

Five new species of *Asphondylia* (Diptera, Cecidomyiidae, Asphondyliini) from Brazilian restinga (Atlantic Forest)

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Abstract. *Asphondylia braziliensis* sp. nov., *Asphondylia fluminensis* sp. nov., *Asphondylia marambaensis* sp. nov., *Asphondylia varroniae* sp. nov., and *Asphondylia xerezi* sp. nov., are described based on material from Brazilian restingas. The first species induces galls on *Struthanthus acuminatus* (Ruiz. & Pav.) Kuijt (Loranthaceae), the second on *Erythroxylum ovalifolium* Peyr (Erythroxylaceae), the third on *Lantana fucata* Lindl. (Verbenaceae), the fourth on *Varronia curassavica* Jacq. (Cordiaceae), and the fifth on *Heliotropium* sp. (Heliotropiaceae). One host plant, *Erythroxylum ovalifolium*, is endemic to the Atlantic forest. The other plant species are native to Brazil. Illustrations of relevant morphological characters are provided. The new species are compared with congeneric Neotropical species. Types are deposited in the Entomological Collection of the Museu Nacional, Rio de Janeiro.

Keywords. Gall midges; Host plant; Morphology; Taxonomy.

INTRODUCTION

Asphondylia Loew, 1850 (Asphondyliina, Asphondyliini, Cecidomyiidi) is a diverse and widespread genus of Cecidomyiidae, with more than 300 species, all gall-inducers, 98 of them occur in the Neotropical region and 20 in Brazil (Gagné & Jaschhof, 2021). The genus is easily recognizable mainly by the male and pupal morphology. Males have two-toothed gonostyli and pupae exhibit upper and lower frontal horns (Gagné, 1994).

Five new species of *Asphondylia* are described here based on material from Brazilian restingas, a phytophysiognomy of the Atlantic forest. They induce galls on *Erythroxylum ovalifolium* Peyr (Erythroxylaceae), *Lantana fucata* Lindl. (Verbenaceae), *Struthanthus acuminatus* (Ruiz. & Pav.) Kuijt (Loranthaceae), *Varronia curassavica* Jacq. (Cordiaceae), and *Heliotropium* sp. (Heliotropiaceae), all plants native to Brazil. Their galls were previously reported and illustrated in the literature by Maia, 2001 and Rodrigues *et al.*, 2014. Due to nomenclatural changes, four botanical names were updated: *Lantana fucata*, *Struthanthus acuminatus* and *Heliotropium* sp. – cited as *Lantana lilacina* Desf., *Struthanthus concinnus* (Mart.) Mart. and *Tournefortia* sp. in Rodrigues *et al.*, 2014, respectively, and *Varronia curassavica* – cited as *Cordia verbenacea* DC. in Maia, 2001 (Miller & Gottschling, 2007). In addition, the genera *Varronia* and

Heliotropium previously positioned in Boraginaceae are currently positioned in the families Cordiaceae and Heliotropiaceae, respectively (Miller, 2013).

According to Gagné & Jaschhof, 2021, five gall midge species have been reported on Cordiaceae, six on Erythroxylaceae, three on Heliotropiaceae, four on Loranthaceae, and 18 on Verbenaceae in the Neotropical Region.

Varronia curassavica is native to Brazil, where it occurs in five phytogeographical areas: Amazon, Atlantic Forest, Caatinga, Cerrado, and Pampa (Stapf & Silva, 2023). This plant is used in folk medicine due to its anti-inflammatory, analgesic and cicatrizing properties (Lorenzi & Matos, 2008). *Heliotropium* L. is a genus native to Brazil, where it is widespread, with records in all phytogeographical domains and states, being represented by 14 species (Melo, 2023). *Erythroxylum ovalifolium* is endemic to the Atlantic Forest, restricted to the restinga physiognomy and known only from the state of Rio de Janeiro. *Struthanthus acuminatus* has only been recorded in areas of the Atlantic Forest in Brazil (Caires & Dettke, 2023). *Lantana fucata* L., recognized as a ruderal species, is native to Tropical and Subtropical America (Silva & Lima, 2012). In Brazil, this plant is widespread, occurring from north to south, in the Atlantic Forest, Caatinga, Cerrado, and Pampas (Silva *et al.*, 2022).

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MATERIAL AND METHODS

Galls on *Erythroxylum ovalifolium*, *Lantana fucata*, *Struthanthus acuminatus*, *Varronia curassavica* and *Heliotropium* sp. were collected at restinga areas in the southeastern Brazil, the first in the State of Rio de Janeiro (RJ), in the following municipalities – Maricá (22°52'S, 42°54'W), Arraial do Cabo (22°55'S, 42°21'W) and Carapebus (22°23'S, 41°45'W); the second and fifth in RJ, both in the municipality of Mangaratiba (Ilha da Marambaia, Kutuca beach: (23°04'04.85", 23°03'59.17"S, 43°59'39.41", 43°59'33.59"W); and the fourth in the State of São Paulo, in Bertioiga (23°51'S, 46°08'W) as well as in RJ, in Maricá and Carapebus. Field work was performed in different dates (see "Material Examined").

Branches with galls were removed from the host plants and transported in plastic bags to the laboratory. Some gall samples were dissected to obtain the larvae and the remainder was kept in plastic pots covered by a fine screen to obtain adults and pupal exuviae. The specimens were first preserved in 70% ethanol and then mounted on microscope slides following the methods outlined in Gagné (1994). The genus was identified using the identification key of Gagné (1994), and the new species were proposed after comparison with literature data (host plants, gall morphology and cecidomyiid descriptions). All specimens were deposited in the Entomological Collection of the Museu Nacional/Universidade Federal do Rio de Janeiro (MNRJ).

Morphological studies and drawings were made with the aid of an optical microscope with coupled photographic camera and drawing tube. Measurements were made using a microscope slide with scale from 0.01 to 5.0 mm. Length of wings was measured from the arculus to the apex (Fig. 1A); total length of females from head vertex to posterior margin of the 8th abdominal segment; pupal antennal horns were measured from base to apex, the length of the basal part was compared with that of the distal part (Fig. 1B). Lower facial horns are considered "aligned" when mesal and lateral horns are arranged in an almost horizontal line (Fig. 1B) and "non-aligned" when the mesal horn is clearly positioned below the lateral horns (Fig. 1C). All drawings were redrawn using Corel DRAW®. Adult morphological terminology follows Gagné (1994). The new species were compared to other Neotropical congeneric species.

Descriptions

Asphondylia braziliensis Maia, sp. nov. (Figs. 2A-4D)

Diagnosis: Male hypoproct rounded apically, deeply bilobed; ovipositor with needle part about 1.00-1.20 × length 7th sternite; pupa: antennal horn 0.23-0.30 mm long, upper facial horn single and conical, three lower frontal horns not aligned, 8th abdominal segment with 5-7 dorsal spines in the posterior row, larva: spatula with lateral teeth longer than mesal ones, mesal teeth round-

ed apically, three setose lateral papillae on each side of spatula.

Male: Body: 3.40-3.75 mm long (N = 3). Head (Fig. 2A): 0.40-0.50 mm long, 0.50 mm wide (N = 3), eye facets hexagonal, closely appressed; antennae: flagellomeres 1 and 2 not fused, scape obovate, setose, 0.11-0.12 mm long, 0.0 mm wide (N = 3), pedicel globose, setose, 0.05 mm long, 0.05 mm wide (N = 3), 1st-12th flagellomeres cylindrical, all 0.04 mm wide, circumfila longitudinally wavy, dense, anastomosing, equally spread along segments (Fig. 2B), 1st-7th flagellomeres 0.1-0.18 mm long (N = 3), 8th-10th flagellomeres 0.16-0.17 mm long (N = 3), 11th 0.15-0.17 mm long (N = 3), 12th flagellomere 0.12-0.13 mm long (N = 2) (Fig. 2C), proportion flagellomere neck-node 1:10; frons with 30 setae (N = 2); mouthparts: labrum long-attenuated, 0.08 mm long, 0.03 mm wide (N = 3); hypopharynx of the same shape as labrum, with long, anteriorly-directed lateral setulae, 0.10 mm long, 0.03 mm wide (N = 3); labella elongate and convex, 0.16 mm long, 0.10 mm wide (N = 1), with lateral and mesal setae; palpus 0.14 mm long: 1st segment globoid, 0.02 mm long, 0.02 mm wide (N = 2), 2nd segment cylindrical, 0.04 mm long, 0.02 mm wide (N = 2), 3rd segment fusiform, 0.08 mm long, 0.02 mm wide (N = 2), all segments with setae. **Thorax:** scutum with two dorsocentral rows of setae, setae more abundant anteriorly and posteriorly, two groups of lateral setae more abundant anteriorly, extending from base to distal margin, scales intermixed; scutellum with scattered setae; anepimeron setose; remaining pleural sclerites bare; legs: tarsal claws curved beyond midlength, isomorphic, empodium longer than claws (Fig. 2D); wing: length 2.50 mm (N = 3) (Fig. 2E). **Abdomen:** trichoid sensilla not visible; 1st-7th tergites sclerotized, rectangular with a posterior row of setae, few scattered lateral and mesal setae and mostly covered elsewhere with scales, tergite 1 shorter than other tergites, ½ length of 2nd tergite, 8th tergite bare, narrow, longer sublaterally than mesally; 2nd-8th sternites more sclerotized than tergites, rectangular, as long as tergites, with a posterior row of setae, several mesal and lateral setae, and mostly covered elsewhere with scales; 8th sternite with scattered setae and mostly covered elsewhere with scales. **Terminalia (Fig. 2F):** gonocoxite short and stout, 0.16 mm long, 0.07 mm wide (N = 2); gonostylus ovoid, 0.05 mm long, 0.04 mm wide; hypoproct deeply bilobed, rounded apically.

Female: Body length: 3.50-4.70 mm (N = 4). **Head:** 0.40-0.60 mm long, 0.50 mm wide, antennae: scape 0.12-0.13 mm long, 0.05-0.07 mm wide (N = 4), pedicel 0.05-0.07 mm long, 0.05-0.07 mm wide (N = 4), 1st-11th flagellomeres cylindrical, all 0.04 mm wide, circumfila comprising two longitudinal bands connected subbasally and apically by two transverse bands (Fig. 3A), flagellomeres 1 and 2 not fused, 1st flagellomere 0.25 mm long (N = 4), 2nd flagellomeres 0.19-0.21 mm long (N = 4), 3rd flagellomere 0.18-0.20 mm long (N = 4), 4th flagellomere 0.18-0.19 mm long (N = 5), 5th and 6th flagellomeres 0.17-0.20 mm long (N = 4), 7th flagellomere 0.17-0.19 mm

