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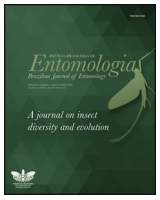

Three new species of *Bruggmannia* Tavares, 1906 (Diptera: Cecidomyiidae) from Brazil and description of male and larva of *B. monteiroi* Maia & Couri, 1993

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ABSTRACT

Bruggmannia capixaba, sp. n., *Bruggmannia gaucha*, sp. n., and *Bruggmannia marambaiensis* sp. n. are described and illustrated. All species were collected in Atlantic forest areas. They induce galls on *Guapira* (Nyctaginaceae), a plant genus native to Brazil, the first on *G. pernambucensis* and the others on *G. opposita.* Furthermore, the male and larva of *Bruggmannia monteiroi* are described for the first time, based on specimens collected in the type locality.

Introduction

Bruggmannia Tavares, 1906 is a Neotropical genus of Cecidomyiidae with 21 known species, 16 from Brazil, two from El Salvador, two from St. Vincent, and one from Cuba (1 in Proença and Maia, 2018, 19 in Gagné and Jaschhof, 2021 and 1 in Maia and Oliveira, 2021). All species are gall-inducers, mostly on Nyctaginaceae (18 species), but also on Myrsinaceae (one species) and Rubiaceae (two species). Concerning Nyctaginaceae, *Neea* Ruiz & Pav., *Guapira* Aubl. and *Pisonia* L. are the host genera, with nine, five and four species of *Bruggmannia*, respectively (Table 1).

The genus is recognizable by male flagellomeres constricted near the middle of nodes; flagellomere necks longer and circumfila less appressed to flagellomeres than in other genera of Schizomyiina; palpus three-segmented; empodia shorter than claws; ovipositor short, not pigmented, with elongate ventral and sparse dorsal setae; cerci separate and tiny; pupa with weakly developed or not produced antennal horns; and the mature larva without a prothoracic sternal spatula (Gagné, 1994). Furthermore, the anal segment is greatly narrowed and elongated in the larvae of most species.

In this paper, three new species that induce galls on *Guapira* are described, two on *G. opposita* (Vell.) Reitz and one on *G. pernambucensis* (Casar.) Lundell., the former harboring four previously known species of *Bruggmannia* and the latter a single one.

Guapira opposita is a widespread plant native to Brazil, where it occurs in the Amazon, Atlantic forest, Caatinga, and Cerrado (Rossetto et al., 2022), while *Guapira pernambucensis* is endemic to Brazil and restricted to coastal low forests (*restinga*) areas of the Atlantic forest.

Material and methods

The Entomological Collection of the Museu Nacional/Universidade Federal do Rio de Janeiro (MNRJ) was examined for specimens of *Bruggmannia* as well as unidentified gall midges associated with *Guapira* species. All were mounted on microscope slides. They were collected in areas of Atlantic forest in Brazil (Guarapari, state of Espírito Santo; Mangaratiba and Maricá, state of Rio de Janeiro; and Porto Alegre,

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Table 1
Bruggmannia Tavares, 1906 (Diptera: Cecidomyiidae): list of species, host plants, known stages of life cycle and geographical distribution based on Proença and Maia, 2018; Gagné and Jaschhof, 2021; Maia, 2021; Maia and Oliveira, 2021. AM – Amazonas, BA – Bahia, ES – Espírito Santo, MG – Minas Gerais, MT – Mato Grosso, RJ – Rio de Janeiro, RS – Rio Grande do Sul, SC – Santa Catarina, SP – São Paulo.

Species of *Bruggmannia*	Host plant		Known stages of life cycle					Geographical distribution
	Family	Species	Larva of 3rd instar	Pupa	Male	Female	Gall	
B. acaudata Maia, 2004	Nyctaginaceae	*Guapira opposita* (Vell.) Reitz	X	X	X	X	X	Brazil: ES, RJ, BA
B. braziliensis Tavares, 1906	Myrsinaceae	*Myrsine* sp.	unknown	X	X	X	X	Brazil: RS
B. chapadensis Proença & Maia, 2021	Nyctaginaceae	*Guapira pernambucensis* (Casar.) Lundell.	X	X	X	X	X	Brazil: MT
B. depressa (Kieffer 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: SC
B. elongata Maia & Couri, 1993	Nyctaginaceae	*Guapira opposita* (Vell.) Reitz	X	X	X	X	X	Brazil: BA, ES, RJ, SP, SC, RS
B. globulifex (Kieffer, 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: AM
B. indaiensis	Nyctaginaceae	*Neea theifera* Oerst.	X	X	X	X	X	Brazil: MG
B. lignicola (Kieffer, 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: RJ
B. longicauda K (Kieffer, 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: RJ
B. longiseta (Kieffer, 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: AM
B. micrura (Kieffer, 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: AM
B. monteiroi Maia & Couri 1993	Nyctaginaceae	*Guapira opposita* (Vell.) Reitz	unknown	X	unknown	X	X	Brazil: RJ
B. neeana (Kieffer, 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: RJ
B. pisoniae (Cook, 1909)	Nyctaginaceae	*Pisonia* sp.	unknown	unknown	unknown	unknown	X	Cuba
B. pisonifolia (Felt, 1912)	Nyctaginaceae	*Pisonia nigricans* Sw.	X	X	X	X	X	St. Vincent
B. pisonioides Gagné, 1994	Nyctaginaceae	*Pisonia nigricans* Sw.	X	X	X	X	X	St. Vincent
B. psychotriae Möhn, 1960	Rubiaceae	*Psychotria carthagenensis* Jacq.	X	X	X	X	X	El Salvador
B. pustulans Möhn, 1960	Nyctaginaceae	*Pisonia macranthocarpa* (Donn. Sm.) Donn. Sm.	X	X	X	X	X	El Salvador
B. randiae Möhn, 1960	Rubiaceae	*Randia spinosa* Jacq.	X	X	X	X	X	Brazil: SC
B. robusta Maia & Couri, 1993	Nyctaginaceae	*Guapira opposita* (Vell.) Reitz	X	X	X	X	X	Brazil: SP, RJ, ES, BA, RS
B. ruebsaameni (Kieffer, 1913)	Nyctaginaceae	*Neea* sp.	X	unknown	unknown	unknown	X	Brazil: SC

state of Rio Grande do Sul) by several researchers on different dates (see "Material Examined").

Specimens of *Bruggmannia monteiroi* were obtained from rearing in laboratory. To this end, fieldwork was carried out in the *Maricá restinga* (Maricá, RJ) (Fig. 1a), the type locality of the species, from April 2021 to April 2022. During this period, individuals of the host plant, *Guapira opposita* (Fig. 1b), were examined for galls induced by this cecidomyiid. Gall samples were taken to the laboratory and kept in plastics pots. These pots, layered at the bottom with damp cotton and covered by fine screening, were checked daily for adults. Immature insects were obtained by dissecting galls. All specimens were first preserved in 70% ethanol and later mounted in slides following the methodology outlined in Gagné (1994) and deposited in the Cecidomyiidae Collection of Museu Nacional, Rio de Janeiro (MNRJ).

Morphological studies and drawings of the most important taxonomic characters were made with the aid of an optical microscope coupled with photographic camera and drawing tube. Measurements were taken using a microscope slide with scale from 0.01 to 5.0mm. All drawings were scanned and edited using Corel DRAW®. Morphological terminology follows Gagné (2018) for adult terminology, Gagné (1994) for larval and pupal terminology, and Elsayed et al. (2020) just for pupal antennal papillae.

Results

Three previously unknown species of *Bruggmannia* were found in the MNRJ: *Bruggmannia capixaba*, sp. n., *Bruggmannia gaucha*, sp. n., and *Bruggmannia marambaiensis* sp. n., the first on *Guapira pernambucensis* and the others on *Guapira opposita*. Besides, males and larvae of *Bruggmannia monteiroi* were obtained by lab rearing.

Bruggmannia capixaba, Maia, sp. n.

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Description. Male. 2.0-2.7 mm long (n=4). Head (Fig. 2a): eye facets circular, closely appressed; antennae: scape trapezoidal, setose, pedicel globoid, setose, flagellomeres cylindrical, node microtrichose and neck microtrichose, flagellomere node 5 times the length of neck (n=3); 1st and 2nd flagellomeres connate; circumfila wavy (Fig. 2b); frons with 17-18 setae (n=3); mouth parts: labrum long-attenuate; hypopharynx of the same shape of labrum, with long anteriorly directed lateral setulae; labella elongate-convex, with lateral and three mesal setae each; palpus: 1st segment globoid, slightly shorter than 2nd segment, 2nd and 3th segments claviform and subequal in lenght, all segments with setae and scales. Thorax: scutum with two dorsocentral rows of setae with scales intermixed, setae more abundant anteriorly and two rows of lateral setae, with scales intermixed; scutellum with setae subdistally; anepimeron with some setae and scales; other pleura bare; wing (Fig. 2c) length (from arculus to apex): 1.70–2.00 mm (n=4); legs broken in all specimens immediately after first tarsomere. Abdomen (Fig. 2d): 1st–7th tergites sclerotized, rectangular with posterior row of setae, few lateral setae, scales scattered, basal pair of trichoid sensilla not visible; 8th tergite not visible; 2nd–8th sternites rectangular with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, a basal pair of trichoid sensilla. Terminalia (Fig. 3a):

Figure 1 Studied area and host plant: a) Restinga de Maricá (Maricá, RJ), b) *Guapira opposita* (Vell.) Reitz (Nyctaginaceae).

gonocoxite hemispherical, setose, setae more abundant at the apex, microtrichose, 2.7 times the length of gonostylus; gonostylus squarish with a row of setae just below teeth, scattered setae, microtrichose; cerci separate, riniform, setose, microtrichose; hypoproct bilobed, setose, microtrichose; aedeagus glossiform, gonocoxal lobes very short.

Female. 2.7-2.9 mm long (n=2). Circumfila less sinuous than in male, with two connected rings (Fig. 3b); frons with 18 setae (n=1); labella elongate-convex, 1.5 times as long as wide (n=1); palpus: 1st segment globoid, conspicuously shorter than 2nd segment; wing length (from arculus to apex): 1.95–2.10 mm (n=4); legs broken in all specimens immediately after first tarsomere. Abdomen (Fig. 3c): 1st–7th tergites as in male; 8th tergite sclerotized, laterally notched, with distal row of setae, scales scattered, basal pair of trichoid sensilla not visible; 2nd–6th sternites rectangular with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, and a basal pair of trichoid sensilla; 7th sternite 1.5 times as long as 6th sternite, rectangular with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, and a basal pair of trichoid sensilla; 8th sternite not sclerotized; ovipositor (Fig. 3d) soft, short, 1.85 times the length of 7th sternite (n=1); cerci tiny with some short setae.

