

Two new species of *Lopesia* Rübsaamen (Diptera, Cecidomyiidae) associated with *Mimosa hostilis* (Mimosaceae) in Brazil

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ABSTRACT. Two new species of *Lopesia* Rübsaamen (Diptera, Cecidomyiidae) associated with *Mimosa hostilis* (Mimosaceae) in Brazil. Two new species of *Lopesia* Rübsaamen (Diptera, Cecidomyiidae, Lopesiini), *L. mimosae* Maia, **sp. nov.** and *L. pernambucensis* Maia, **sp. nov.**, that induce galls on *Mimosa hostilis* Benth. (Mimosaceae) are described and illustrated based on material from “caatinga” in Pernambuco, Brazil.

KEYWORDS. *Caatinga*; Cecidomyiidae; Diptera; *Lopesia*; Mimosaceae.

RESUMO. Duas espécies novas de *Lopesia* Rübsaamen (Diptera, Cecidomyiidae) associadas a *Mimosa hostilis* (Mimosaceae) no Brasil. Duas novas espécies de *Lopesia* Rübsaamen, 1908 (Diptera, Cecidomyiidae, Lopesiini), *L. mimosae* Maia, **sp. nov.** and *L. pernambucensis* Maia, **sp. nov.**, que induzem galhas em *Mimosa hostilis* Benth. (Mimosaceae) são descritas e ilustradas com base em material da caatinga de Pernambuco, Brasil.

PALAVRAS-CHAVE. *Caatinga*; Cecidomyiidae; Diptera; *Lopesia*; Mimosaceae.

One of the poorest known faunas of galling insects of Brazil is that found in the *caatinga*, a seasonally dry tropical forest in the northeast. The *caatinga* has 800,000 km² (2°54' to 17°21' S) representing approximately 11% of the Brazilian territory (IBGE 1985; Rizzini 1997; Leal *et al.* 2003). The climate is semi-arid, hot, with irregular and low precipitation. Seven to 10 months of the year are dry (RADAMBRASIL 1983; Nimer 1977).

In an attempt to start to bridge the gap in the knowledge of the galling fauna of the *caatinga* and to better understand the distribution and host plant relationships in this arid region, we describe two new species of galling insects from *Mimosa hostilis* Benth. (Mimosaceae). *Mimosa hostilis* (Mimosaceae) is a small tree that occurs widely in this seasonally dry forest. It is found in the states of Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia (Oliveira *et al.* 1999). *Mimosa hostilis* is popularly known as “jurema preta” and may reach a height of 5-7 meters. Leaves are compound, alternate and bipinate with deciduous diminutive leaflets (Tigre 1976). The tree flowers during the dry season (winter, August through November). It is a spontaneous species that grows in nutrient poor soils (acid soils - pH 4.5) with high aluminium content and low contents of P, K, Ca, and Mg (Pereira 1998). The species is widely used in the diet of domestic animals and so is of major importance to the inhabitants of the harsh semi-arid *caatinga* (Carvalho Filho & Salviano 1982).

Two kinds of galls are induced on the leaflet lamina and/or on the secondary and primary veins. They are green and each composed of two valves. One kind is bare (Fig. 1),

while the other one is covered by short hairs (Fig. 2). Gall size (glabrous): 0.52 ± 0.04 cm ($\bar{x} \pm EP$, n=50), hairy (0.47 ± 0.02 cm ($\bar{x} \pm EP$, n=50).

Both galling species belong to *Lopesia* Rübsaamen, 1908 (Diptera, Cecidomyiidae, Lopesiini). This genus has indistinct limits that comprises species that have four-segmented palpi; male antennae with binodal or gynecoid flagellomeres, and three separate circumfila or interconnected circumfila (as in female); R₅ joining C beyond the wing apex; Rs closer to the end of R₁ than to the arculus; tarsal claws bowed near the basal third, generally toothed (simple only in *L. licaniae* Gagné, 1996 in Gagné & Hibbard, 1996); ovipositor short, barely protrusible and female cerci separate. *Lopesia* is known from 13 species: 3 Afrotropical, 1 Nearctic and 9 Neotropical (Gagné 2004). In this paper two new Neotropical species are described and illustrated.