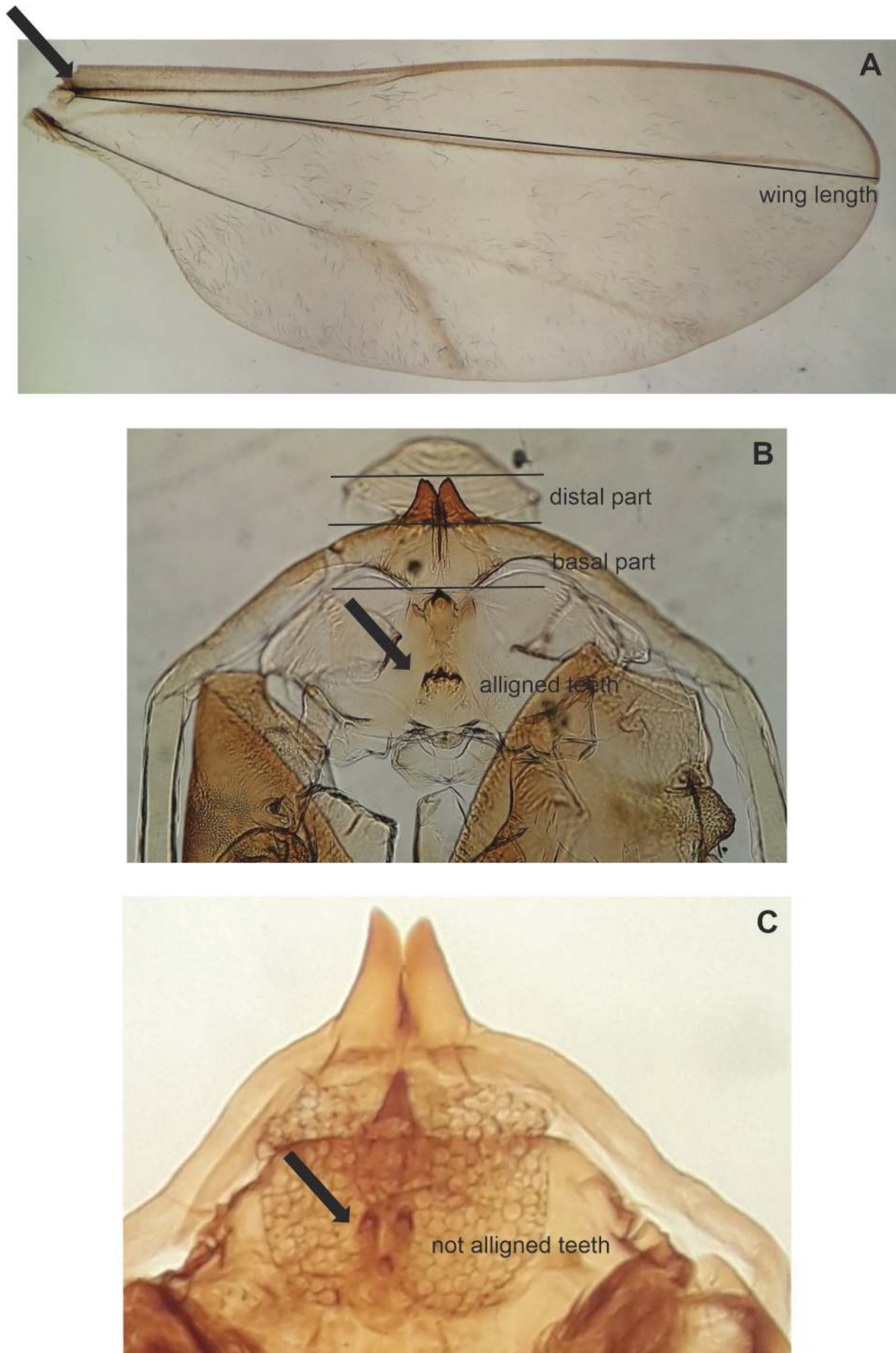


Figure 1. *Asphondylia* spp.: (A) *Asphondylia hancorniae* Maia, 2023, wing, (B-C) Pupa head, frontal view: (B) Antennal horn: basal and distal part, lower facial horn, teeth aligned (seta), (C) Lower facial horn, teeth not aligned (seta).

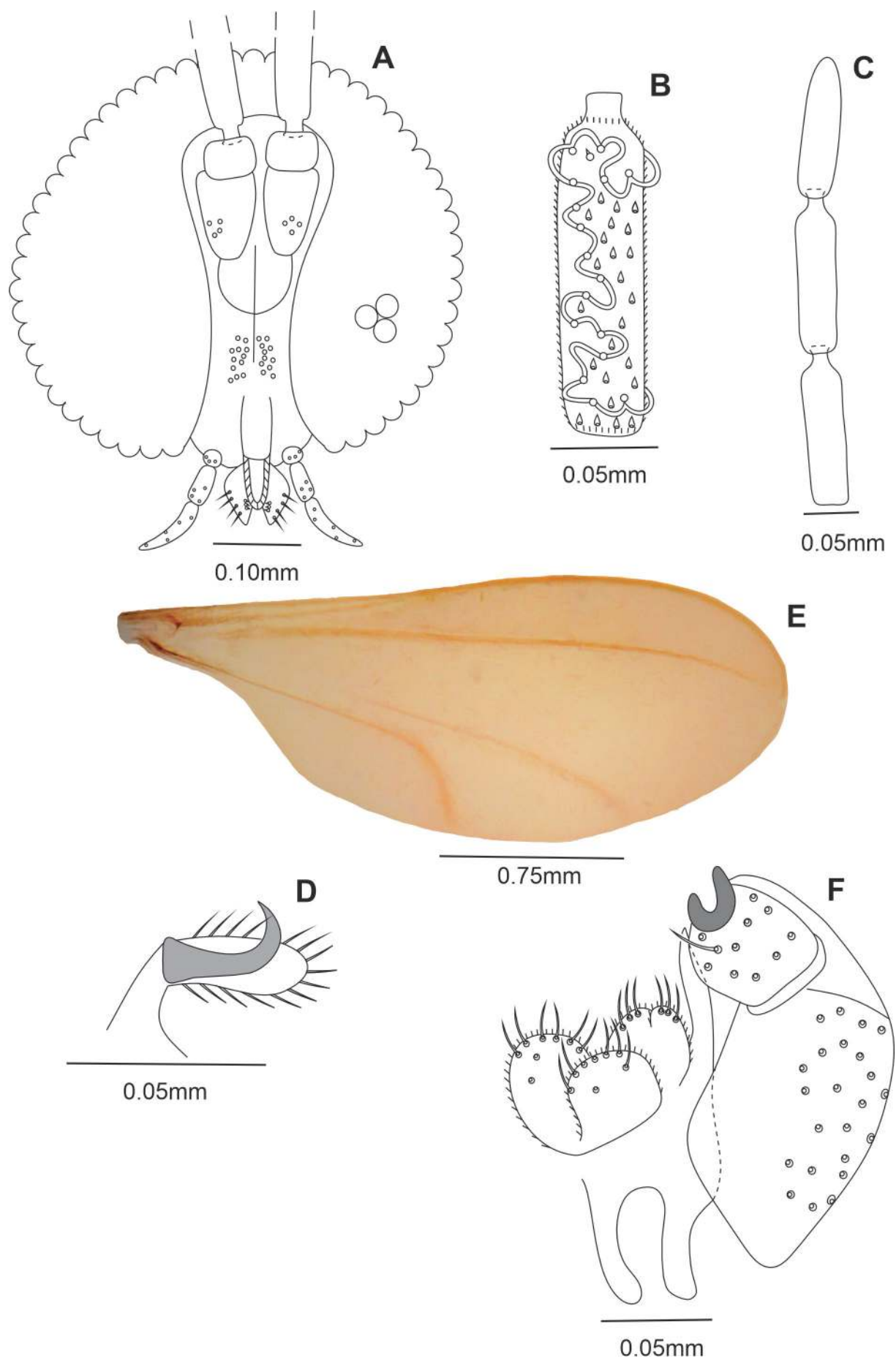


Figure 2. *Asphondylia braziliensis* Maia, **sp. nov.**, male: (A) Head, ventral view, (B) 5th flagellomere, (C) 10th-12th flagellomeres, (D) Midleg, tarsal claw and empodium, lateral view, (E) Wing, (F) Terminalia, dorsolateral view.

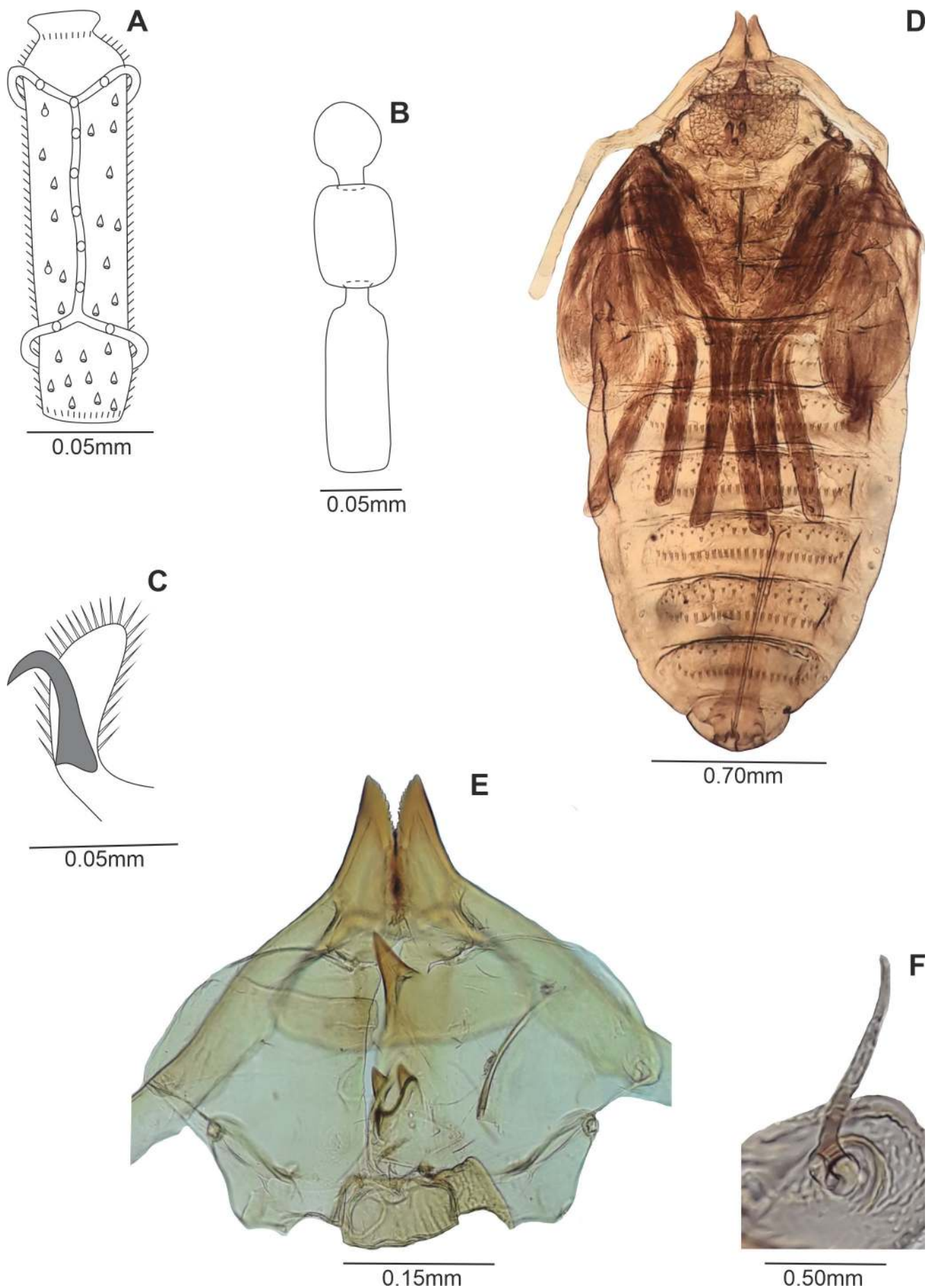


Figure 3. *Asphondylia braziliensis* Maia, **sp. nov.** (A-C) female: (A) 3rd flagellomere, (B) 10th-12th flagellomeres, (C) Hindleg, tarsal claw and empodium, lateral view, (D-F) pupa: (D) General aspect, ventral view, (E) Head, frontal view, (F) Prothoracic spiracle.