Pupa (Fig. 4a), 3.1-3.5 mm long (n=3). Integument brownish. Head (Fig. 4b): a pair of antennal papillae present, antennal horn conical, short, with outer and inner margins smooth; apical seta 0.4 times the length of prothoracic spiracle; upper facial horns conical; lower facial horns conical; two pairs of lower facial papillae: one pair with seta, a triplet of papillae (two with setae and one bare) near base of each palpus; upper cephalic margin thickened laterally, face with lateral projection, head integument grainy just below antennal bases and around upper facial horns, except below them. Thorax: prothoracic spiracle setiform, curved, relatively short, 0.12 mm long, 2.0 times as long as flagellomeres width (Fig. 4b), prothorax with three pairs of dorsal papillae and two pairs of lateral papillae, lateral projection just below prothoracic spiracles with grainy integument (Fig. 4b). Abdomen: spiracles not elongated, 2nd–8th segments with dorsal spines near anterior margin, arranged only centrally, spines in the 2nd segment rudimentary, shorter than those of 3rd-8th segments (Fig. 4c), integument ventrally sculptured (Fig. 4d). Last segment with two terminal conical projections far apart (Fig. 4e) (pupal sex not determined, all specimens similar to each other).

Larva unknown.

Gall: on leaves, globose, pink, with trichomes, and one-chambered on *Guapira pernambucensis* (Fig. 4f).

Etymology. The word "*capixaba*" means native of the state of Espírito Santo.

Material Examined. Holotype male. Brazil, Espírito Santo, Guarapari, PEPCV (Parque Estadual Paulo César Vinha), 2007, Bregonci & Polycarpo col., MNRJ. Paratypes: same locality, date and collector as holotype, 3 males, 2 females, 5 pupal exuviae, MNRJ.

Distribution: Espírito Santo (Guarapari).

Comments. This species is unique in having glossiform edeagus; ovipositor 1.85 times the length of 7th sternite; setiform, curved, relatively short prothoracic spiracles; lateral projection just below prothoracic spiracles; short and sparse abdominal spines. Other two species of *Bruggmannia* associated with *Guapira* have glossiform aedegus – *B. chapadensis* Proença & Maia, 2018 and *B. gaucha* Maia & Mendonça, sp. n., but they differ from each other mainly in the following characters: relative length of ovipositor (in *B. capixaba* 1.85 x length of 7th sternite, in *B. chapadensis* 1.4 x and in *B. gaucha* 1.7 x), shape of upper facial horn (conical in *B. capixaba* and *B. gaucha*, semicircular in the other two species), length of prothoracic spiracle (longer in *B. capixaba* than in the others), arrangement of dorsal spines (only centrally in *B. capixaba* and *B. chapadensis,* along the entire width of 2nd to 8th abdominal tergites in *B. gaucha*).

***Bruggmannia gaucha*, Maia & Mendonça, sp. n.**

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Description. Male. 2.0-2.3 mm long (n=3). Head: eye facets circular, closely appressed; antennae: scape trapezoidal, setose, pedicel globoid, setose, flagellomeres cylindrical, node microtrichose and neck almost entirely microtrichose, flagellomere node 3.6 times the length of neck (n=3); 1st and 2nd flagellomeres connate; circumfila wavy (Fig. 5a); last three flagellomeres similar in length (Fig. 5b); frons barely visible in the slides; mouth parts: labrum long-attenuate; hypopharynx of the same shape of labrum, with long anteriorly directed lateral setulae; labella elongate-convex, with lateral and two mesal setae each; palpus: 1st segment globoid, 2nd and 3th segments claviform, 2nd segment 1.5 times as long as 1st segment, 3nd segment 1.5 times as long as 2nd segment, all segments with setae and scales. Thorax: scutum with two dorsocentral rows of setae with scales intermixed, setae more abundant anteriorly and two rows of lateral setae, with scales intermixed; scutellum with scattered setae; anepimeron with a longitudinal row of setae and some scales; other pleura bare; wing (Fig. 5c) length (from arculus to apex): 2.10–2.20 mm (n=3); tarsal claws bent beyond midlength, empodium reaching bent in claws (Fig. 5d). Abdomen (Fig. 5e): 1st–7h tergites

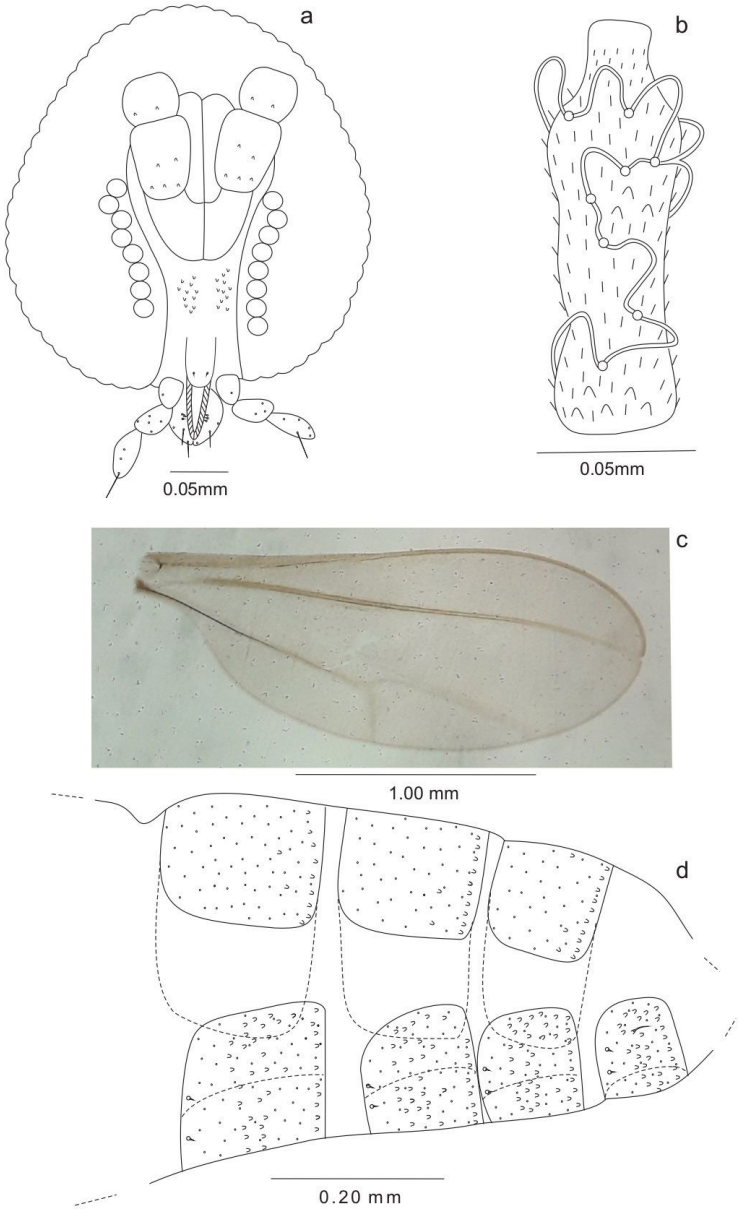

Figure 2 *Bruggmannia capixaba*, sp. n., male: a) Head, frontal view, b) 3rd flagellomere, c) Wing, d) 5th-8th abdominal segments, lateral view.

sclerotized, rectangular with posterior row of setae, few lateral setae, scales scattered, no basal pair of trichoid sensilla; 8th tergite not visible; 2nd–8th sternites rectangular with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, and a basal pair of trichoid sensilla. Terminalia (Fig. 5f): gonocoxite hemispherical, setose, setae more abundant at the apex, microtrichose, 2.0-2.2 times the length of gonostylus; gonostylus squarish with a row of setae just below teeth, scattered setae, microtrichose; cerci separate, riniform, setose, microtrichose; hypoproct bilobed, setose, microtrichose; aedeagus glossiform, gonocoxal lobes very short.

Female. 3.2-3.5 mm long (n=3). Head as in male (Fig. 6a), circumfila less sinuous than in male, with two connected rings (Fig. 6b); frons with 30 setae (n=2); labella elongate-convex, 2.0-3.0 times as long as wide (n=3); palpus: 2nd segment 2.0 times as long as 1st segment, 2nd and 3rd segments subequal in length; wing length (from arculus to apex): 2.35–2.50 mm (n=3). Abdomen (Figs. 6c-7a): 1st–7th tergites as in male; 8th tergite sclerotized, laterally notched, with distal row of setae, scales scattered, no basal pair of trichoid sensilla; 2nd–6th sternites as in male; 7th sternite 1.72-1.86 times as long as 6th sternite, with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, and a basal pair of trichoid sensilla; 8th sternite not sclerotized; ovipositor (Fig. 7b) soft, short, 1.72 times the length of 7th sternite (n=1); cerci tiny with some short setae.

Pupa (Fig. 8a). 2.1-3.1 mm long (n=2). Integument brownish. Head (Fig. 8b): pair of antennal papillae present, antennal horn conical, short, with outer and inner margins smooth; apical seta 0.7 times the length of prothoracic spiracle; upper facial horns semicircular; lower facial horns conical; two pairs of lower facial papillae: one pair with seta, the other bare; two lateral facial papillae near base of each palpus, one with setae, the other bare; upper cephalic margin thickened laterally, face with lateral projection, head integument wrinkled just below antennal bases and around upper facial horns, except below them. Thorax: prothoracic spiracle setiform, curved, short, 0.08-0.09 mm long, 1.2-1.3 times as long as flagellomeres width, prothorax with three pairs of dorsal papillae and two pairs of lateral papillae, no lateral projection just below prothoracic spiracles. Abdomen: spiracles not elongated,