MATERIAL AND METHODS

The study was done in a *caatinga* fragment highly impacted by human activities in the district of Parnamirim, in western Pernambuco, distant 560 km from the capital Recife. The climate is dry tropical, with an average temperature of 24 to 26°C (Andrade-Lima 1982) and an average annual precipitation of 509mm, at 400 m.a.s.l. (39°57'00”W - 8°79'00”S) (Silva *et al.* 2000). In April 2008, 30 individuals of *M. hostilis* were haphazardly found in the studied area, from which 10 shoots were randomly selected around the canopy of each individual. Two distinct gall morphotypes were found on *M. hostilis*. Part of the samples was stored in

plastic bags until the emergence of the galling adults and/or parasitoids. From the other part of the sample we recorded gall size and then dissected them to rear the juvenile stages of the gall inducers. Insects that merged from the galls and those obtained from dissected galls were stored in alcohol 70%.

The gall midges were prepared and mounted on slides following the methods of Gagné (1994). All material, including the types, was incorporated in the Diptera collection of Museu Nacional, Rio de Janeiro (MNRJ). Morphological terminology follows Gagné (1994). The field and laboratory work were done by G. W. Fernandes, C. H. P. Magalhães and J.C. Santos while the taxonomy and descriptions of the new taxa were made by V. C. Maia.

***Lopesia mimosae* Maia, sp. nov.**

(Figs. 3–19)

Adult. Body length: 3.95–4.05 mm in male (n = 4); 3.70–5.0 mm in female (n = 4).

Head (Fig. 3). Eye facets circular; antennae with scape obconic, pedicel globose, male flagellomeres binodal and tricircumfilar, circumfila with short loops similar in length (Fig. 4); female flagellomeres cylindrical, with 2 ring-like circumfila (Fig. 5); flagellomere necks bare in both sexes; 12th flagellomere with apical process in both sexes; flagellomeres 1 and 2 not connate. Frontoclypeus with 4–6 setae. Labrum long-attenuate with three pairs of ventral setae. Hypopharynx of same shape as labrum, with long, anteriorly directed lateral setulae. Labella elongate-convex, each with several lateral setae and 2 pairs of short mesal setae. Palpus with three setose segments, first segment globose and shortest, second and third of similar length (Fig. 6).

Thorax. Anepimeron setose, other pleural sclerites asetose. Wing (Fig. 7) length: 2.90–3.90 mm in male (n = 4); 3.0–3.7 mm in female (n = 4); R_s reaching the costal margin

after wing apex, R_s reaching R_1 after midlength; M_3 present, CuA forked, CuP present. Tarsal claws simple, empodia rudimentary (Figs. 8, 9).

Male abdomen (Figs. 10, 11). Tergites 1–7 rectangular, with complete row of caudal setae, some lateral setae, 2 basal trichoid sensilla, and elsewhere with scattered scales. Tergite 8 not sclerotized, without setae or scales, except for 2 basal trichoid sensilla. Sternites 2–7 rectangular, with setae more abundant mesally, complete row of caudal setae, some lateral setae, and 2 basal trichoid sensilla. Sternite 8 ovoid with a mesal indentation at distal margin. Male terminalia (Fig. 12). Gonocoxite extended laterally; gonostylus elongate, narrowest at midlength, setulose only basally and with ridges elsewhere, cerci convex apically, hypoproct deeply bilobed, aedeagus elongate, tapering towards apex, longer than hypoproct.