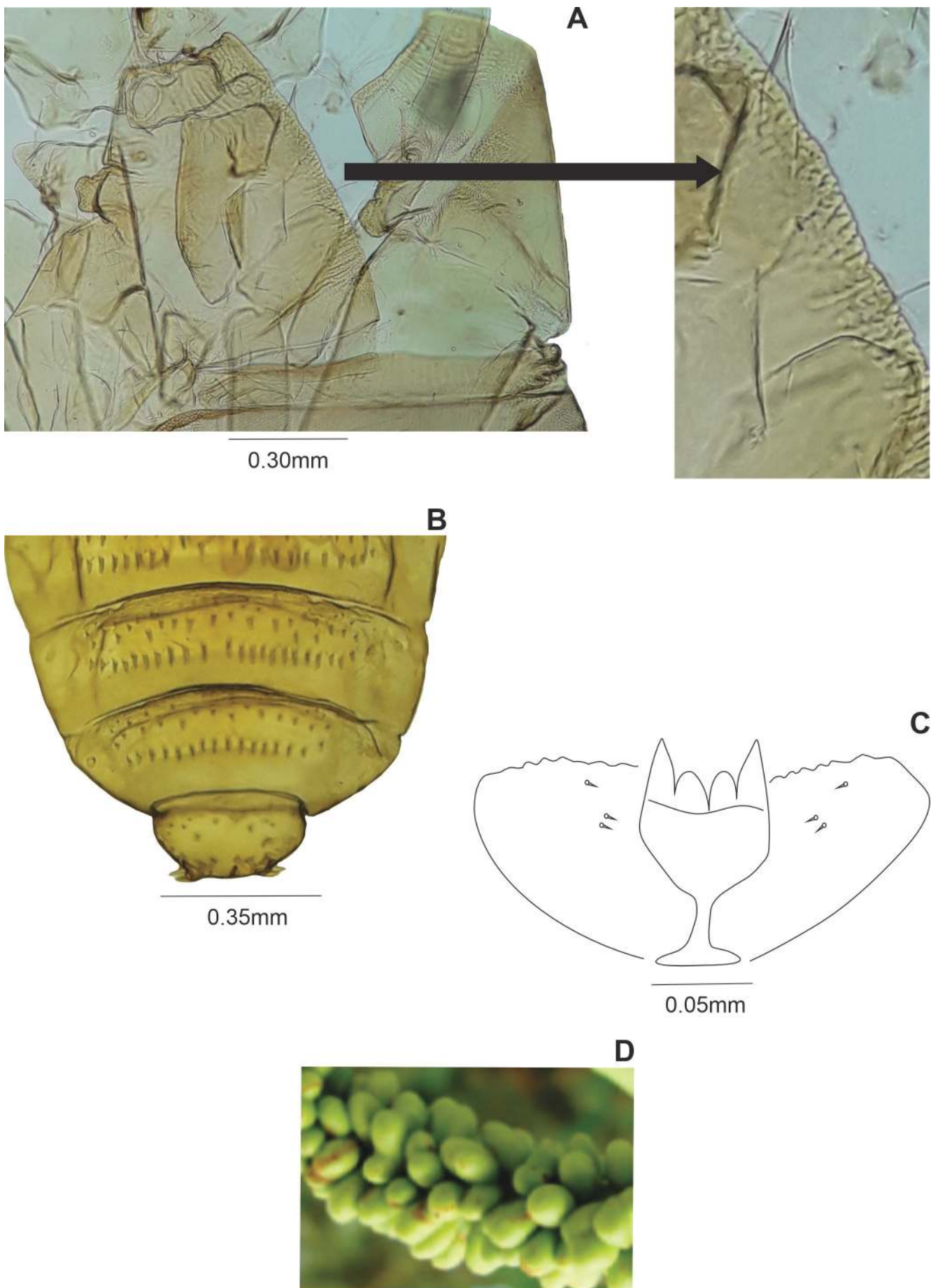


Figure 4. *Asphondylia braziliensis* Maia, **sp. nov.**, pupa: (A) Thoracic integument, dorsolateral view, (B) 5th-8th abdominal segments, dorsal view, (C) Larva, spatula and associated papillae, ventral view, (D) Stem galls on *Struthanthus acuminatus* (Ruiz. & Pav.) Kuijt (Loranthaceae).

long (N = 4), 8th flagellomere 0.16-0.18 mm long (N = 4), 9th flagellomere 0.14-0.15 mm long (N = 4), 10th flagellomere 0.11-0.12 mm long (N = 4), 11 flagellomere 0.06-0.08 mm long, 12th flagellomere 0.04-0.045 mm long (Fig. 3B); mouthparts: labrum 0.11 mm long, 0.035 mm wide (N = 2), hypopharynx 0.16 mm long, 0.035 mm wide (N = 2), labellum 0.05-0.07 mm long, 0.02-0.04 mm wide at midlength (N = 4), palpus 0.19-0.23 mm long (N = 4): 1st segment globose 0.02-0.03 mm long, 0.02-0.03 mm wide (N = 4), 2nd segment cylindrical 0.06-0.065 mm long, 0.025-0.03 mm wide at midlength (N = 4), 3rd segment conical 0.11-0.14 mm long and 0.02 mm wide at midlength (N = 4). **Thorax:** wing length: 2.90-3.00 mm (N = 3); tarsal claw more robust than in male (Fig. 3C). Abdomen (Fig. 3D): trichoid sensillae not visible, 1st-7th tergites as in male, 8th tergite with posterior margin with lobes 0.15-17 mm long (N = 2), 2nd-6th sternites as in male, 6th sternite 0.34 mm long (N = 1), 7th sternite rectangular 0.54-0.63 mm long, 1.84-1.85 × length sternite 6 (N = 3),

setose, mostly covered elsewhere with scales; sternite 8 not sclerotized; ovipositor: needle part 0.54-0.65 mm long (N = 3), 1.00-1.20 × length sternite 7 (N = 2). Other characters as in male.

Pupa (Fig. 4A): Color: brownish. Body length: 2.80-4.20 mm (N = 8). **Head (Fig. 4B):** face with lateral projection; antennal horn 0.23-0.30 mm long (N = 5), conical, pointed, inner margin serrated, distal part longer than basal part; dorsal plate 0.12-0.21 mm long, 0.40-0.53 mm wide (N = 6), apical seta 0.03-0.035 mm long (N = 5); upper facial horn bifid, 0.06 mm long (N = 6), conical; three lower facial horns not aligned, 0.03 mm long (N = 3); two pairs of lower facial papillae: one pair setose, the other bare; three pairs of lateral facial papillae: one pair setose, two bare; upper cephalic margin thickened laterally. **Thorax:** integument wrinkled (Fig. 4C); prothoracic spiracle, 0.11-0.12 mm long, longer than antennal basal width, setiform, conspicuously curved (N = 5) (Fig. 4D).

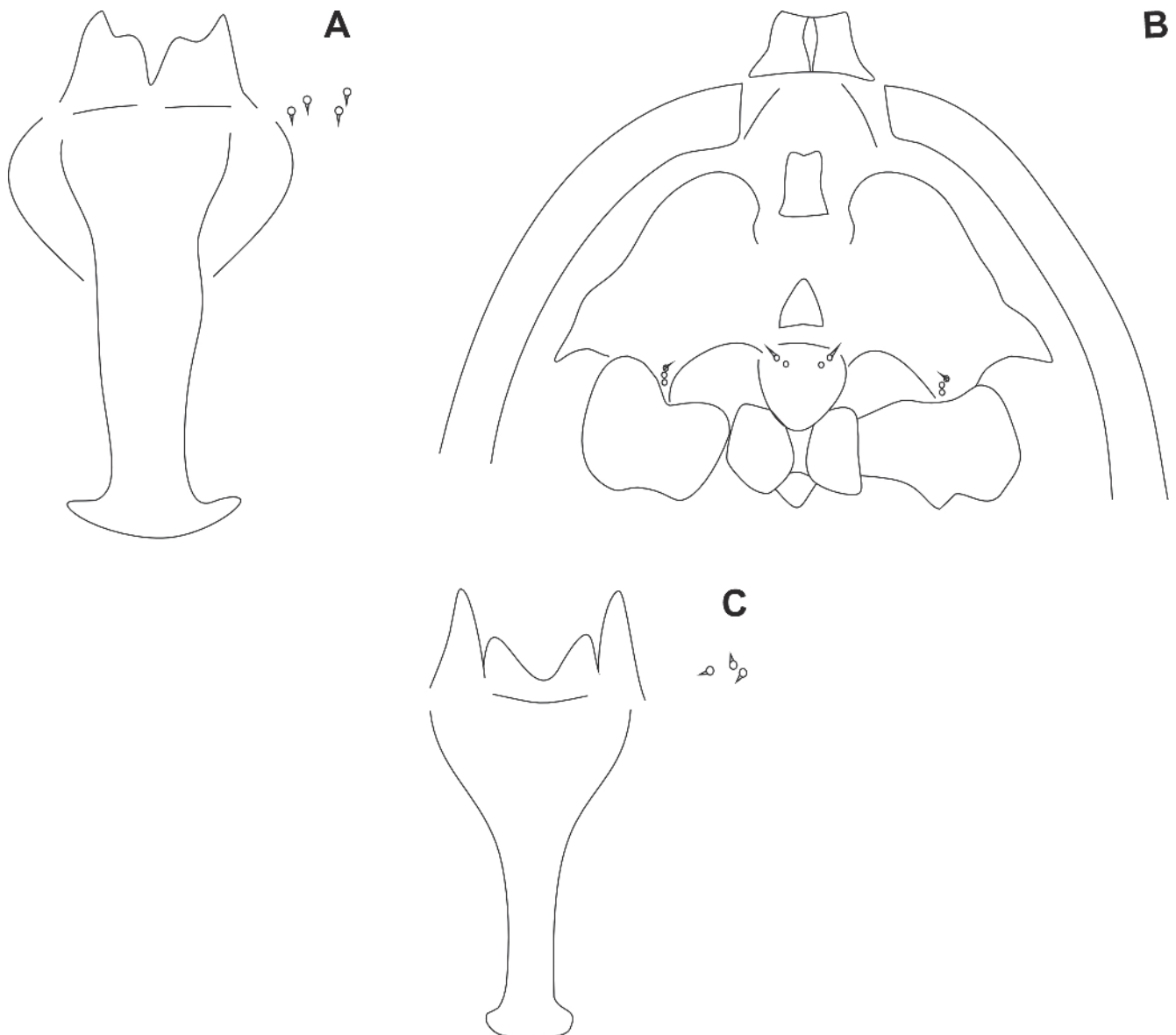


Figure 5. *Asphondylia* spp.: (A-B) *Asphondylia parasiticola* Möhn, 1960, ventral view, redrawn from Möhn, 1960 (original drawings without scales): (A) Larva, spatula and associated papillae, (B) Pupa, head, (C) *Asphondylia struthanthi* Rübsaamen, 1915, redrawn from Rübsaamen, 1915: Larva, spatula and associated papillae, ventral view (original drawings without scales).

Abdomen: segments 2-8 with transverse rows of crescent dorsal spines at basal half (Fig. 5A); posterior row with 12-17 spines in the 2nd segment (N = 6), 14-22 in the 3rd (N = 6), 14-18 in the 4th (N = 6), 14-17 in the 5th (N = 6), 13-16 in the 6th (N = 6), 10-12 in the 7th (N = 6), 5-7 in the 8th (N = 6).

Larva: Body: 2.30-2.60 mm long (N = 5); head 0.04 mm long, 0.081 mm wide (N = 2). Spatula (Fig. 5B) quadridentate, 0.24-0.25 mm long (N = 4), lateral teeth longer than mesal, 0.03 mm long, mesal teeth 0.02 mm long (N = 3); three setose lateral papillae on each side of spatula. Terminal segment 0.07-0.08 mm long (N = 3). Terminal segment with no visible papillae in the slides (terminal segment smashed).

Gall: On leaf and stem, conical, green, glabrous, complex, one-chambered on *Struthanthus acuminatus* (Ruiz. & Pav.) Kuijt) (Loranthaceae) (Fig. 5C).