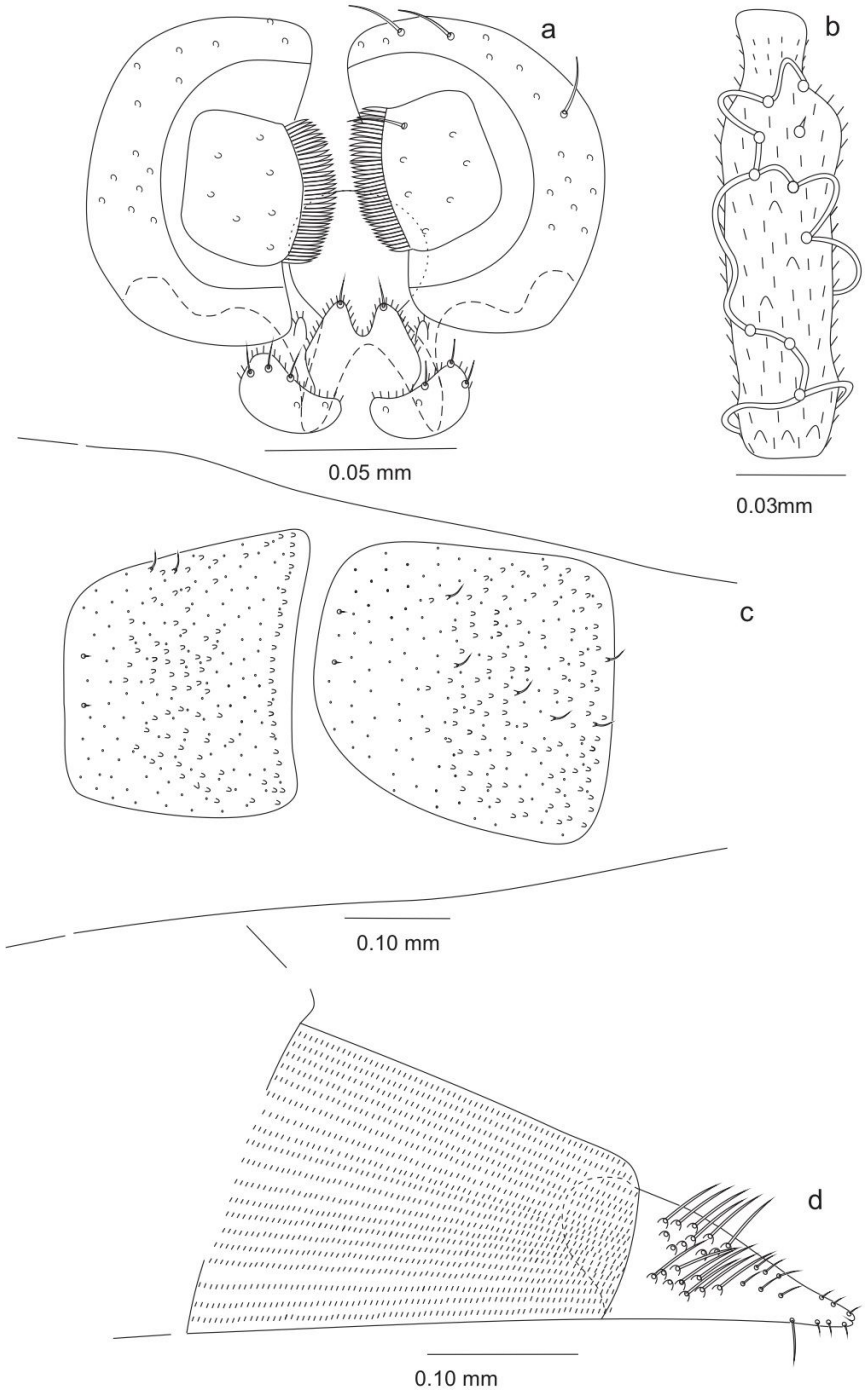

Figure 3 *Bruggmannia capixaba*, sp. n.: a) Male terminalia, dorsal view, b) Female 3rd flagellomere, c) Female, 7th – 8th abdominal segments, ventral view, d) Ovipositor, ventral view.

2nd–8th segments with dorsal spines near anterior margin, arranged only centrally, spines in the 2nd segment rudimentary, shorter than those of 3rd-8th segments (Fig. 8c), integument ventrally sculptured. Last segment with two rounded terminal projections in both sexes, projections close together and longer in male pupa, projections far apart and shorter in female pupa (Figs. 8d, e).

Larva (Fig. 9a). 3.20 mm long (n=3), body elongate, cylindrical, tapered towards posterior end; integument rough. Prothoracic sternal spatula absent, sternal papillae setose; three setose lateral papillae on each side, four dorsal papillae setose from 1st to 7th abdominal segments. Terminal segment with 1/5 of total length of larva, integument rough dorsally, elongate and strongly tapered towards apex, a group of setulae subasally (Fig. 9b). Papillae not visible. Anus rounded.

Gall (Fig. 9c): on stem, fusiform to ovoid, reddish, glabrous, one to multichambered on *Guapira opposita*.

Etymology. The name "*gaucha*" means native of the state of Rio Grande do Sul.

Material Examined. Holotype male. Brazil, Rio Grande do Sul, Porto Alegre (Morro Santana), 22.X.2013, Rodrigues A. col, MNRJ. Paratypes: same locality, date and collector as holotype, 2 males, 3 females, 2 pupal exuviae, 2 pupae, 4 larvae, MNRJ.

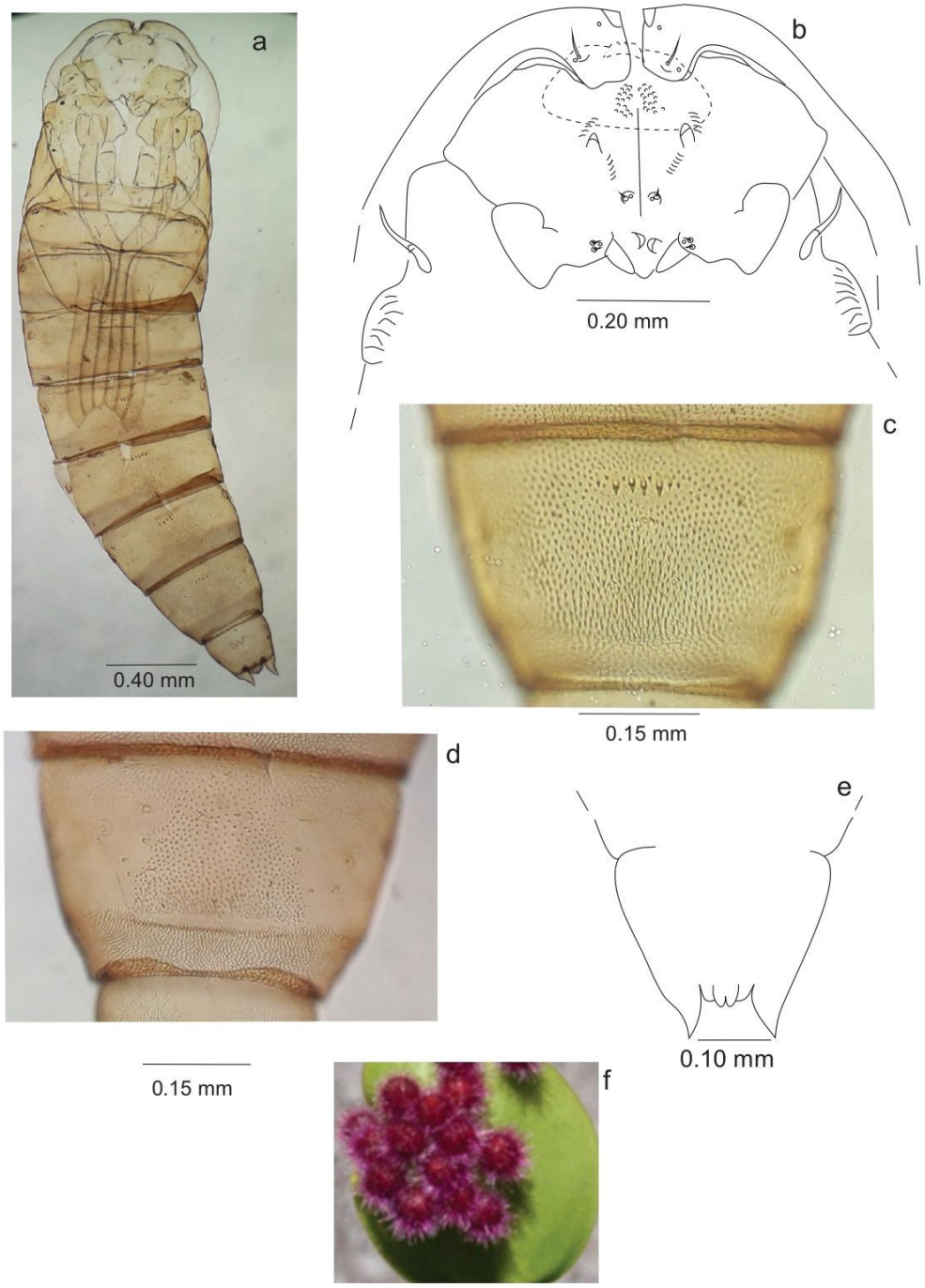

Figure 4 *Bruggmannia capixaba*, sp. n., pupa: a) General aspect, dorsal view, b) Head and prothoracic spiracles, ventral view, c) 7th abdominal segment, dorsal view, d) 7th abdominal segment, ventral view, e) Terminal segment, ventral view, f) Gall, general aspect (from Bregonci et al., 2010, original photo without scale).

Distribution: Rio Grande do Sul (Porto Alegre, Viamão, Canela, Maquiné e Torres).

Comments. This species is unique in having the following set of characters: 1) Adults: glossiform aedeagus, ovipositor 1.72 times the length of 7th sternite; 2) Pupa: no lateral projection below prothoracic spiracles; setiform, curved and short prothoracic spiracles; short and not sparse abdominal spines; and 3) Larva: terminal segment with 1/5 of total length of body. The comparison between *Bruggmannia gaucha* and other congeneric species on *Guapira* was showed in the comments of *B. capixaba*.

***Bruggmannia marambaiensis* Maia & Espinheira, sp. n.**

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Description. Male. 2.4-2.8 mm long (n=4). Head (Fig. 10a): eye facets circular, closely appressed; antennae: scape trapezoidal, setose, pedicel globoid, setose, flagellomeres cylindrical, node microtrichose and neck bare, flagellomere node 5 times the length of neck (n=3); 1st and 2nd flagellomeres connate, circumfila wavy (Fig. 10b); frons with 25-37 setae (n=3); mouth parts: labrum long-attenuate; hypopharynx of the same shape of labrum, with long anteriorly directed lateral

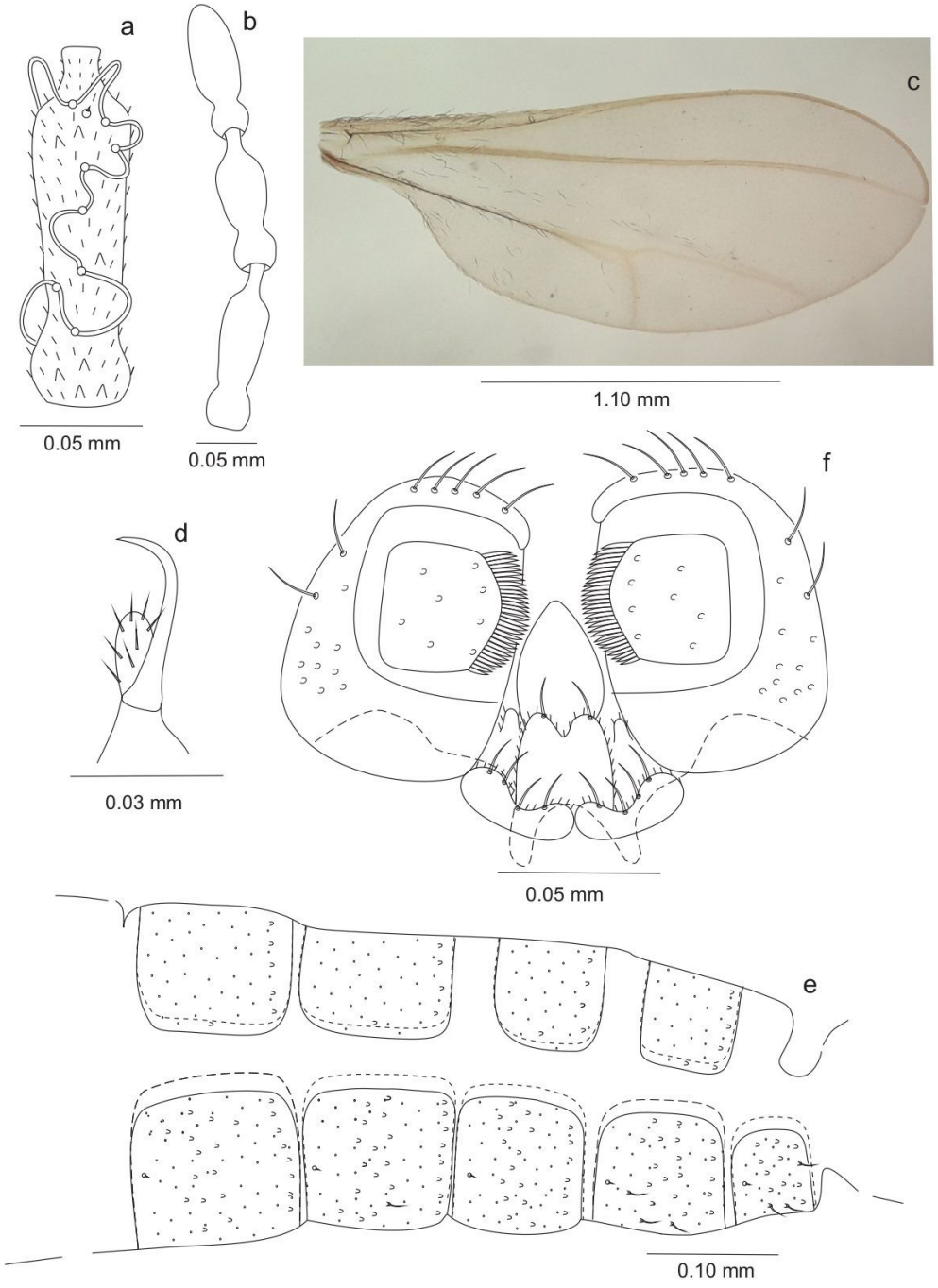

Figure 5 *Bruggmannia gaucha*, sp. n., male: a) 3rd flagellomere, b) 10th – 12th flagellomeres, c) Wing, d) Tarsal claw, foreleg, lateral view, e) Abdominal segments, f) Terminalia, dorsal view.