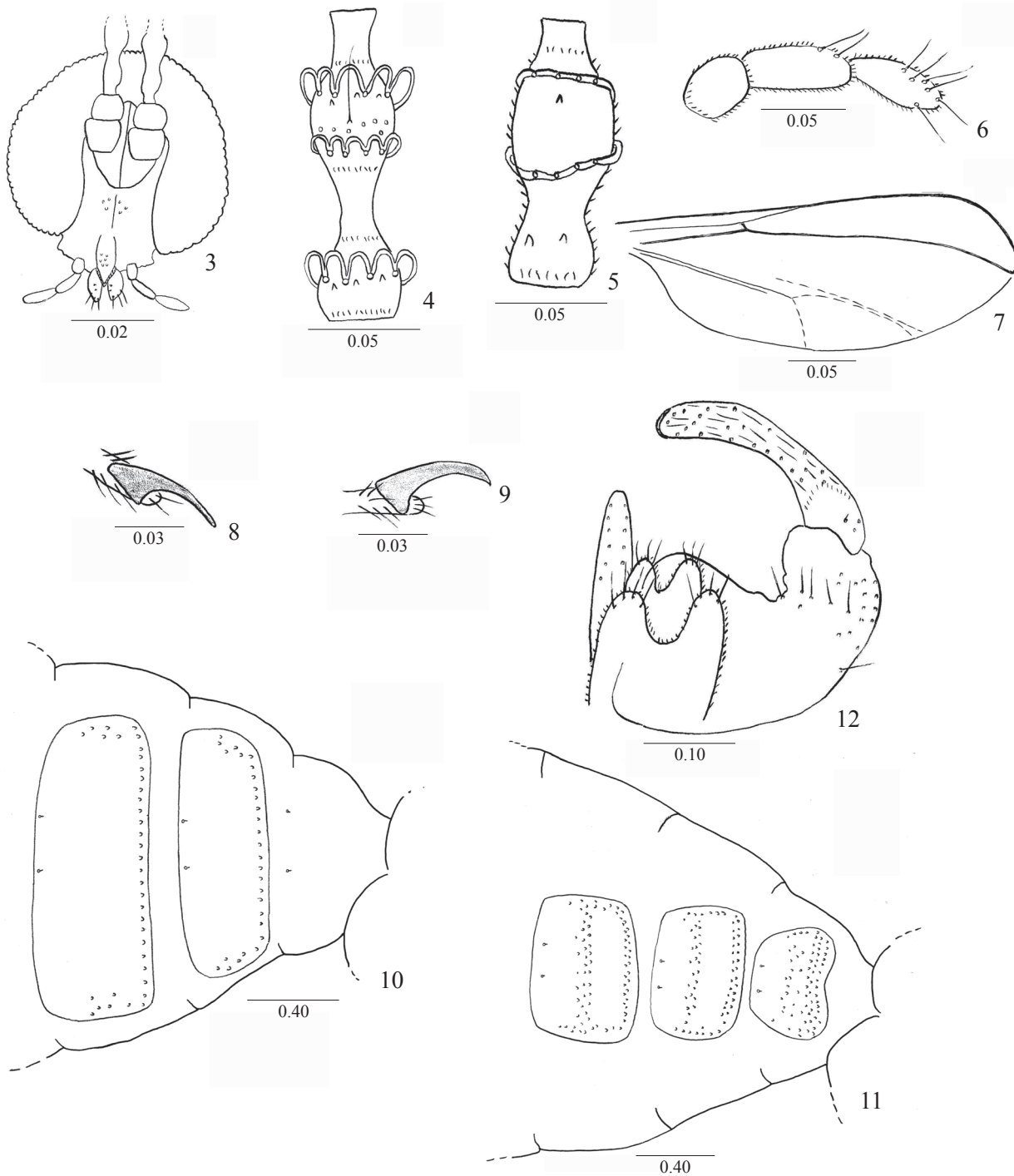
Female abdomen (Figs. 13, 14). Tergites 1–8 as in male. Sternites 2–7 trapezoid, with setae more abundant mesally, complete row of caudal setae, some lateral setae, and 2 basal trichoid sensilla. Sternite 8 not sclerotized. Ovipositor barely protrusible; cerci elongate, triangular, separate, and setose (Fig. 15).