Material examined: Holotype male, BRAZIL: Rio de Janeiro State, Mangaratiba, Ilha da Marambaia, Praia do Kutuca, 21.VI.2020, Rodrigues, A. col. (MNRJ-ENT1-69762). Paratypes: MALES – same data as holotype: 2 ♂♂ (MNRJ-ENT1-69763, MNRJ-ENT1-69764); FEMALES – same data as holotype: 2 ♀♀ (MNRJ-ENT1-69768, MNRJ-ENT1-69769); 28.VIII.2010: 2 ♀♀ (MNRJ-ENT1-69766, MNRJ-ENT1-69767); Praia Suja, 18.IX.2020: 1 ♀ (MNRJ-ENT1-69765); PUPAL EXUVIAE – same data as holotype: 2 pupal exuviae (MNRJ-ENT1-69771, MNRJ-ENT1-69778); 24.VII.2010: 8 pupal exuviae (3: MNRJ-ENT1-69770, 2: MNRJ-ENT1-69773, 3: MNRJ-ENT1-69774); 28.VIII.2010: 2 pupal exuviae (MNRJ-ENT1-69775); 18.IX.2020: 1 pupal exuviae (MNRJ-ENT1-69776); 25.II.2011: 2 pupal exuviae (MNRJ-ENT1-69772, MNRJ-ENT1-69777); PUPA – 25.II.2011: 1 pupa (MNRJ-ENT1-69772); THIRD INSTAR LARVAE – 26.V.2010: 4 larvae (MNRJ-ENT1-69781); 24.VII.2010: 8 larvae (4: MNRJ-ENT1-69779, 4: MNRJ-ENT1-69780).

Etymology: The name “*braziliensis*” refers to the country where the type-material was collected.

Geographic distribution (based on gall records on the host plant): Brazil, Rio de Janeiro State, Mangaratiba municipality (Rodrigues *et al.*, 2014).

Remarks: Only two species of *Asphondylia* were previously known from *Struthanthus*: *A. parasitica* Möhn 1960, inducer of stem and fruit galls on *Struthanthus marginatus*, described from El Salvador, and *A. struthanthi* Rübsaamen 1915, inducer of fruit galls on *Struthanthus* sp., described from Brazil (Gagné & Jaschhof, 2021).

Asphondylia braziliensis differs from *A. parasitica* in the following morphological characters:

(1) **larva:** spatula with stalk longer in *A. parasitica* than in *A. braziliensis*, apical teeth weakly indented in *A. parasitica* and deeply indented in *A. braziliensis*,

Table 1. Comparative length of adults and larvae of *Asphondylia braziliensis* Maia, **sp. nov.**, *A. parasitica* Möhn, 1960, and *A. struthanthi* Rübsaamen, 1915 (Diptera, Cecidomyiidae). Data on the last two species were obtained from literature.

Length:	<i>Asphondylia braziliensis</i> , sp.nov.	<i>Asphondylia parasitica</i> Möhn, 1960	<i>Asphondylia struthanthi</i> Rübsaamen, 1915
Male			
Body	3.40-3.75 mm	—	2.90-3.00 mm
Scape	0.110-120μ	—	118μ
Pedicel	50μ	—	72μ
1 st flagellomere	170-180μ	—	256μ
5 th flagellomere	170-180μ	—	—
9 th flagellomere	160-170μ	—	—
10 th flagellomere	160-70μ	—	—
11 th flagellomere	150-170μ	—	—
12 th flagellomere	12-130μ	—	—
Palpus			
1 st segment	20μ	—	28-30μ
2 nd segment	40μ	—	46-48μ
3 rd segment	80μ	—	100μ
Female			
Body	3.50-4.70 mm	3.70-3.80 mm	—
Scape	120-130μ	184μ	—
Pedicel	50-70μ	75-76μ	—
1 st flagellomere	250μ	308μ	—
5 th flagellomere	170-200μ	212μ	—
9 th flagellomere	140-150μ	162μ	—
10 th flagellomere	110-120μ	108μ	—
11 th flagellomere	60-80μ	80μ	—
12 th flagellomere	40-45μ	40μ	—
Palpus			
1 st segment	20-30μ	39-40μ	—
2 nd segment	60-65μ	90-92μ	—
3 rd segment	110-140μ	162-164μ	—
Larva			
Body	2.30-2.60 mm	3.50 mm	2.50-2.70 mm
Spatula	240-250μ	285μ	212μ

mesal teeth somewhat longer in *A. parasitica* than in *A. braziliensis*, mesal teeth pointed in *A. parasitica* and rounded apically in *A. braziliensis*, 4 setose lateral papillae on each side of spatula in *A. parasitica*, 3 setose lateral papillae on each side of spatula in *A. braziliensis* (Fig. 5A × Fig. 4C);

(2) **pupa:** antennal horns truncate in ventral view in *A. parasitica* and pointed in *A. braziliensis*, upper facial horn bifid in *A. parasitica* and simple in *A. braziliensis*, one lower facial horn in *A. parasitica* and three in *A. braziliensis* (Fig. 5B × Fig. 3E);

(3) **female:** the new species has body longer, all segments of the palpi shorter, scape, pedicel, 1st, 5th and 9th flagellomeres shorter, 10th flagellomeres longer, 11th shorter or equal and 12th equal or longer in *A. braziliensis* than in *A. parasitica* (Table 1).

The male of *A. parasitica* is unknown. *Asphondylia braziliensis* differs from *A. struthanthi* in the following morphological characters:

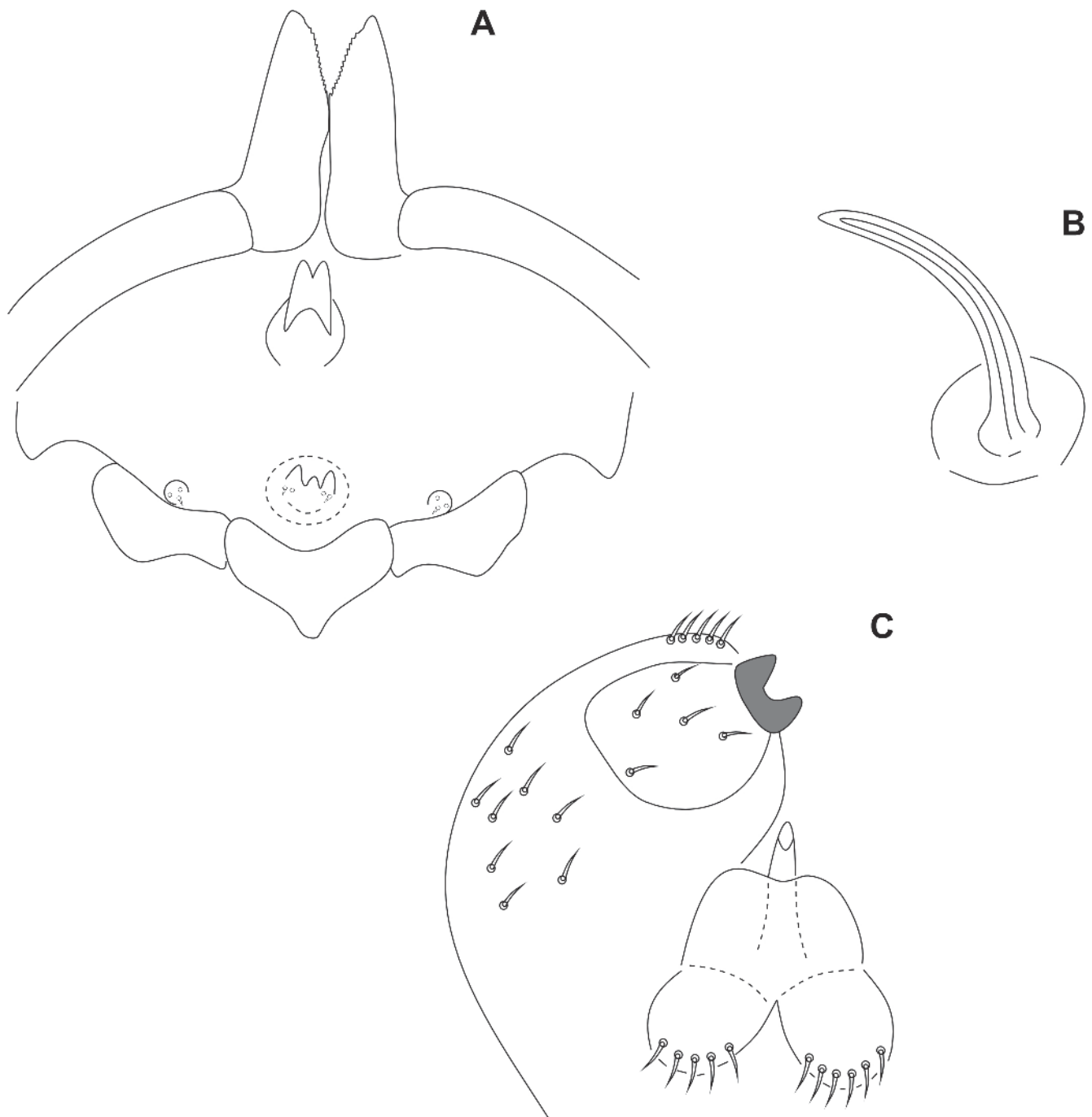


Figure 6. *Asphondylia struthanthi* Rübsaamen, 1915, redrawn from Rübsaamen, 1915 (original drawings without scales): (A-B) Pupa: (A) Head, frontal view, (B) Prothoracic spiracle, (C) Male terminalia, dorsal view.

- (1) **larva:** spatula: stalk longer in *A. struthanthi* than in *A. braziliensis*, base of spatula truncate in *A. struthanthi* and anchor-shaped in *A. braziliensis*, mesal teeth divergent in *A. struthanthi* and parallel in *A. braziliensis* (Fig. 5C × Fig. 4C);
- (2) **pupa:** the upper frontal horn is bifid in *A. struthanthi* and conical in *A. braziliensis* (Fig. 6A × Fig. 3E), the prothoracic spiracle is cylindrical in *A. struthanthi* and setiform in *A. braziliensis* (Fig. 6B × Fig. 3F);
- (3) **male:** the body is shorter in *A. struthanthi* than in *A. braziliensis*, the pedicel and 1st flagellomere, and all segments of palpi are shorter in *A. braziliensis* than in *A. struthanthi* (Table 1). The female of *A. struthanthi* is unknown.

***Asphondylia fluminensis* Maia, sp. nov.**
(Figs. 7A-11B)

Diagnosis: Male hypoproct rounded apically, slightly bilobed, ovipositor with needle part about 2.02-2.14 × length 7th sternite; pupa: antennal horn 0.20-0.26 mm long, upper facial horn single and conical, three lower frontal horns aligned, 8th abdominal segment with 7-8 dorsal spines in the posterior row, larva: spatula with lateral teeth longer than mesal ones, mesal teeth pointed apically, three setose lateral papillae on each side of spatula.