setulae; labella elongate-convex, with lateral and three mesal setae each; palpus: 1st segment globoid, shorter than 2nd segment, 2nd and 3th segments claviform, 2nd segment 1.1-1.5 times as long as 1st segment, 3rd segment 1.3-1.5 as long as 2nd segment, all segments with setae and scales. Thorax: scutum with two dorsocentral rows of setae with scales intermixed, setae more abundant anteriorly and two rows of lateral setae, with scales intermixed; scutellum with setae subdistally; anepimeron with some setae and scales; other pleura bare; wing (Fig. 10c) length (from arculus to apex): 1.80–1.90 mm (n=2); tarsal claws bent beyond midlength, empodium rudimentary (Fig. 10d). Abdomen (Fig. 10e): 1st–6th tergites sclerotized, rectangular with posterior row of setae, no lateral setae, scales scattered, no basal pair of trichoid sensilla, 7th tergite sclerotized, rectangular with posterior row of setae, few lateral setae, scales scattered, no basal pair of trichoid sensilla; 8th tergite sclerotized, with a mesal reentrance at distal margin, bare; 2nd–6th sternites rectangular with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, and a basal pair of trichoid sensilla; 7th sternite with a mesal reentrance at basal margin, posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, and a basal pair of trichoid sensilla,8th sternite rectangular, with scattered setae, scales and a basal pair of trichoid sensilla. Terminalia (Fig. 11a): gonocoxite hemispherical, setose, setae more abundant at the apex, microtrichose, 2.0-2.5 times the length of gonostylus; gonostylus squarish with a row of setae just below teeth,

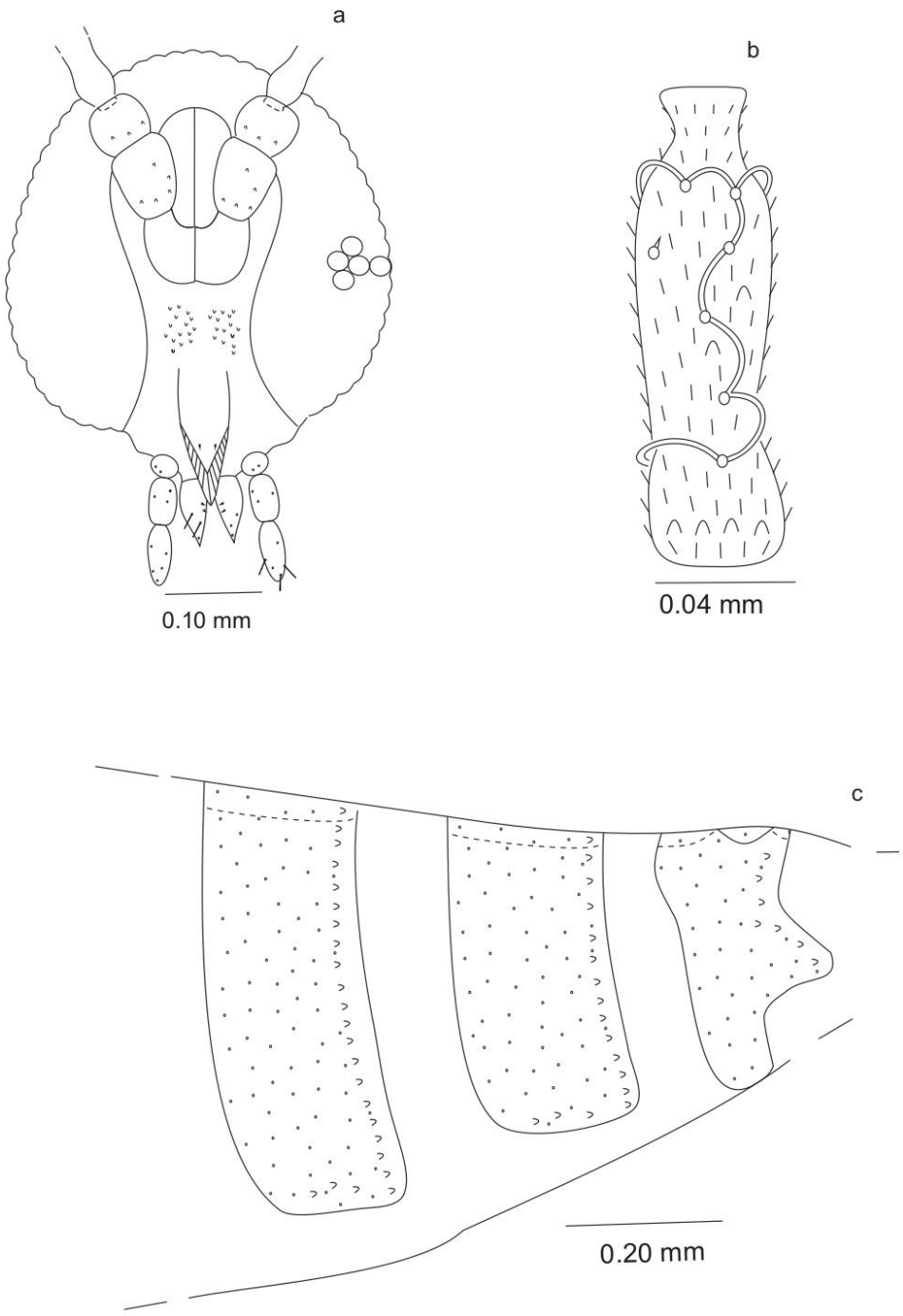

Figure 6 *Bruggmannia gaucha*, sp. n., female: a) Head, ventral view, b) 5th flagellomere, c) 6th – 8th abdominal segments, dorsal view.

scattered setae, microtrichose; cerci wide with lobes rounded, setose, microtrichose; hypoproct bilobed, lobes narrower than cercal lobes, microtrichose; aedeagus conical, gonocoxal lobes very short.

Female. 2.5-3.0 mm long (n=4). Circumfila less sinuous than in male, with two connected rings (Fig. 11b); last three flagellomeres shorter than others (Fig. 11c); frons with 42 setae (n=1); labella elongate-convex; palpus: 2nd segment 2 times as long as 1st segment, 3rd segment 1.3 as long as 2nd segment; wing length (from arculus to apex): 1.95–2.20 mm (n=5). Abdomen (Fig. 11d): 1st–7th tergites as in male; 8th not visible; 2nd–6th sternites as in male; 7th sternite 2.0 times as long as 6th sternite, with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, and a basal pair of trichoid sensilla; 8th sternite not sclerotized; ovipositor (Fig. 11e) soft, short, subequal to 7th sternite in lenght (n=1); cerci tiny with some short setae.

Pupa (Fig. 12a). 2.5-3.0 mm long (n=5). Integument brownish. Head (Fig. 12b): a pair of antennal papillae present, antennal horn triangular, short, with outer and inner margins smooth; apical seta 0.5 times the length of prothoracic spiracle (n=5); upper facial horns triangular; lower facial horns absent; two pairs of lower facial papillae: one pair with seta, the other bare; a triplet of papillae (two with setae and one bare) near base of each palpus; upper cephalic margin thickened laterally, face with lateral projection, head integument wrinkled just

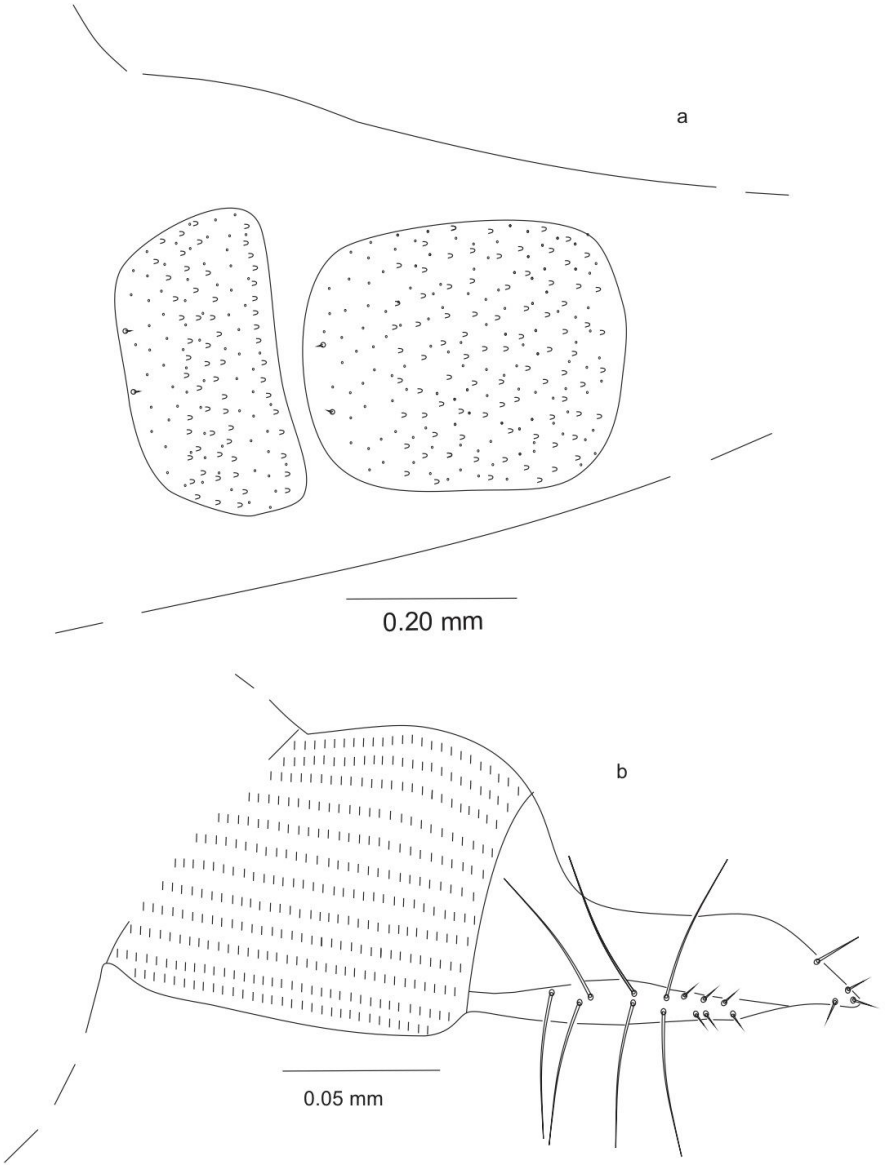

Figure 7 *Bruggmannia gaucha*, sp. n., female: a) 6th and 7th abdominal segments, ventral view, b) Ovipositor, lateral view.

below antennal bases and around upper facial horns, except below them. Thorax: prothoracic spiracle setiform, curved, relatively short, 0.15 mm long, 2.0 times as long as flagellomeres width (n=5), prothorax with three pairs of dorsal papillae and two pairs of lateral papillae, no lateral projection just below prothoracic spiracles. Abdomen: spiracles not elongated, 2nd–8th segments with dorsal spines near anterior margin, arranged only centrally (Fig. 12c), spines in the 2nd segment rudimentary, shorter than those of 3rd-8th segments, integument ventrally sculptured (Fig. 12d). Last segment with two rounded terminal projections far apart in female pupa and absent in male pupa (Figs. 13a, b).