Pupa. Color: brownish. Body length: 3.60–4.50 mm (n=5). Head (Fig. 16): integument grainy; antennal base thickened marginally; cephalic seta short, 0.030–0.035 mm in length (n= 4); two pairs of lower facial papillae, one pair setose and the other asetose, and three pairs of lateral papillae, one pair setose and the others asetose; upper cephalic margin thickened laterally. Thorax: prothoracic spiracle short, 0.055–0.070 mm in length (n = 5). Abdomen: spiracles 0.030–0.040 mm in length (n=6), segments 3–8 with a single row of dorsal spines at basal third and 4 dorsal papillae (Fig. 17).

Larva. Body elongate, cylindrical, tapered at both ends, thinnest anteriorly. Length: 3.70 mm (n = 1). Integument rough. Spatula 0.35 mm in length (n = 1), with two well-developed apical teeth and elongate stalk. Lateral papillae in



Figs. 1–2. Galls on *Mimosa hostilis* Benth. (Mimosaceae): 1, glabrous gall induced by *L. mimosae* Maia, sp. nov.; 2, hairy gall induced by *L. pernambucensis* Maia, sp. nov.



Figs. 3–12. *Lopesia mimosae* Maia, **sp. nov.**: 3, male head, frontal view; 4, male flagellomere 3; 5, female flagellomere 5; 6, male palpus; 7, male wing; 8, male tarsal claw and empodium of foreleg; 9, female tarsal claw and empodium of midleg; 10, male abdominal segments 6–8, dorsal view; 11, male abdominal segments 6–8, ventral view; 12, male terminalia, dorsal view. Scales in mm.

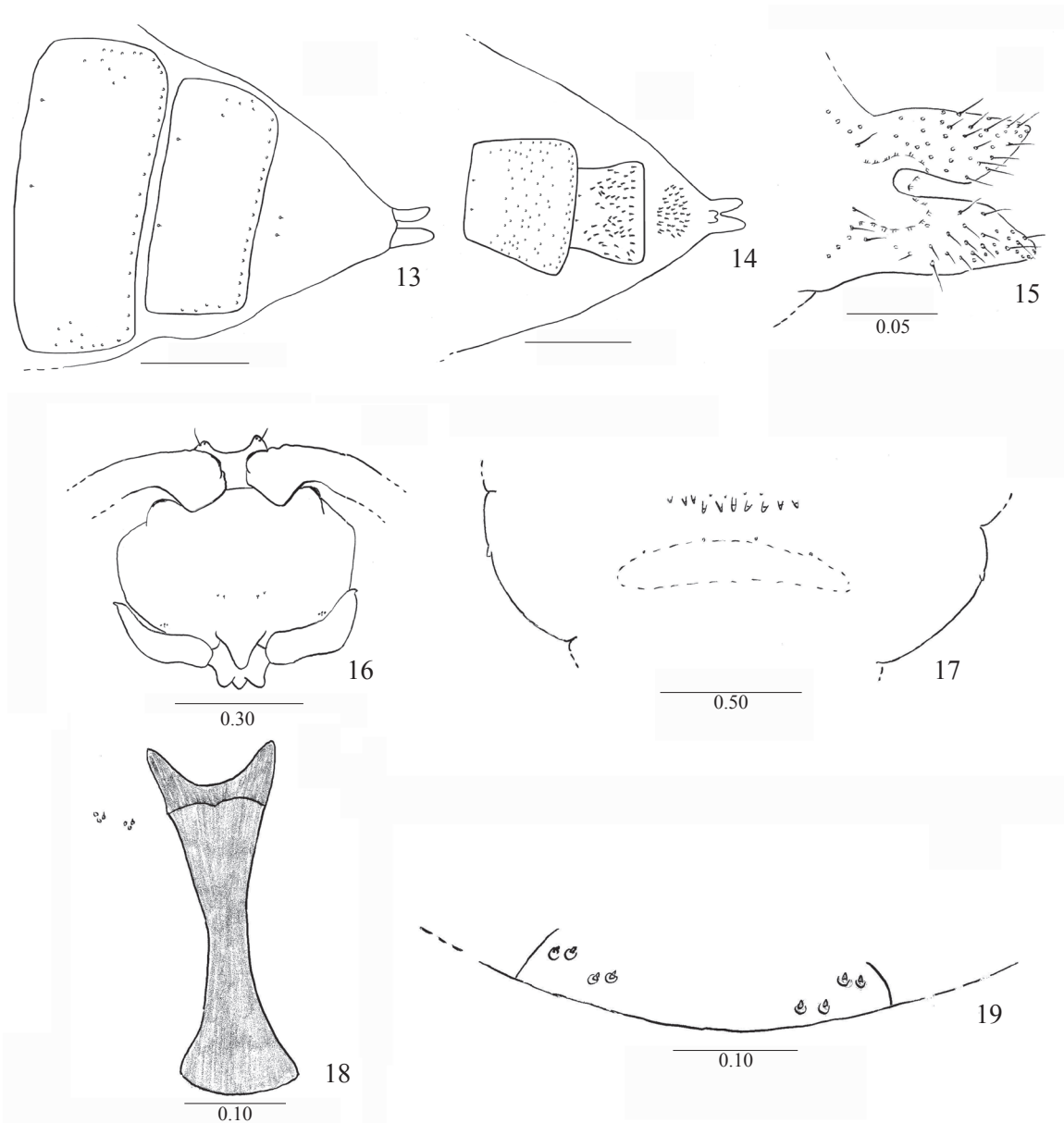
2 groups of three per side, 2 of each group setose, 1 asetose (Fig. 18). Terminal segment convex, with 4 pairs of corniform terminal papillae (Fig. 19).