Male: Body: 2.60-3.05 mm long (N = 3). Head (Fig. 7A): 0.55 mm long, 0.55 mm-0.60 mm wide (N = 3), eye facets

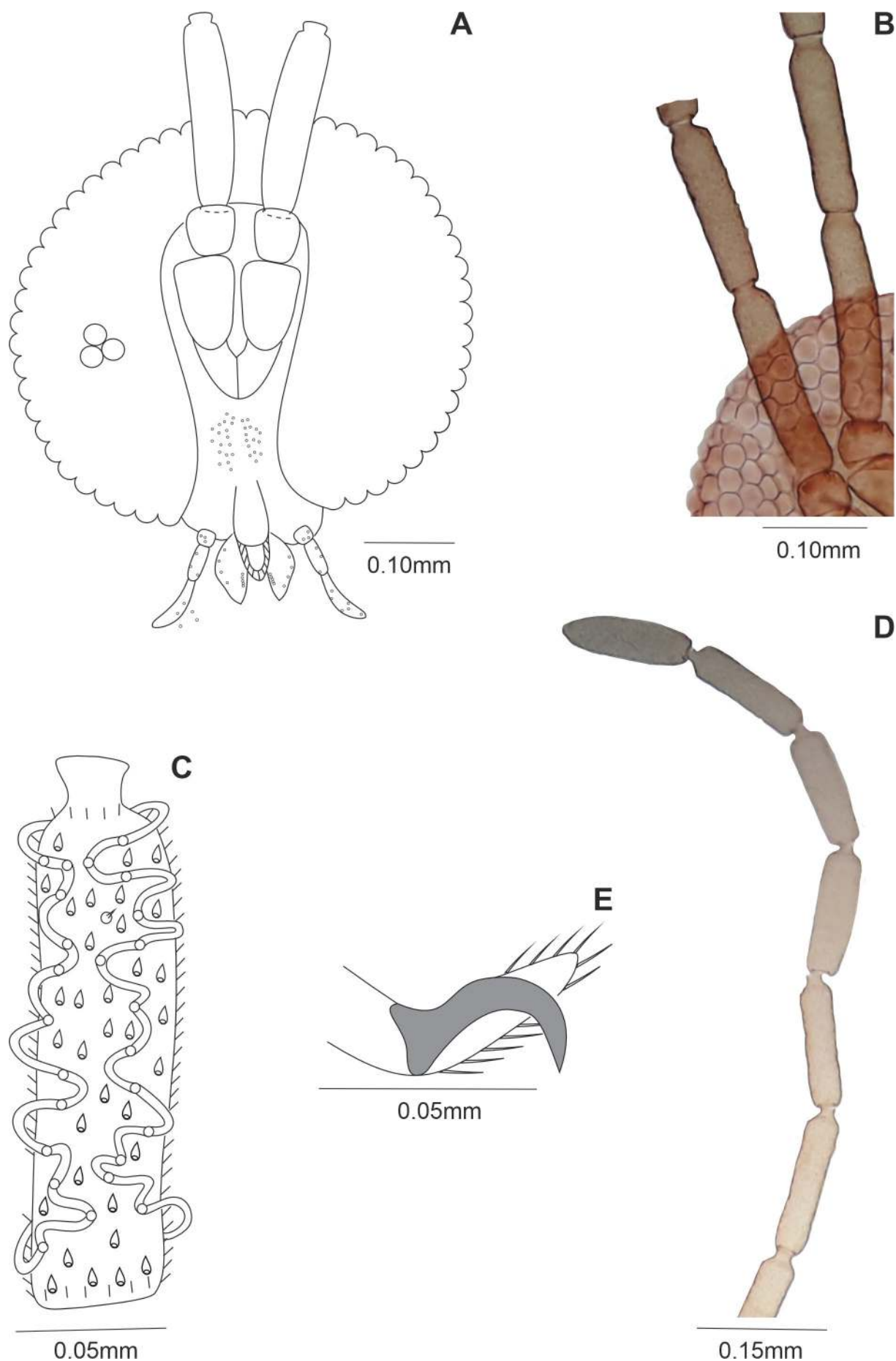


Figure 7. *Asphondylia fluminensis* Maia, **sp. nov.**, male: (A) Head, ventral view, (B) 1st-2nd flagellomeres, (C) 5th flagellomere, (D) 7th-12th flagellomeres, (E) Foreleg, tarsal claw and empodium, lateral view.

circular, closely appressed; antennae: flagellomeres 1 and 2 not fused (Fig. 7B), scape obovate, setose, 0.10-0.11 mm long, 0.05-0.06 mm wide (N = 4), pedicel globose, setose, 0.04-0.06 mm long, 0.05-0.06 mm wide, 1st-9th flagellomeres cylindrical, all 0.04-0.05 mm wide, circumfila longitudinally wavy, dense, anastomosing, equally spread along segments (Fig. 7C), 1st flagellomere 0.21-0.22 mm long (N = 4), 2nd flagellomere 0.17-0.19 mm long (N = 4), 3rd-7th flagellomeres 0.17-0.18 mm long (N = 4), 8th-10th flagellomeres 0.16 mm long (N = 2), 11th flagellomere 0.15-0.16 mm long (N = 2), 12th flagellomeres 0.15 mm long (N = 2) (Fig. 7D), proportion flagellomere node/neck: 1:16; frons with 37-40 setae (male, N = 2); mouthparts: labrum long-attenuated, 0.07-0.08 mm long, 0.03 mm wide (N = 2); hypopharynx of the same shape as labrum,

0.09-0.13 mm long, 0.03 mm wide (N = 3) with long, anteriorly-directed lateral setulae; labella elongate and convex, 0.04-0.05 mm long, 0.02-0.03 mm wide (N=3), with lateral and mesal setae; palpus 0.11-0.14 mm long: 1st segment globoid, 0.02 mm long, 0.02 mm wide (N = 3), 2nd segment cylindrical, 0.03-0.04 mm long, 0.02 mm wide (N = 3), 3rd segment fusiform, 0.06-0.08 mm long, 0.02 mm wide (N = 3), all segments with setae. **Thorax:** scutum with two dorsocentral rows of setae, setae more abundant anteriorly and posteriorly, two groups of lateral setae more abundant anteriorly, extending from base to distal margin, scales intermixed; scutellum with scattered setae; anepimeron and anepistenum setose; remaining pleural sclerites bare; legs: tarsal claws curved beyond midlength, isomorphic, empodium longer than

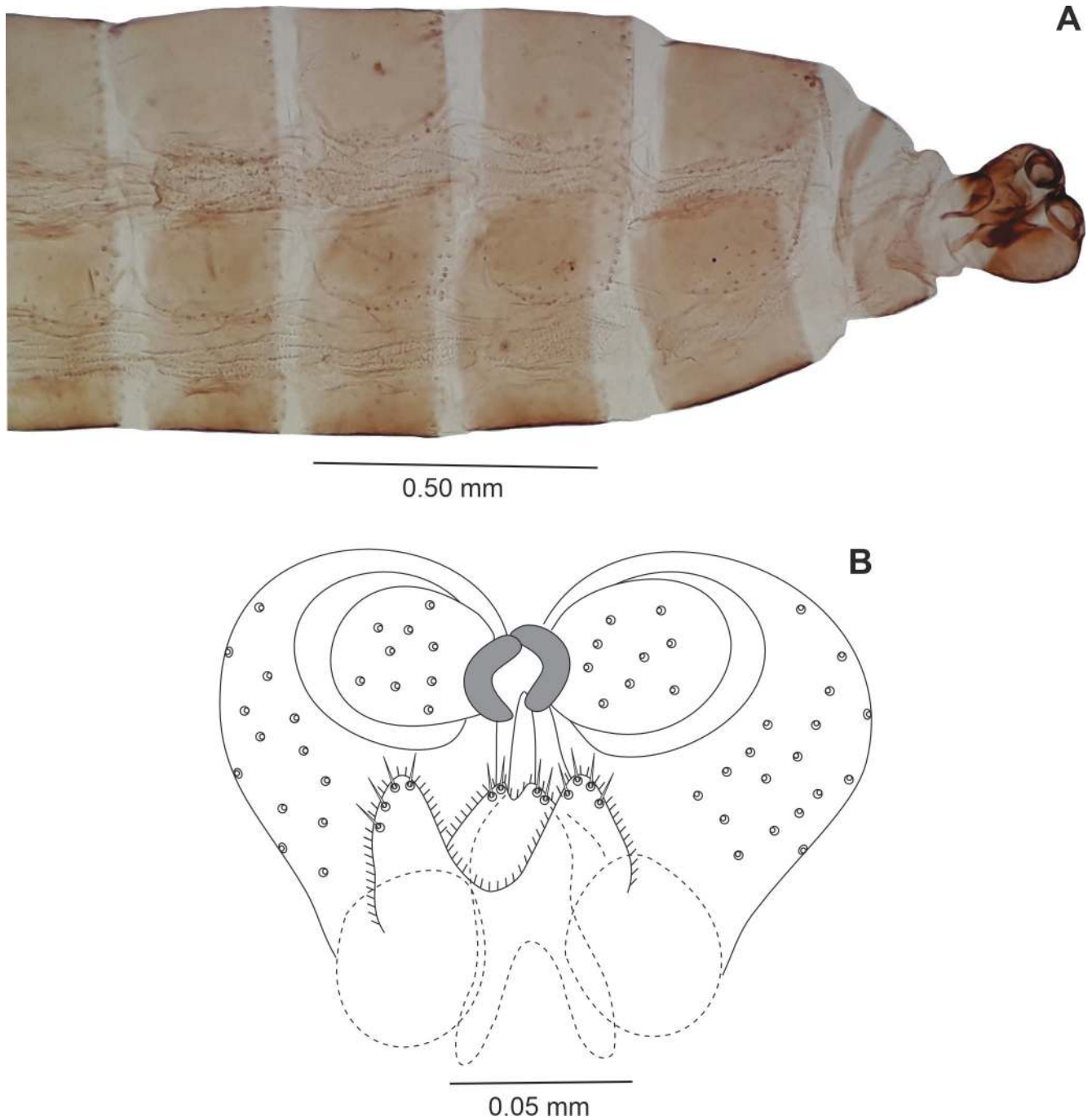


Figure 8. *Asphondylia fluminensis* Maia, **sp. nov.**, male: (A) 3rd abdominal segment-terminalia, lateral view, (B) Terminalia, dorsal view.

claws (Fig. 7E); wing: length 2.20-2.30 mm (N = 3). **Abdomen (Fig. 8A):** trichoid sensilla not visible; 1st-7th tergites sclerotized, rectangular with a posterior row of setae, few scattered lateral setae and mostly covered elsewhere with scales, 1st tergite shorter than other tergites, 1/35 × length of 2nd tergite, 8th tergite band-like, bare; 2nd-8th sternites more sclerotized than tergites, rectangular, as long as tergites, with a posterior row of setae, several setae and midlength, few lateral setae, and mostly covered elsewhere with scales; 8th sternite with scattered setae

and mostly covered elsewhere with scales. **Terminalia (Fig. 8B):** gonocoxite short and stout, 0.14 mm long, 0.07-0.09 mm wide (N = 2); gonostylus ovoid, 0.05 mm long, 0.04 mm wide (N = 2); hypoproct slightly bilobed, rounded apically.

Female: Body length: 2.80-2.90 mm (N = 2). **Head:** 0.05 mm long, 0.04 mm long (N = 2), antennae: scape 0.11 mm long, 0.05 mm wide (N = 1), pedicel 0.05-0.07 mm long, 0.06-0.07 mm wide (N = 2), 1st-11th flagellomeres cylindri-

