, W.S., 2018. Insect gall occurrence in savanna and forest remnant sites of Hidrolândia, GO, Brazil Central. Papéis Avulsos Zool. 58, e20185804.
Urso-Guimarães, M.V., Scareli-Santos, C., 2006. Galls and gall makers in plants from the Pé-de-Gigante Cerrado reserve, Santa Rita do Passa Quatro, SP, Brazil. Braz. J. Biol. 66 (1B), 357–369.
Urso-Guimarães, M.V., Scareli-Santos, C., Bonifácio-Silva, A.C., 2003. Occurrence and characterization of entomogen galls in plants from natural vegetation areas in Delfinópolis, MG, Brazil. Braz. J. Biol. 63 (4), 705–715.
Vaz, A.M.S.F., Tozzi, A.M.G.A., 2003. Bauhinia ser, Cansenia (Leguminosae-Caesalpinioideae) no Brasil. Rodriguesia 54, 55–143.