Type material. Holotype male, BRAZIL, Pernambuco, Parnamirim, 23.IV.2008, G. W. Fernandes leg. (MNRJ). Paratypes: same data as holotype, 3 males, 4 females; 2 pupae, 7 pupal exuviae, 01 larva (MNRJ). Obtained from bivalvate, glabrous galls on *Mimosa hostilis* Benth. (Mimosaceae).

Etymology. The name *mimosae* is the genitive of the host plant generic name.

***Lopesia pernambucensis* Maia, sp. nov.**
(Figs. 20–31)

Adult. Body length: 4.05–4.10 mm in male (n = 2); 5.35–5.50 mm in female (n = 3).



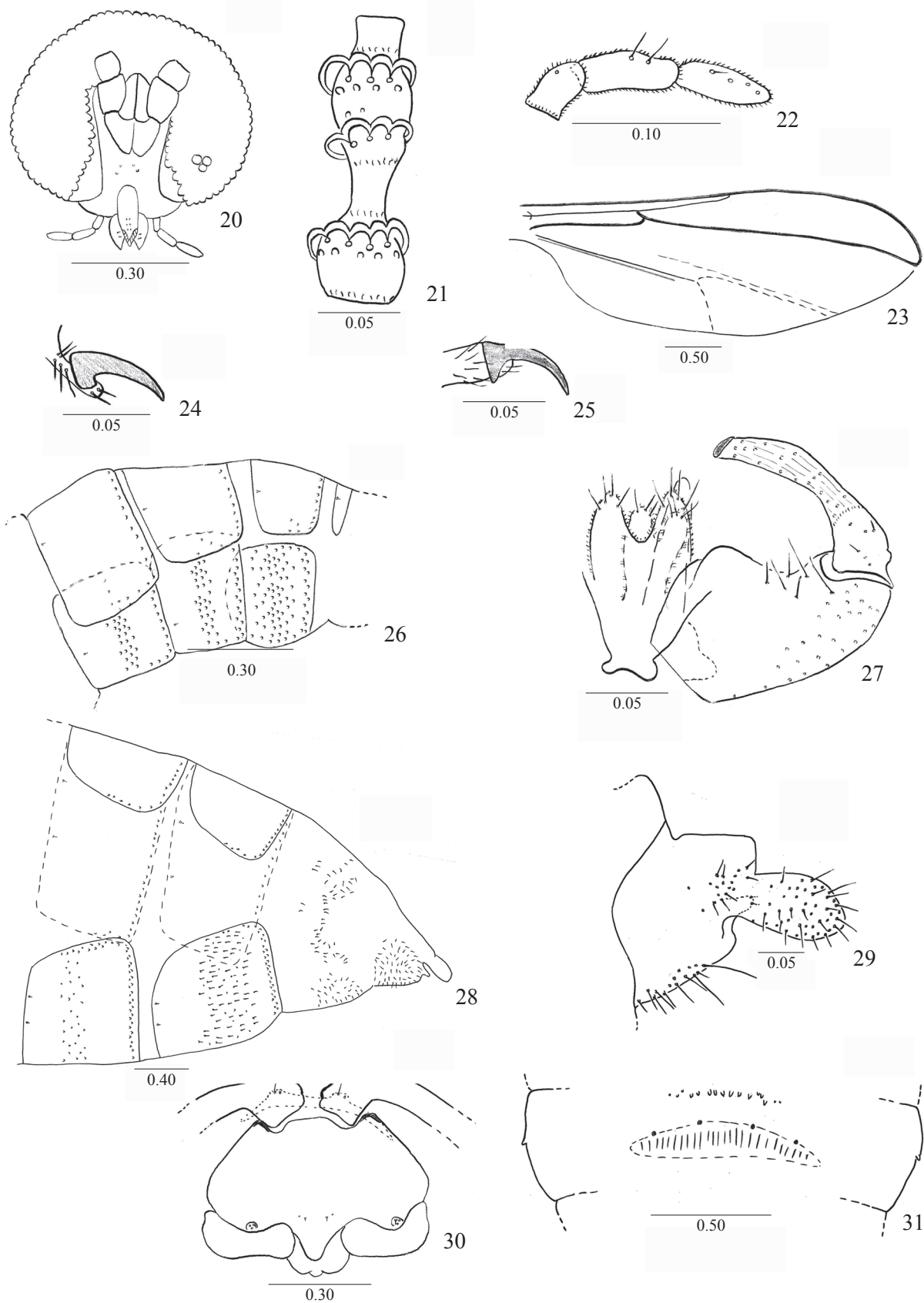
Figs. 13–19. *Lopesia mimosae* Maia, **sp. nov.**: 13, female abdominal segment 6 to end, dorsal view; 14, female abdominal segment 6 to end, ventral view; 15, female cerci, dorsal view; 16, pupa head, ventral view; 17, pupa abdominal segment 7, dorsal view; 18, larva prothoracic spatula and lateral papillae, ventral view; 19, larva terminal segment, dorsal view. Scales in mm.

Head (Fig. 20). Antennae with scape obconic pedicel globose, male flagellomeres binodal and tricircumfilar, circumfila with short loops similar in length (Fig. 21); flagellomere necks bare; 12th flagellomere with apical process; flagellomeres 1 and 2 not connate. Female antennae broken. Frontoclypeus with 6 setae. Labrum long-attenuate with three pairs of ventral setae. Hypopharynx of same shape as labrum, with long, anteriorly directed lateral setulae, labella elongate-convex, each with several lateral setae and 2 pairs of short mesal setae. Palpus with three setose, cylindrical segments, first segment the shortest, second and third of similar length (Fig. 22).

Thorax. Anepimeron setose, other pleural sclerites aetose. Wing (Fig. 23) length: 3.35 mm in male (n = 1); 4.20 mm in

female (n = 3); R₅ reaching C after wing apex, Rs reaching R₁ after midlength, M₃ present, CuA forked, and CuP present. Tarsal claws simple, empodium rudimentary (Figs. 24, 25).