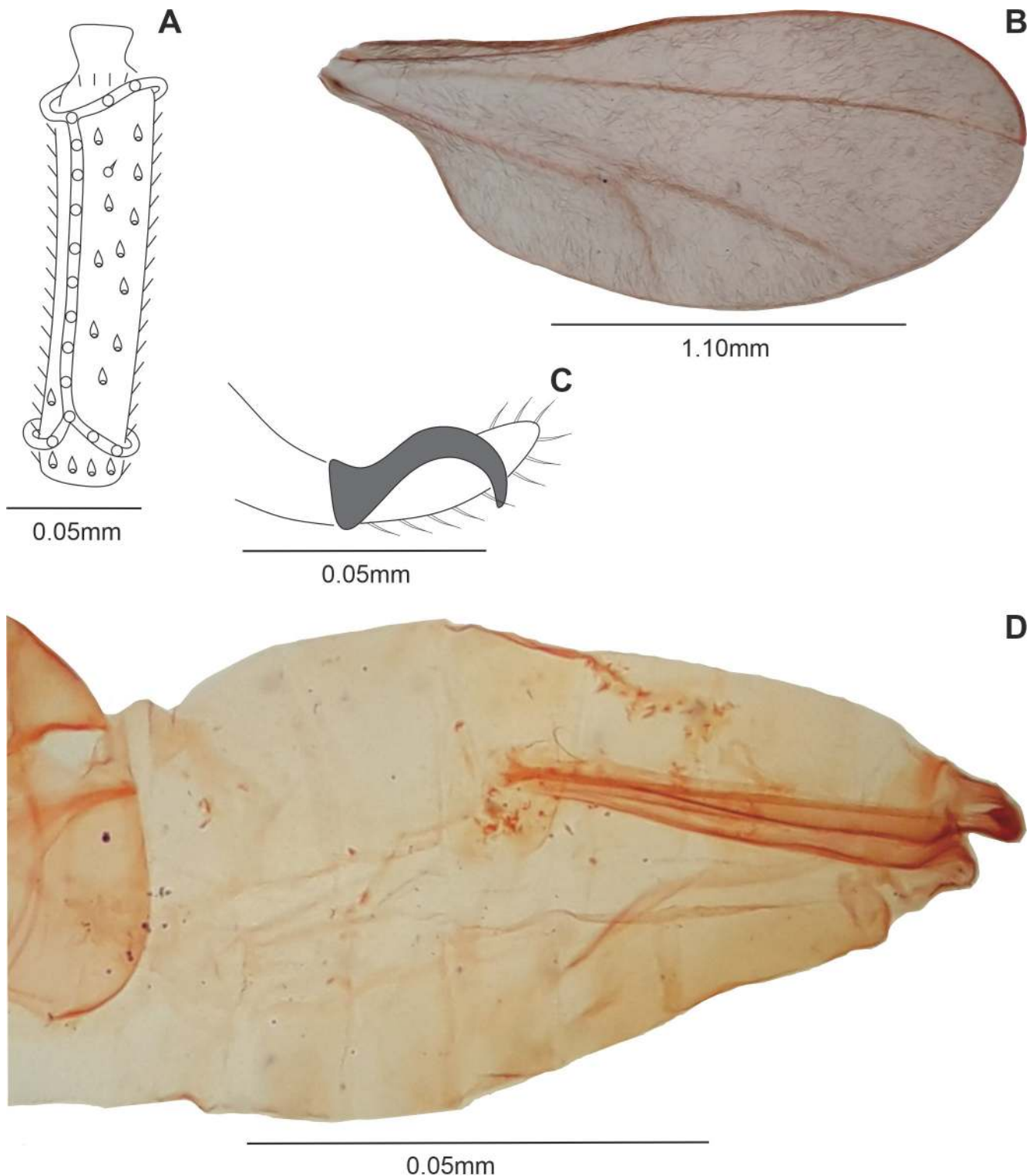


Figure 9. *Asphondylia fluminensis* Maia, **sp. nov.**, female: (A) 5th flagellomere, (B) Wing, (C) Foreleg, tarsal claw and empodium, lateral view, (D) Abdomen, lateral view.

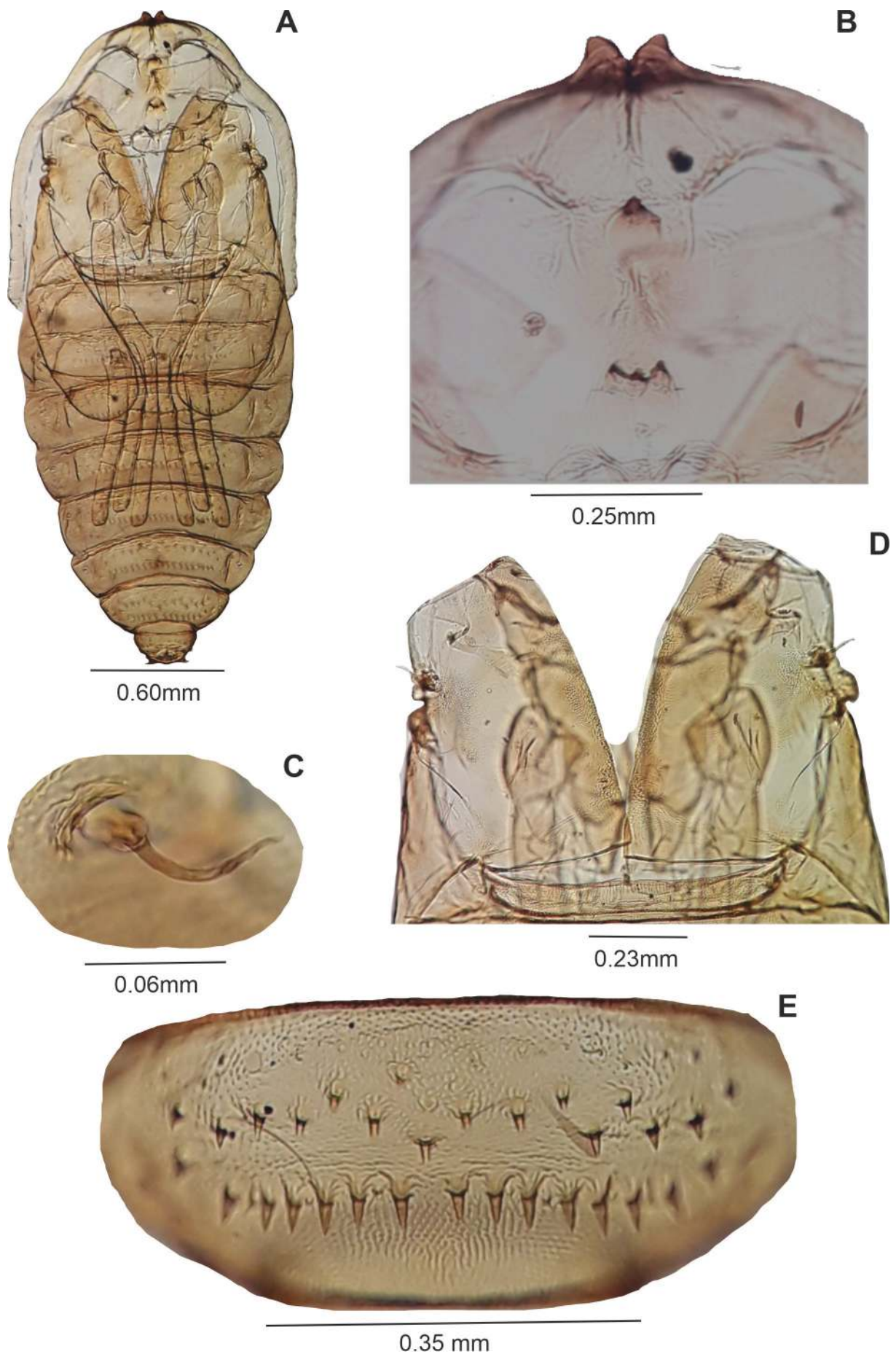


Figure 10. *Asphondylia fluminensis* Maia, **sp. nov.**, pupa: (A) General aspect, ventral view, (B) Head, frontal view, (C) Prothoracic spiracle, (D) Thoracic integument, dorsal view, (E) 7th abdominal segment, dorsal view.

cal, circumfila comprising two longitudinal bands connected subbasally and apically by two transverse bands (Fig. 9A), 1st flagellomere 0.23-0.28 mm long, 0.05 mm wide (N = 2), 2nd flagellomere 0.28 mm long, 0.05 mm wide (N = 1), 3rd flagellomere 0.16-0.18 mm long, 0.04-0.05 mm wide (N = 2), 4th-5th flagellomeres 0.15-0.18 mm long, 0.04-0.05 mm wide (N = 2), 6th flagellomere 0.15-0.17 mm long, 0.04-0.05 mm wide (N = 2), 7th flagellomere 0.17 mm long, 0.04-0.05 mm wide (N = 1), 8th flagellomere 0.14 mm long, 0.04 mm wide (N = 1), 9th flagellomere 0.10 mm long, 0.04 mm wide (N = 1), 10th flagellomere 0.08 mm long, 0.04 mm wide (N = 1), 11th flagellomere 0.05 mm long, 0.04 mm wide (N = 1), 12th flagellomere globose, 0.04 mm long, 0.04 mm wide (N = 1); proportion flagellomere neck-node 1:15; frons with 26 setae; mouthparts: labrum 0.05-0.05 mm long, 0.04 mm wide (N = 2), hypopharynx 0.10 mm long, 0.04 mm wide (N = 2), labelum 0.04-0.045 mm long, 0.03 mm wide at midlength (N = 2), palpus 0.14 mm long (N = 1); 1st segment globose

0.02 mm long, 0.02 mm wide (N = 1), 2nd segment cylindrical 0.05 mm long, 0.02 mm wide at midlength (N = 1), 3rd segment fusiform 0.07 mm long, 0.01 mm wide at midlength (N = 1). **Thorax:** wing length: 2.30-2.40 mm (N = 2) (Fig. 9B); tarsal claws curved beyond midlength, isomorphic, empodium longer than claws (Fig. 9C). Abdomen (Fig. 9D): trichoid sensillae not visible, 1st-7th tergites as in male, 8th tergite with posterior margin with lobes 0.08-0.09 mm long (N = 2), 2nd-6th sternites as in male, 6th sternite 0.23 mm long (N = 2), 7th sternite 0.42 mm long, 1.82 × length of sternite 6 (N = 2), setose, mostly covered elsewhere with scales; sternite 8 not sclerotized; ovipositor: needle part 0.85-0.90 mm long, 2.02-2.14 × length sternite 7 (N = 2). Other characters as in male.

Pupa (Fig. 10A): Color: brownish. Body length: 2.70-3.15 mm (N = 10). **Head (Fig. 10B):** dorsal plate 0.15-0.17 mm long, 0.40-0.46 mm wide (N = 7), antennal horn 0.20-0.26 mm long (N = 10), conical, pointed, inner

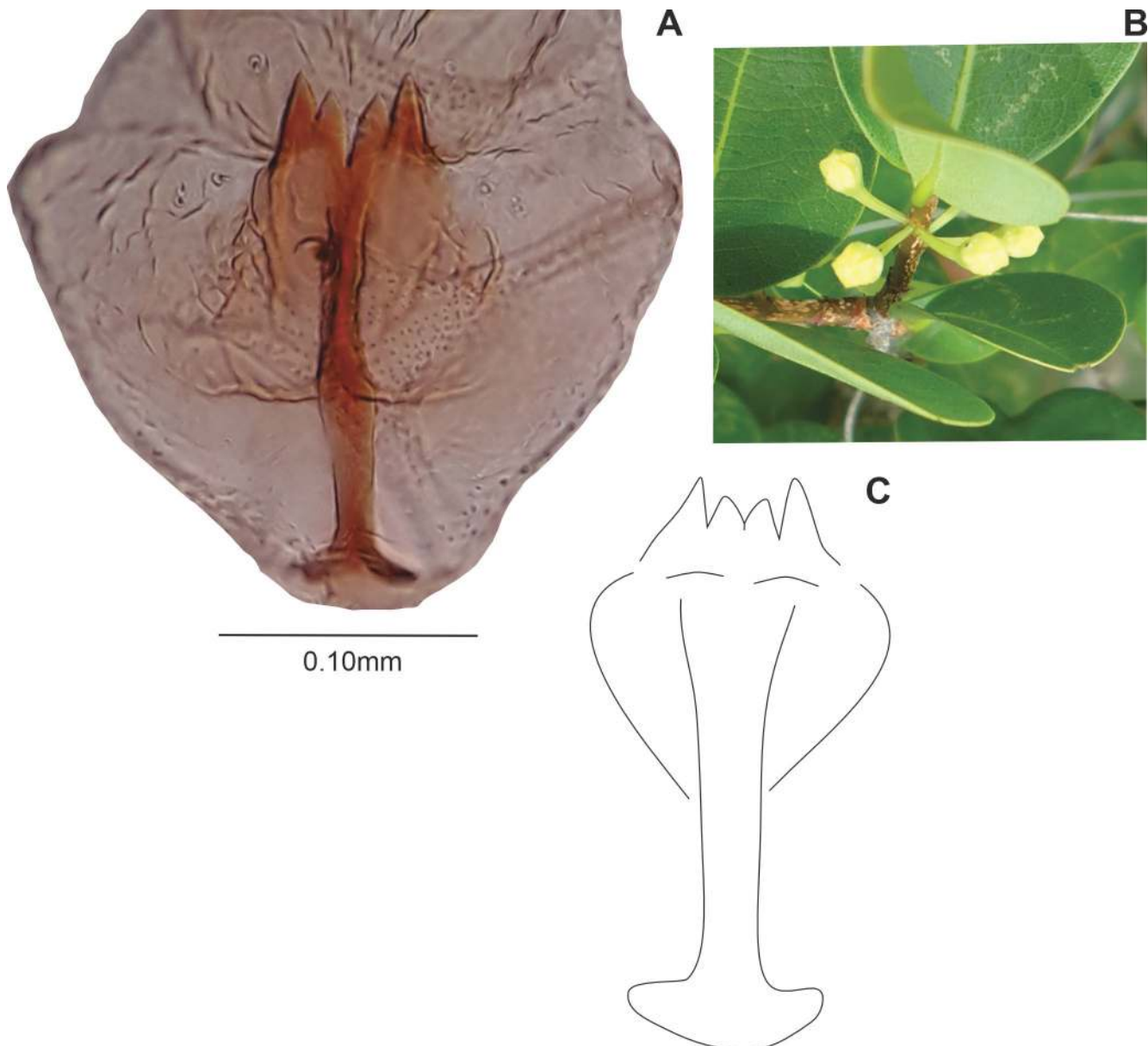


Figure 11. *Asphondylia* spp.: (A) *A. fluminensis* Maia, **sp. nov.**, larva, spatula and associated papillae, ventral view, (B) Flower bud galls on *Erythroxylum ovalifolium* Peyr. (Erythroxylaceae), (C) *A. erythroxylis* Möhn, 1959, larva, spatula, ventral view, redrawn from Möhn, 1959 (original drawing without scale).