Larva. 2.8-3.5 mm long (n=5), body elongate, cylindrical, tapered towards posterior end (Fig. 13c). Integument rough. Prothoracic sternal spatula absent, sternal papillae setose; three setose lateral papillae on each side, four dorsal papillae setose from 1st to 7th abdominal segments. Terminal segment with 1/3-1/4 of total length of larva (n=5), elongate and strongly tapered towards apex; integument spiny dorsally, a group of setulae near basal margin. Papillae not visible. Anus rounded.

Gall: on leaves, globoid, brown, glabrous, and one-chambered on *Guapira opposita*.

(Fig. 13d).

Etymology. The name "*marambaiensis*" refers to the type-locality: Marambaia Island.

Material Examined. Holotype male. Brazil, Rio de Janeiro, Mangaratiba, Ilha da Marambaia, Praia do Sítio, 29.vii.2010, Rodrigues A. col, MNRJ. Paratypes: same locality, date and collector as holotype, 2 males, same locality and collector, 21.xi.2010, 2 males, 4 females, 6 pupal exuviae), same locality and collector, 22.vi.2020, 1 female, same locality and collector, 25.vii.2010, 6 pupal exuviae, same locality and collector, 24.ii.2011, 6 larvae, MNRJ.

Distribution: Rio de Janeiro (Mangaratiba).

Comments. This species is unique in having the following set of characters: 1) Adults: conical aedeagus; ovipositor and 7th sternite

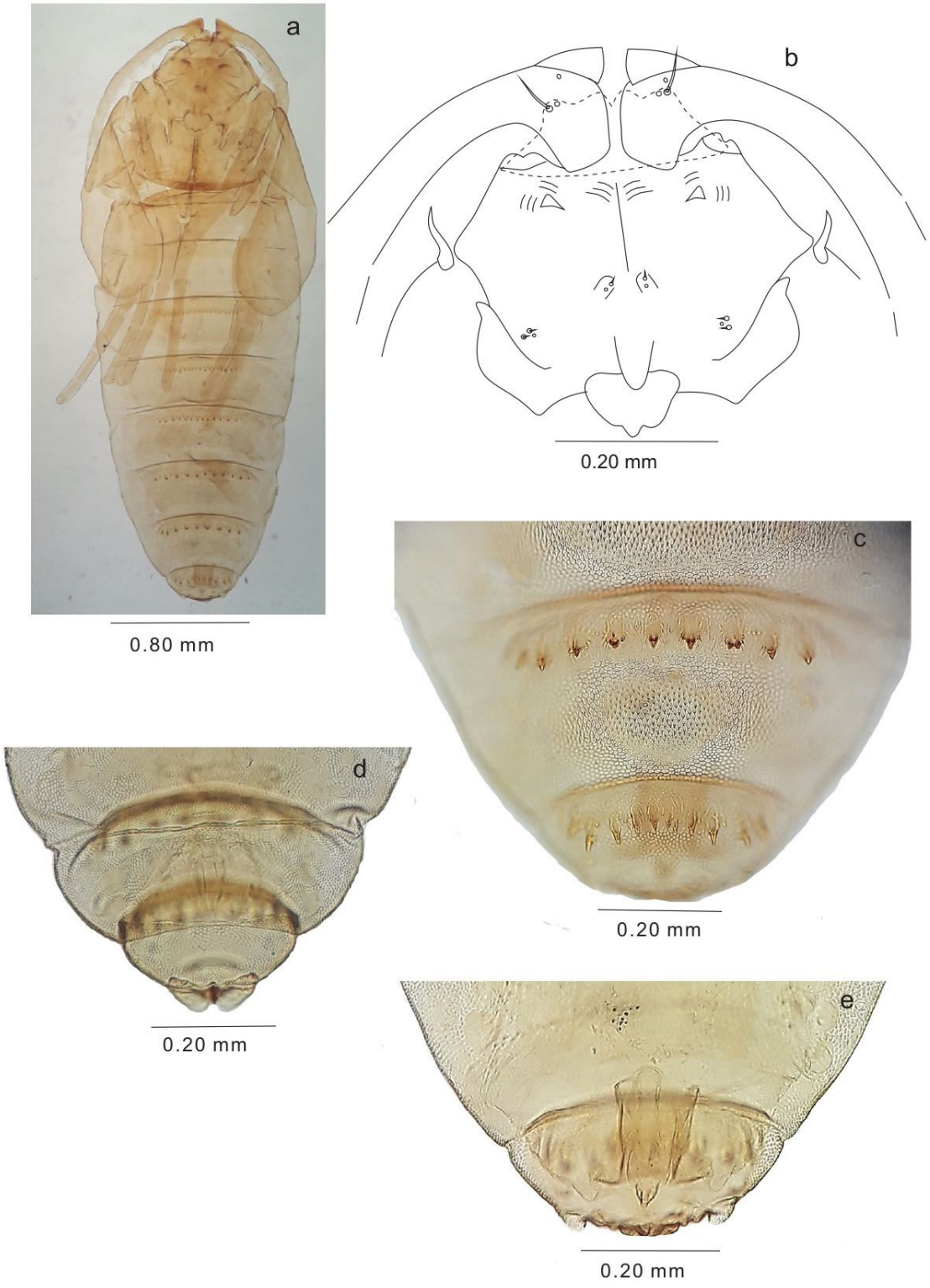

Figure 8 *Bruggmannia gaucha*, sp. n., pupa: a) General aspect, dorsal view, b) Head, ventral view, c) 7th abdominal segment to end, dorsal view, d-e) Terminal segment, sexual dimorfism, ventral view: d) Male pupa, e) Female pupa.

subequal in length; 2) Pupa: no lateral projection below prothoracic spiracles; setiform, little curved and long prothoracic spiracles; long and sparse abdominal spines; and 3) Larva: terminal segment with 1/3-1/4 of total length of body. *Bruggmannia marambaiensis* has aedeagus conical. There is only one other congeneric species with conical aedeagus on *Guapira*, *Bruggmannia elongata* Maia & Couri, 1993. Both species differ from each other mainly in the length of empodia (rudimentary in *B. marambaiensis* and reaching the midlength of tarsal claws in *B. elongata*), shape of upper facial horns (conspicuously more pointed in the new species than those of *B. elongata*), width of dorsal

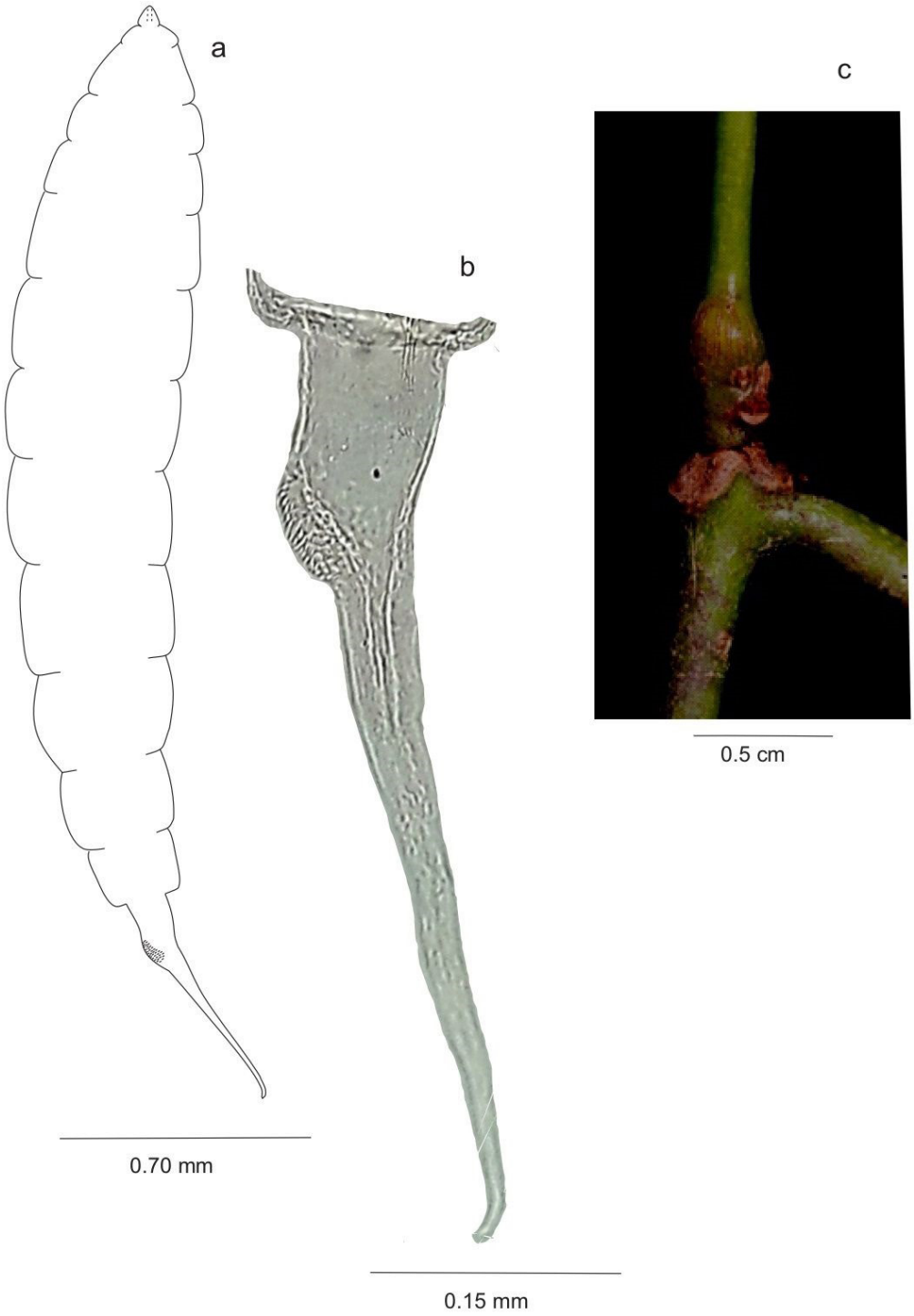

Figure 9 *Bruggmannia gaucha*, sp. n. a) Larva, general aspect, dorsal view, b) Larva, terminal segment, lateral view, c) Gall, general aspect.

plate (narrower in *B. marambaiensis* than that of *B. elongata*), and arrangement of abdominal dorsal spines (along the entire width of *B. marambaiensis* and only centrally in *B. elongata*).