Male abdomen (Fig. 26). Tergites 1–7 rectangular, with complete row of caudal setae, some lateral setae, 2 basal trichoid sensilla, and elsewhere with scattered scales. Tergite 8 short band-like, without setae or scales, with 2 basal trichoid sensilla. Sternites 2–7 rectangular, narrow, with setae more abundant mesally, complete row of caudal setae, some lateral setae, and 2 basal trichoid sensilla. Sternite 8 not sclerotized. Male terminalia (Fig. 27). Gonocoxite wide; gonostylus narrowest at midlength, setulose only basally, with ridges elsewhere, cerci convex apically, hypoproct deeply bilobed; aedeagus longer than hypoproct, elongate, tapering to apex.



Figs. 20–31. *Lopesia pernambucensis* Maia, **sp. nov.**: 20, male head, frontal view; 21, male flagellomere 2; 22, male palpus; 23, male wing; 24, male tarsal claw and empodium of foreleg; 25, female tarsal claw and empodium of hindleg; 26, male abdominal segments 5-8, lateral view; 27, male terminalia, dorsal view; 28, female abdominal segment 6 to end, lateral view; 29, female cerci, lateral view; 30, pupa head, ventral view; 31, pupa abdominal segment 6, dorsal view. Scales in mm.

Female abdomen (Fig. 28): tergites 1-7 rectangular, with complete row of caudal setae, some lateral setae, 2 basal trichoid sensilla, and elsewhere with scattered scales. Tergite 8 short band-like, without setae or scales, with 2 basal trichoid sensilla. Sternites 2-7 trapezoid, with setae more abundant mesally, complete row of caudal setae, some lateral setae, and 2 basal trichoid sensilla. Sternite 8 not sclerotized. Ovipositor barely protrusible; cerci elongate-ovoid, separate, and setose (Fig. 29).

Pupa. Color: brownish. Body length: 4.40-5.15 mm (n=5). Head (Fig. 30): antennal base thickened marginally; cephalic seta 0.030-0.040 mm in length (n=5); two pairs of lower facial papillae, one setose and other asetose; three pairs of lateral facial papillae, one pair setose, the others asetose; upper cephalic margin thickened laterally. Thorax: prothoracic spiracle short, with only 0.06-0.07mm in length (n = 5). Abdomen: spiracles 0.02-0.03 mm in length (n=5), segments 3-8 with a single row of dorsal spines at basal third and 4 dorsal papillae (Fig. 31).

Larva. Unknown.

Type material. Holotype male, BRAZIL, Pernambuco, Parnamirim, 23.IV.2008, G.W. Fernandes leg. (MNRJ). Paratypes: same data as holotype, 1 male, 3 females, 4 pupae, 18 pupal exuviae (MNRJ). Obtained from bivalvate, hairy galls.

Etymology. The name *pernambucensis* refers to the type-locality.

Remarks

Lopesia mimosae differs from *L. pernambucensis* in the length of circumfila loops (shorter in *L. pernambucensis*), proportions among male cercus, hypoproct and aedeagus (aedeagus noticeably longer than hypoproct and cercus in *L. mimosae*), and shape of female cerci (wider in *L. pernambucensis*).

Lopesia mimosae and *L. pernambucensis* differ from most congeners species by the simple tarsal claws. The only other species of *Lopesia* which has simple tarsal claws is *L. licaniae*, but that species has four palpal segments while these two new species have only three segments. Furthermore, the flagellomere necks are setulose in *L. licaniae* and bare in the new species and the dorsal spines on 2-8 abdominal segments of the pupa are conspicuously shortest in the new species.

Acknowledgments. We thank Dr. Raymond J. Gagné (Systematic Entomology Laboratory, USA) for his review of an earlier version of the manuscript. This study was supported by CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico, Proc. 47.2084/2007-0, 30.1197/2007-05, 30.9633/2007-9), Capes/Procad 0166, and DCR-FACEPE/CNPq (DCR-0087-2.05/06).

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