margin serrated, distal part shorter than basal part; apical seta 0.04 mm long (N = 7), antennal width 0.06–0.07 mm; one upper facial horn conical, 0.02 mm long (N = 5); three lower facial horns aligned, 0.01 mm long (N = 5); two pairs of lower facial papillae: one pair setose, the other bare; three pairs of lateral facial papillae: one pair setose, two bare; upper cephalic margin thickened laterally, face with lateral projection. **Thorax:** prothoracic spiracle 0.10–0.11 mm long (N = 6), 1.3 × antennal basal width, setiform, not curved (N = 6) (Fig. 10C), integument wrinkled (Fig. 10D). **Abdomen:** segments 2–8 with transverse rows of crescent dorsal spines at basal half (Fig. 10E); posterior row with 19–27 spines in the 2nd segment, 17–25 in the 3rd, 18–24 in the 4th, 15–22 in the 5th, 15–23 in the 6th, 12–19 in the 7th and 7–8 in the 8th.

Larva: Body: 2.10 mm long (N = 1); head 0.05 mm long, 0.8 mm wide (N = 2). Spatula (Fig. 11A) quadridentate, 0.21 mm long (N = 1), lateral teeth longer than mesal, 0.035 mm long, mesal teeth 0.002–0.03 mm long (N = 2); three setose lateral papillae on each side of spatula. Terminal segment 0.06 mm long, four pairs of terminal papillae (three setose, one shorter than the others, and one corniform) (N = 1).

Gall: On flower bud, globoid, green, glabrous, one-chambered on *Erythroxylum ovalifolium* Peyr (Erythroxylaceae) (Fig. 11B).

Material examined: Holotype male, BRAZIL: Rio de Janeiro State, Maricá, APA de Maricá, 11.VIII.1990, V. Maia col. (MNRJ-ENT1-69782). Paratypes: MALES – same data as holotype: 1 ♂ (MNRJ-ENT1-69783); 01.IX.1997: 2 ♂♂ (MNRJ-ENT1-69786, MNRJ-ENT1-69787); Arraial do Cabo, 11.VIII.1990: 2 ♂♂ (MNRJ-ENT1-69784, MNRJ-ENT1-69785); FEMALES – same data as holotype: 3 ♀♀ (MNRJ-ENT1-69788: 1, MNRJ-ENT1-69789: 2); PUPAL EXUVIAE – same data as holotype: 12 pupal exuviae (1: MNRJ-ENT1-69791, 4: MNRJ-ENT1-69793, 4: MNRJ-ENT1-69795, 3: MNRJ-ENT1-69796); 01.IX.1997: 2 pupal exuviae (MNRJ-ENT1-69797); 07.VIII.1998: 3 pupal exuviae (MNRJ-ENT1-69790); 28.IX.1990: 1 pupal exuviae (MNRJ-ENT1-69794); Carapebus, 29.VII.1998: 4 pupal exuviae (MNRJ-ENT1-69792); THIRD INSTAR LARVAE – APA de Maricá, 18.V.2021: 1 larva (MNRJ-ENT1-69798); 08.IX.1988: 2 larvae (MNRJ-ENT1-69799).

Additional material: Rio de Janeiro state: Maricá, APA de Maricá, MALES – same data as holotype: (MNRJ-ENT1-69800, MNRJ-ENT1-69801); PUPAL EXUVIAE – same data as holotype: 11 pupal exuviae (1: MNRJ-ENT1-69803, 6: MNRJ-ENT1-69806, 4: MNRJ-ENT1-69809); Carapebus, 29.VII.1998, 6 pupal exuviae (MNRJ-ENT1-69802); 26.IX.1998: 5 pupal exuviae (3: MNRJ-ENT1-69804, 2: MNRJ-ENT1-69805); APA de Maricá, 07.VIII.1988: 3 pupal exuviae (MNRJ-ENT1-69807); 01.IX.1997: 1 pupal exuvia (MNRJ-ENT1-69808).

Etymology: The name “*fluminensis*” means “of Rio de Janeiro State”.

Table 2. Comparative length of females and larvae of *Asphondylia fluminensis* Maia, **sp. nov.** and *A. erythroxyli* Möhn, 1959 (Diptera, Cecidomyiidae). Data on *A. erythroxyli* were obtained from literature.

Length:	<i>Asphondylia fluminensis</i> , sp. nov.	<i>Asphondylia erythroxyli</i> Möhn, 1959
Female		
Body	2.80–2.90 mm	2.20 mm
Scape	110μ	118μ
Pedicel	50–70μ	58μ
1 st flagellomere	230–280μ	207μ
5 th flagellomere	150–180μ	156–157μ
9 th flagellomere	100μ	100μ
10 th flagellomere	50μ	70μ
11 th flagellomere	40μ	48–49μ
12 th flagellomere	40μ	36μ
Palpus		
1 st segment	20μ	23–24μ
2 nd segment	50μ	42μ
3 rd segment	70μ	70–72μ
Larva		
Body	2.10 mm	—
Spatula	210μ	293μ

Geographic distribution (based on gall records on the host plant): Brazil, Rio de Janeiro State, Rio de Janeiro (Grumari), Maricá, Arraial do Cabo and Carapebus (Maia, 2013).

Remarks: *Asphondylia erythroxyli* Möhn 1959 is the only previously described congeneric species on *Erythroxylum* P. Browne. It induces fruit galls on *E. mexicanum* and is known from El Salvador (Gagné & Jaschhof, 2021). The new species differs from *A. erythroxyli* in the following morphological characters: (1) larva: the mesal teeth of *A. fluminensis* is clearly deeper than those of *A. erythroxyli* (Fig. 11C); (2) female: the body of *A. fluminensis* is longer and the last three flagellomeres are shorter in the new species than in *A. erythroxyli*. Furthermore, the last three flagellomeres are subequal in length in the new species, while in *A. erythroxyli* they are progressively shorter toward apex (Table 2). The male and pupa of *A. erythroxyli* are unknown.

Asphondylia marambaiensis Maia, **sp. nov.** (Figs. 12A–14F)

Diagnosis: Male hypoproct rounded apically, deeply bilobed, ovipositor with needle part about 1.13–1.16 × length 7th sternite; pupa: antennal horn 0.23–0.29 mm long, upper facial horn single and conical, three lower frontal horns aligned, 8th abdominal segment with 6–9 dorsal spines in the posterior row.

Male: Body length: 3.50–3.65 mm long (N = 2). **Head:** 0.50 mm long, 0.50 mm wide (N = 2), eye facets circular, closely appressed; antennae: flagellomeres 1 and 2 not fused, scape obovate, setose, 0.12 mm long, 0.07 mm wide (N = 2), pedicel globose, setose, 0.07 mm long, 0.06 mm wide (N = 2), 1st–12th flagellomeres cylindri-

cal, all 0.05 mm wide, circumfila longitudinally wavy, dense, anastomosing, equally spread along segments (Fig. 12A), 1st flagellomere 0.25-0.26 mm long (N = 2), 2nd flagellomere 0.22-0.23 mm long (N = 2), 3rd-4th flagellomeres 0.20-0.21 mm long (N = 2), 5th-6th flagellomeres 0.20-0.22 mm long (N = 2), 7th flagellomere 0.20-0.23 mm long (N = 2), 8th flagellomere 0.20-0.22 mm long (N = 2), 9th flagellomeres 0.20-0.21 mm long (N = 2), 10th flagellomere 0.19 mm long (N = 2), 11th flagellomere 0.18-0.19 mm long (N = 2), 12th flagellomere 0.17 mm long (N = 2); proportion flagellomere neck-node 1:10;

frons with 25 setae (N = 1); mouthparts: labrum, hypopharynx and labella kneaded; palpus (Fig. 12B) 0.18-0.19 mm long: 1st segment globoid, 0.02 mm long, 0.02 mm wide (N = 2), 2nd segment cylindrical, 0.05 mm long, 0.02 mm wide, 3rd segment fusiform, 0.11-0.12 mm long, 0.02 mm wide (N = 2), all segments with setae. **Thorax:** scutum with two dorsocentral rows of setae, setae more abundant anteriorly, two groups of lateral setae more abundant anteriorly, extending from base to distal margin, scales intermixed; scutellum with scattered setae; anepimeron setose; remaining pleural sclerites bare;