Bruggmannia monteiroi **Maia & Couri, 1993**

Male description. Adult. 2.95-3.40 mm long (n=3). Head (Fig. 14a): eye facets circular, closely appressed; antennae: scape trapezoidal, setose, pedicel globoid, setose, flagellomeres cylindrical, with microtrichose node and glabrous neck, flagellomere node 6.5 times the length of neck; 1st and 2nd flagellomeres connate; circumfila wavy (Fig. 14b); frons with 26 setae (n=1); mouth parts: labrum long-attenuate; hypopharynx of the same shape of labrum, with long anteriorly directed lateral setulae; labella elongate-convex, with lateral and three mesal setae each; palpus: 1st segment and, 2nd segment ovoid, subequal in lenght, 3rd segment cylindrical, about 1.5-2.25 times the length of 2nd segment (n=3), all segments with setae and scales. Thorax: scutum with two dorsocentral rows of setae, setae more abundant anteriorly, two groups of lateral setae

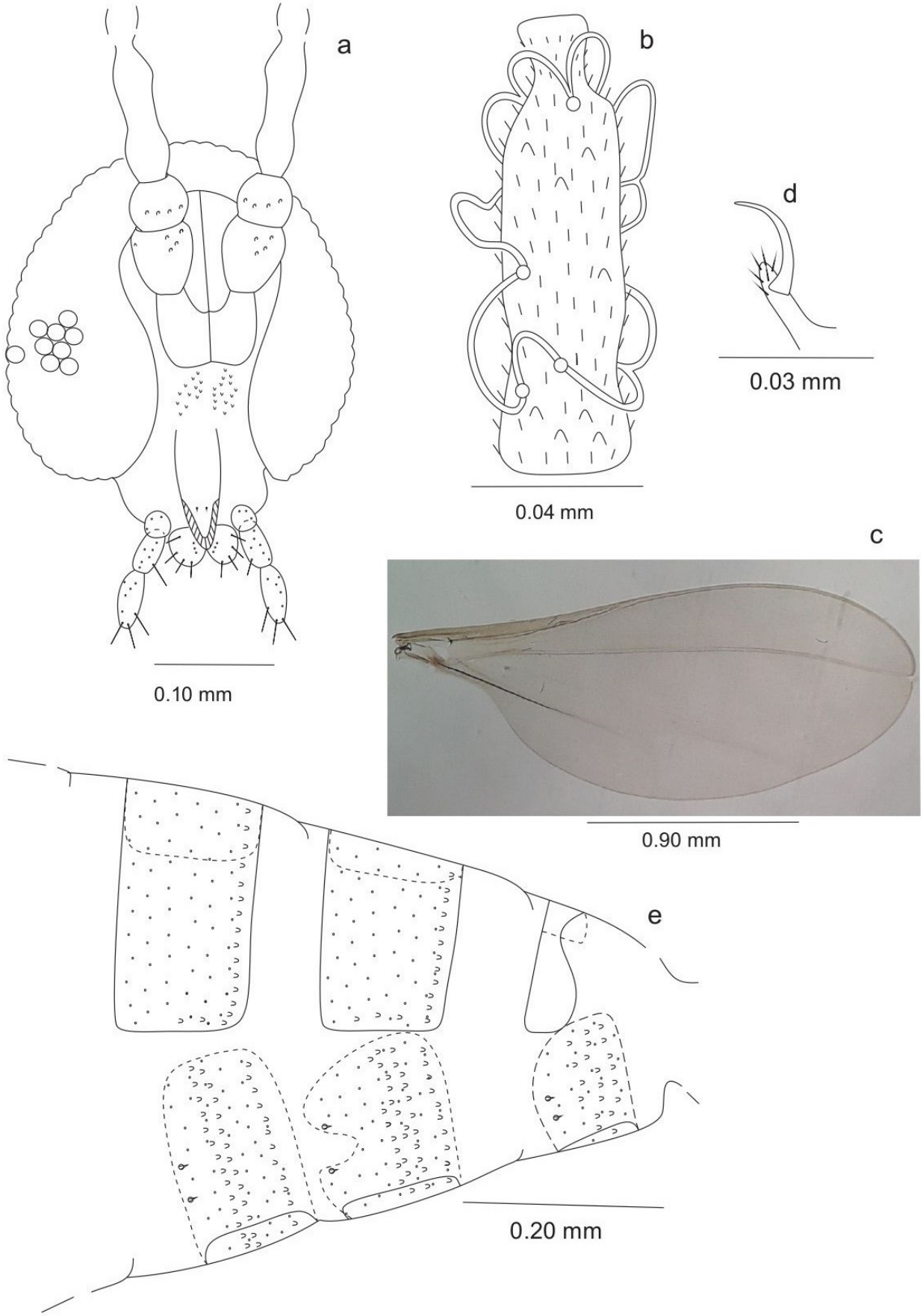

Figure 10 *Bruggmannia marambaiensis*, sp. n., male: a) Head, frontal view, b) 6th flagellomere, c) Wing, d) Tarsal claw, foreleg, lateral view, e) 6th – 8th abdominal segments, lateral view.

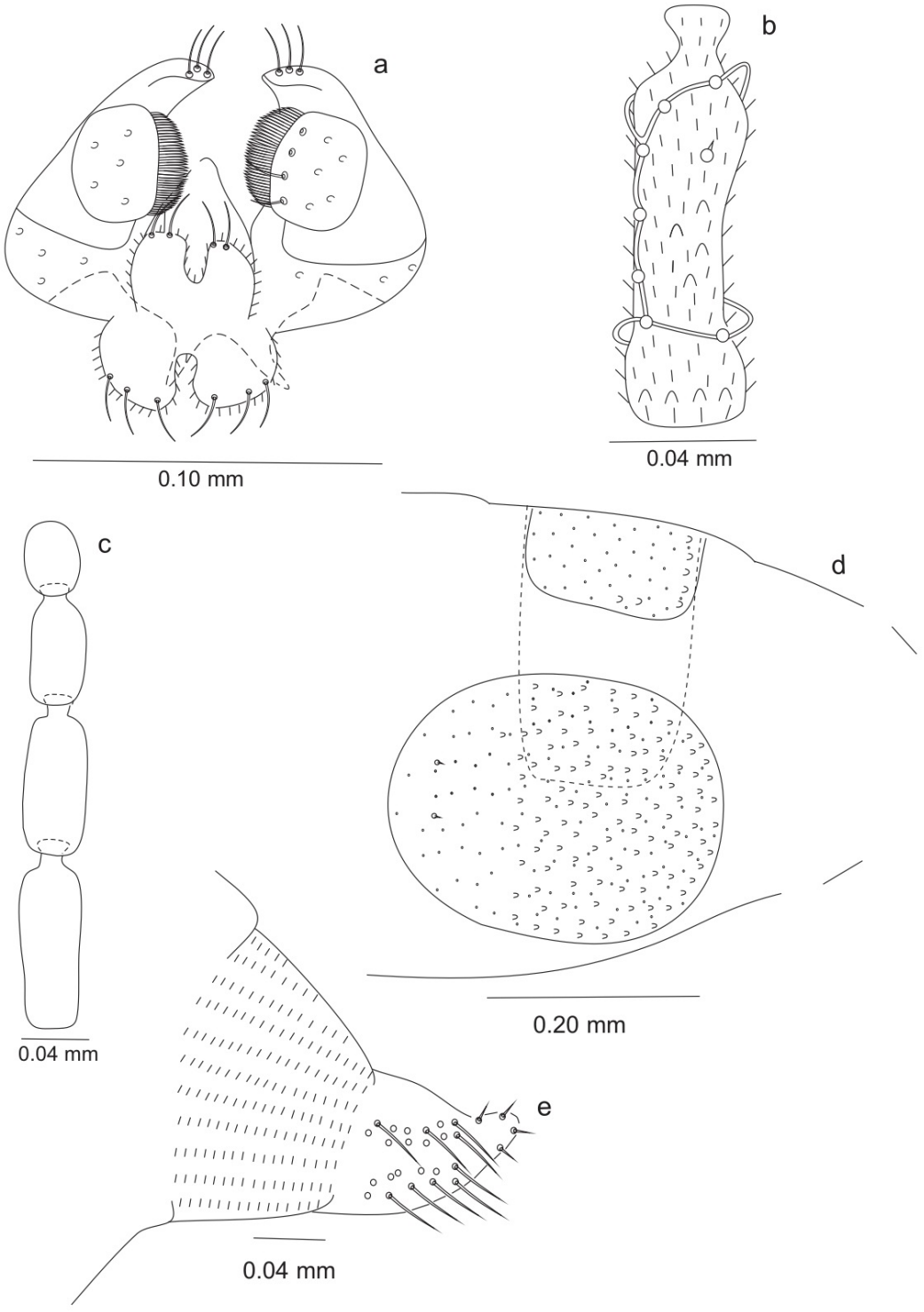

Figure 11 *Bruggmannia marambaiensis*, sp. n., a) Male terminalia, dorsal view, b) Female 5th flagellomere, c) Female 9th –12th flagellomeres, d) Female 7th – 8th abdominal segments, lateral view, e) Ovipositor, lateral view.

with scales intermixed; scutellum with scattered setae; anepimeron with several setae and scales; other pleura bare; wing (Fig. 14c) length (from arculus to apex): 1.70-2.25 mm (n=3); all legs broken. Abdomen (Fig. 14d): 1st–7th tergites sclerotized, rectangular with posterior row of setae, few lateral setae, scales scattered, no basal pair of trichoid sensilla; 8th tergite with an indentation at distal margin in midlenght, bare; 2nd–7th sternites rectangular with posterior row of setae, numerous setae at midlength, lateral setae present, scales scattered, a basal pair of trichoid sensilla, 8th sternite with a reentrance at basal margin, near midlength, with scattered setae and scales, and a basal pair of trichoid sensilla. Terminalia (Fig. 14e): gonocoxite hemispherical, setose, 2.6–3.0 times the length of gonostylus (n=2); gonostylus rectangular with scattered setae, cerci separate, riniform, setose; hypoproct bilobed, setose; aedeagus conical, gonocoxal lobes very short.

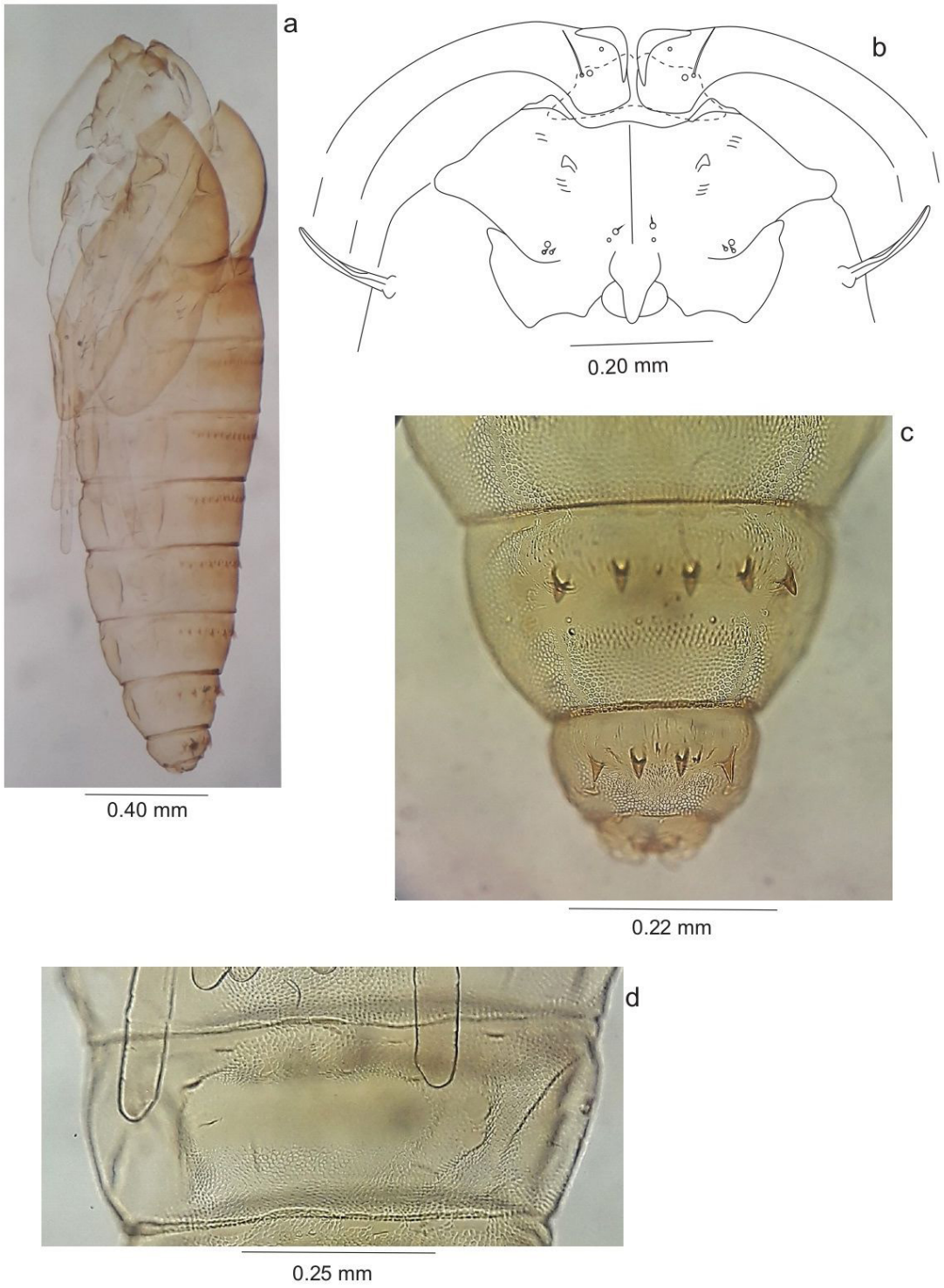

Figure 12 *Bruggmannia marambaiensis*, sp. n., pupa: a) General aspect, lateral view, b) Head and prothoracic spiracle, ventral view, c) Last abdominal segments, dorsal view, d) 6th abdominal segment, ventral view.

Pupa redescription (Fig. 15a). 3,0-4.3 mm long (n=7). Integument brownish. Head: a pair of antennal papillae present, antennal horn triangular, short, with outer and inner margins smooth; apical seta 0.07-0.08mm long (n=5); upper facial horns conical, short; lower facial horns absent; two pairs of lower facial papillae: one pair with seta, the other bare; a triplet of papillae (two with setae and one bare) near base of each palpus; upper cephalic margin thickened laterally, face without lateral projection, head integument wrinkled just below antennal bases and around upper facial horns and below them. Thorax: prothoracic spiracle not projected (Fig. 15b), prothorax with three pairs of dorsal papillae and two pairs of lateral papillae, no lateral projection just below prothoracic spiracles. Abdomen: spiracles not elongated, 2nd–8th segments with dorsal spines near anterior margin, arranged only centrally (Fig. 15c), spines in the

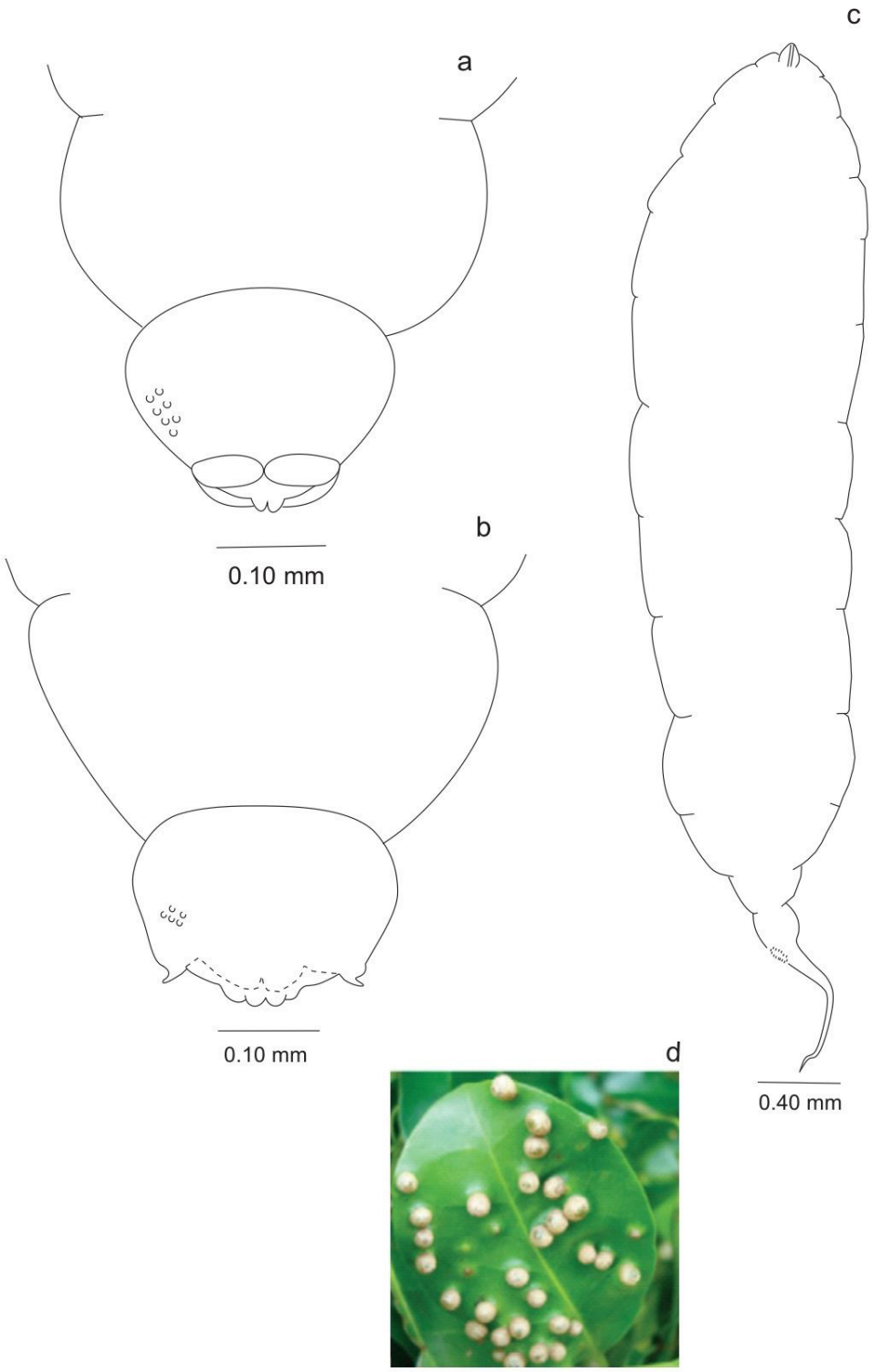

Figure 13 *Bruggmannia marambaiensis*, sp. n.: a-b) Pupa, terminal segment, sexual dimorfism, ventral view, a) Male pupa, b) Female pupa, c) Larva, general aspect, d) Gall, general aspect (from Rodrigues et al., 2014, original photo without scale).

2nd segment rudimentary, shorter than those of 3rd-8th segments, integument ventrally sculptured. Last segment with two rounded terminal projections in both sexes, far apart in female pupa and closely appressed in male pupa (Figs. 15d, e).

Larva description. 3.20 mm long (n=1), body elongate, cylindrical, tapered towards posterior end (Fig. 16a); integument rough (Fig. 16b). Prothoracic sternal spatula absent, sternal papillae setose; three setose lateral papillae on each side, four dorsal papillae setose from 1st to 7th abdominal segments. Terminal segment (Fig. 16c) with 1/16 of the total length of larva, elongate and strongly tapered towards apex, with four setose papillae; anus cleft; integument rough dorsally, ventrally with rounded sculptures near anus and striated distally.

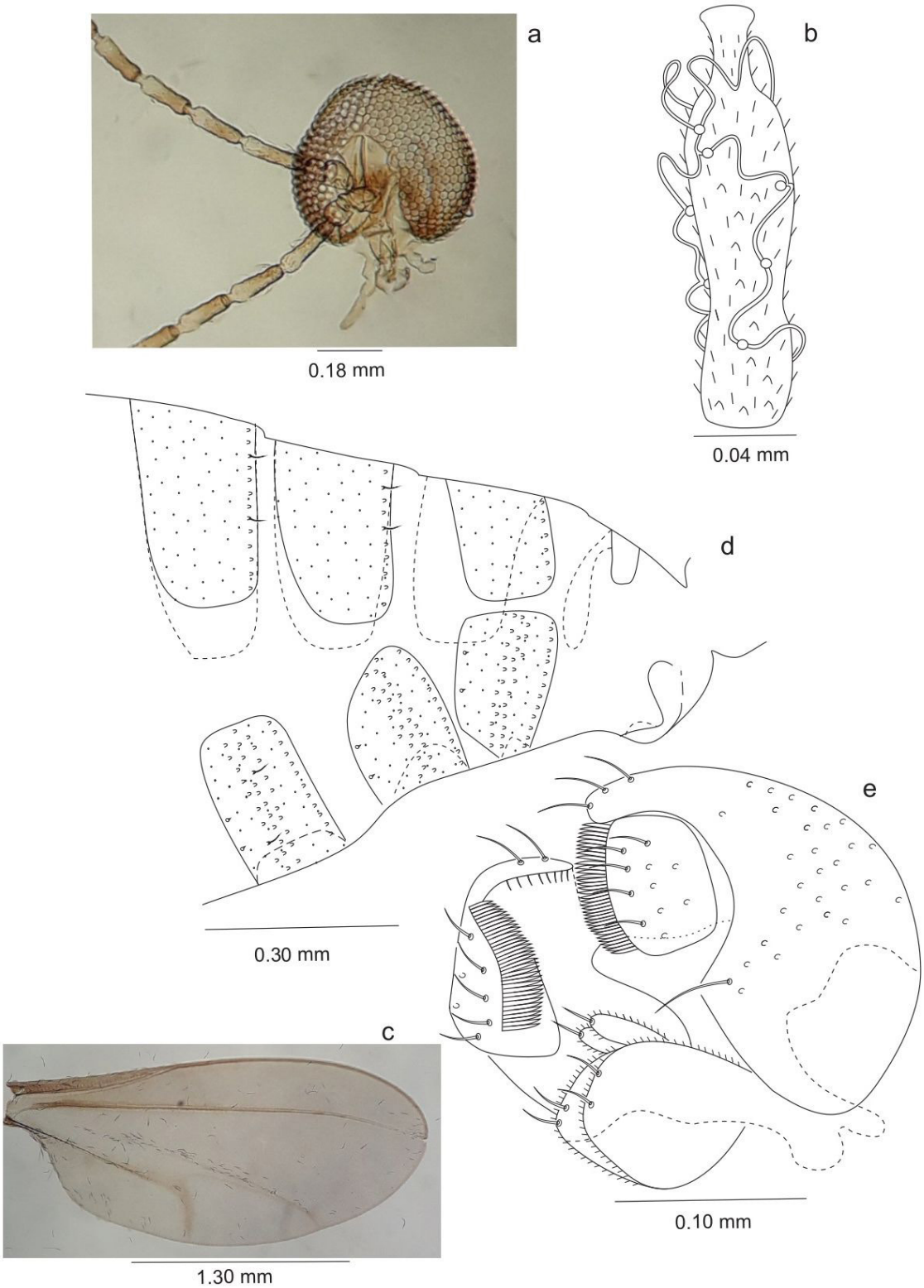

Figure 14 *Bruggmannia monteiroi* Maia & Couri, 1993, male: a) Head, frontal view, b) 5th flagellomere, c) Wing, d) 5th – 8th abdominal segments, lateral view, e) Terminalia, dorsolateral view.

Gall (Fig. 16d). On bud, globose, green or reddish, with trichomes, one-chambered.

Material Examined. Brazil, Rio de Janeiro, Maricá, APA de Maricá, 18.v.2020, Maia & Gomes col., 2 males, 3 male pupal exuviae, 1 female pupal exuvia (emergence on 21.V.2020). Same locality and collectors, 27.iv.2021, 1 male pupal exuvia; 25.v.2021, 1 male (emergence on 31.V.2020), 2 female pupal exuviae and 1 larva; 31.v.2021, 1 male pupal exuvia; 07.vi.2021, 1 male + pupal exuviae; 31.vii.2021, 1 female pupal exuviae and 1 male pupa.

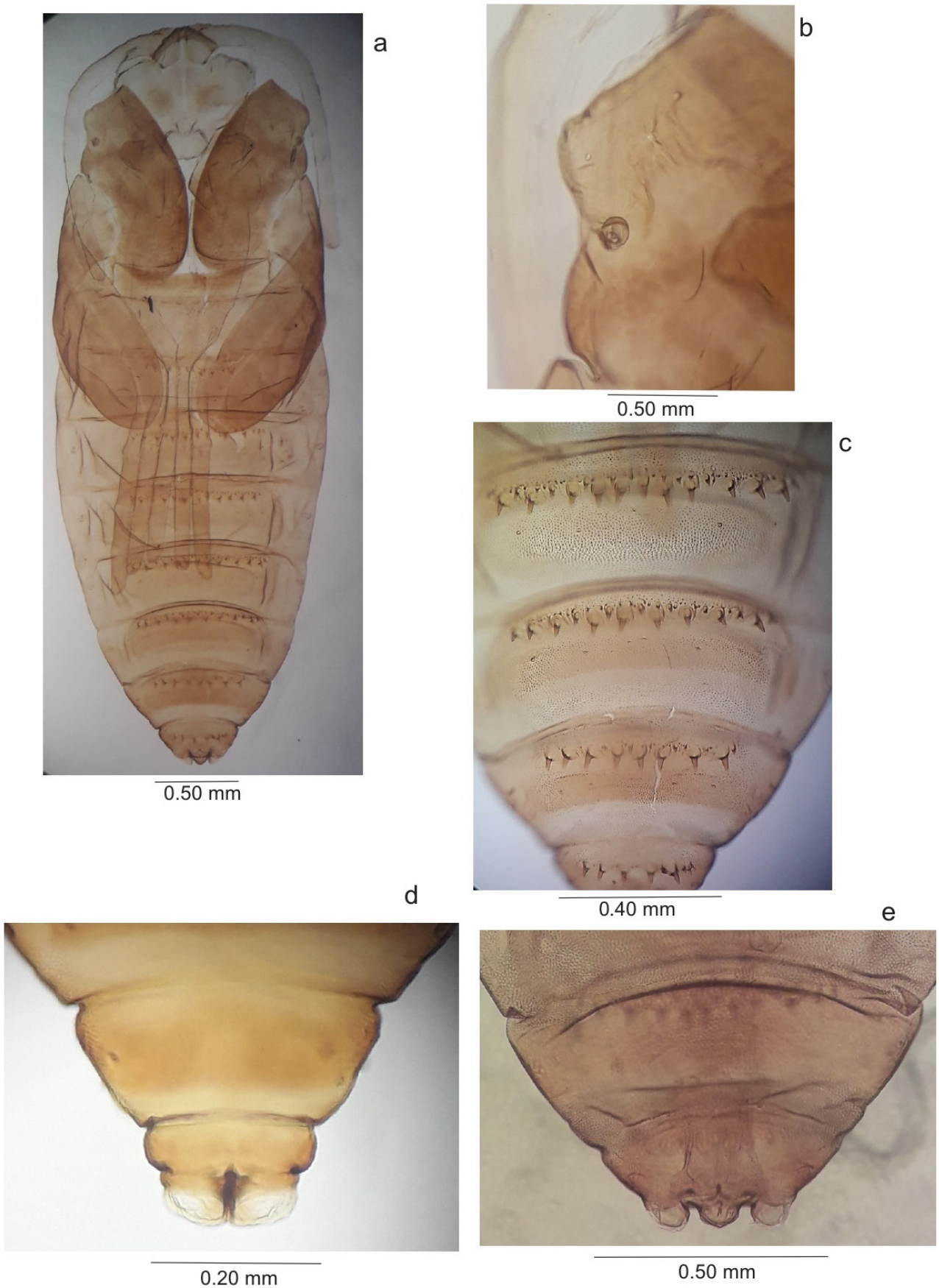

Figure 15 *Bruggmannia monteiroi* Maia & Couri, 1993, pupa: a) General aspect, ventral view, b) Prothoracic spiracle, dorsal view, c) 6th – 9th abdominal segments, dorsal view, d-e) Terminal segment, sexual dimorfism, ventral view: d) Male pupa, e) Female pupa.

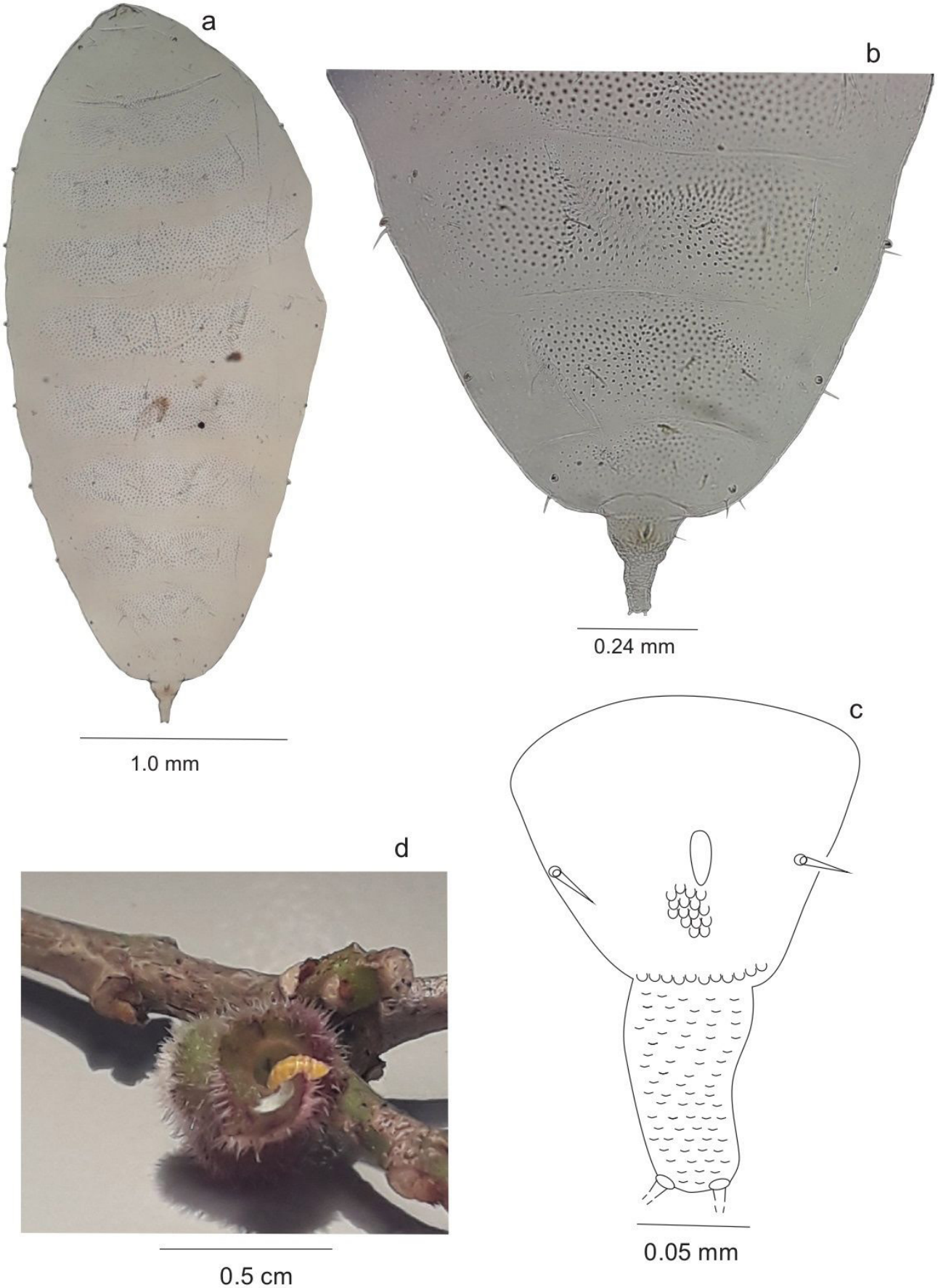

Figure 16 *Bruggmannia monteiroi* Maia & Couri, 1993: a-c) Larva, a) General aspect, b) Last abdominal segments, integument, dorsal view, c) Terminal segment, ventral view, d) Gall, general aspect.

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Conflicts of interest

No conflict of interest.

Author contribution statement

VCM collected galls and reared specimens of *Bruggmannia monteiroi*, analyzed the material, proposed the new species, wrote the full text and was responsible for illustrations. MSMJr collected galls and reared specimens of *Bruggmannia gaucha* and revised the text. IHLE contributed to the description of *Bruggmannia marambaiensis*.

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