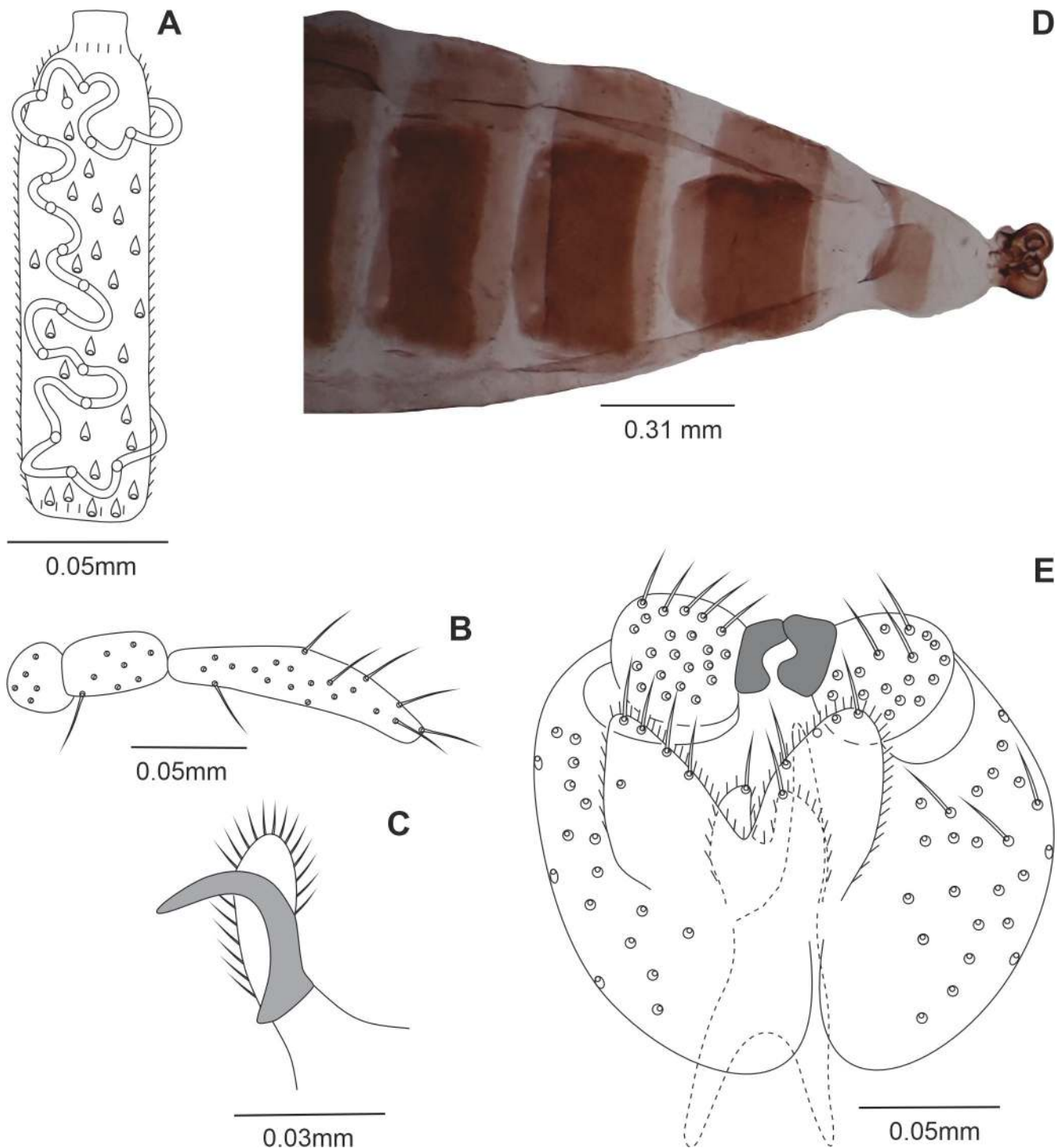


Figure 12. *Asphondylia marambaiensis* Maia, **sp. nov.**, male: (A) 5th flagellomere, (B) Palpus, (C) Midleg, tarsal claw and empodium, lateral view, (D) 5th abdominal segment-terminalia, ventral view, (E) Terminalia, dorsal view.

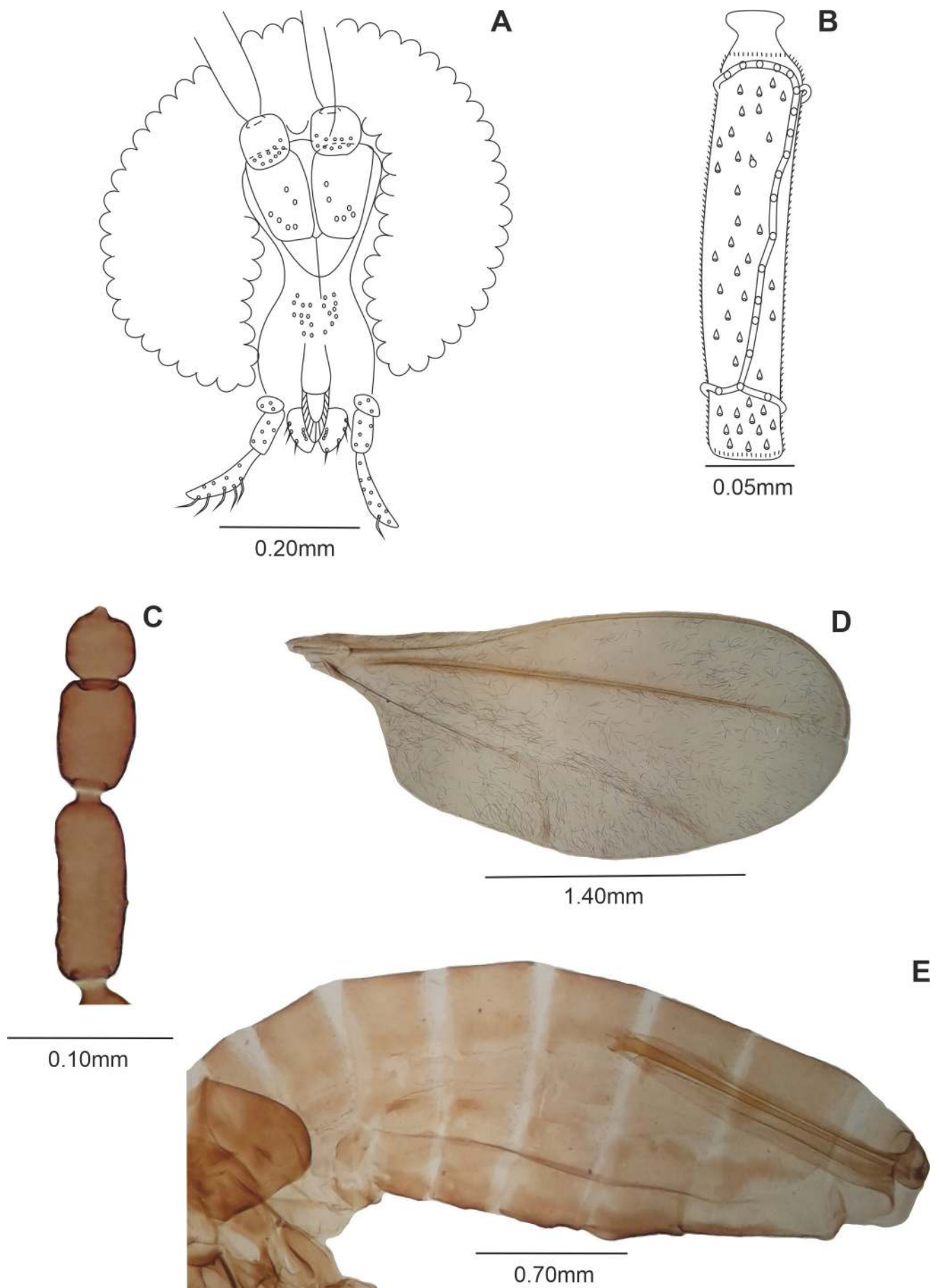


Figure 13. *Asphondylia marambaiensis* Maia, **sp. nov.**, female: (A) Head, ventral view, (B) 5th flagellomere, (C) 10th-12th flagellomeres, (D) Wing, (E) Abdomen, lateral view.

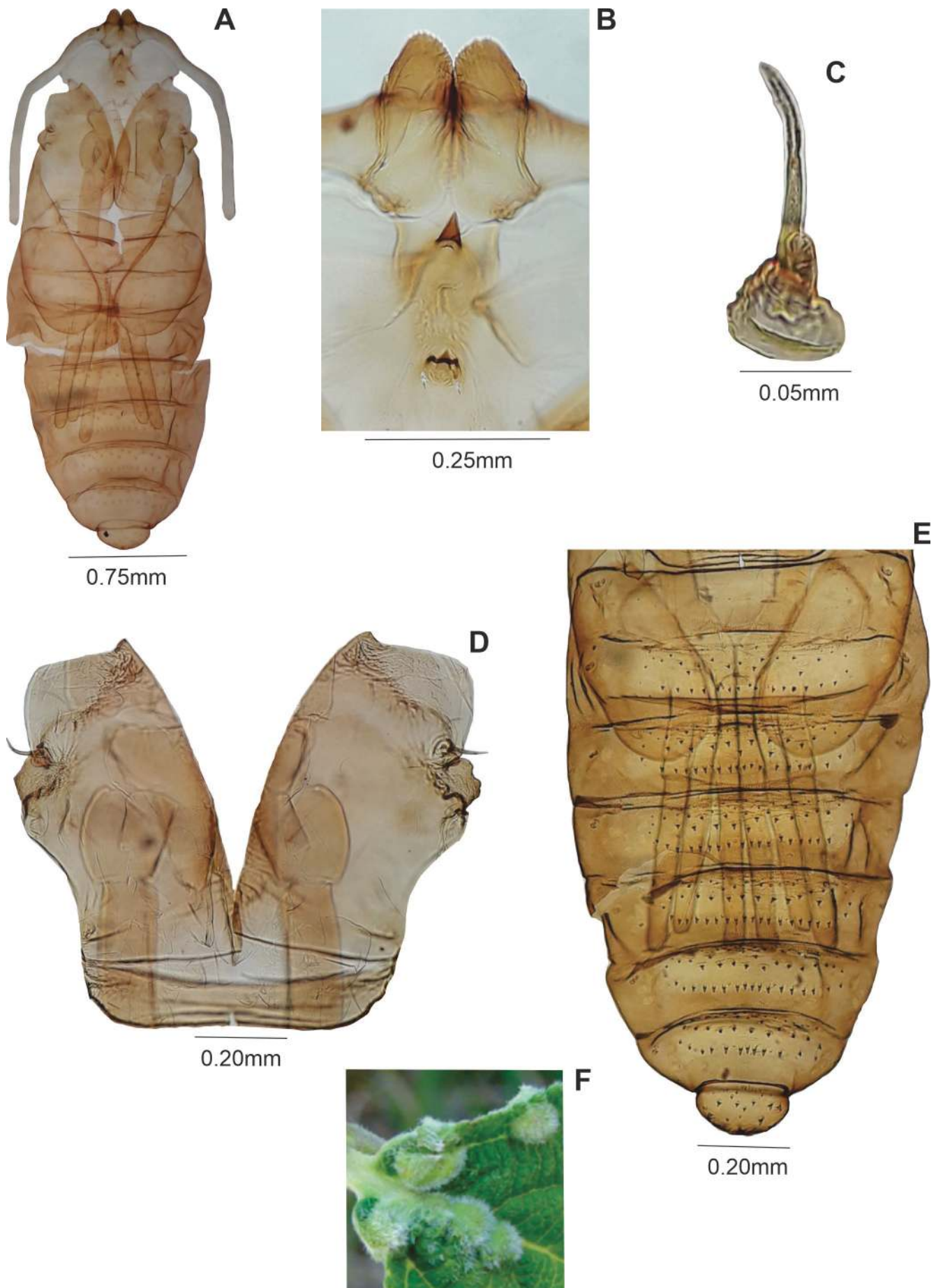


Figure 14. *Asphondylia marambaiensis* Maia, **sp. nov.**, (A-E) pupa: (A) General aspect, ventral view, (B) Cephalic horns, ventral view, (C) Prothoracic spiracle, (D) Thoracic integument, dorsal view, (E) Abdomen, dorsal view, (F) Leaf galls on *Lantana fucata* Lindl. (Verbenaceae).

legs: tarsal claws curved beyond midlength, isomorphic, empodium as long as claws (Fig. 12C); wing: length 2.70 mm (N = 1). **Abdomen (Fig. 12D):** trichoid sensilla not visible; 1st-7th tergites sclerotized, rectangular with a posterior row of setae, few scattered lateral setae and mostly covered elsewhere with scales, 1st tergite shorter than other tergites, $\frac{1}{3}$ × length of 2nd tergite, 8th tergite band-like, bare; 2nd-8th sternites more sclerotized than tergites, rectangular, as long as tergites, with a posterior row of setae, several setae and midlength, few lateral setae, and mostly covered elsewhere with scales; 8th sternite with scattered setae and mostly covered elsewhere with scales. **Terminalia (Fig. 12E):** gonocoxite short and stout, 0.14-0.16 mm long, 0.07-0.08 mm wide (N = 2); gonostylus ovoid, 0.05 mm long, 0.05 mm wide; hypoproct deeply bilobed, rounded apically.

Female: Body length: 4.00-4.50 mm (N = 3). **Head (Fig. 13A):** 0.45-0.55 mm long, 0.50-0.55 mm wide (N = 3), facets circular, antennae: scape 0.13-0.14 mm long, 0.05-0.08 mm wide (N = 3), pedicel 0.07-0.08 mm long, 0.07-0.08 mm wide (N = 3), 1st-10th flagellomeres cylindrical, all 0.05 mm wide, circumfila comprising two longitudinal bands connected subbasally and apically by two transverse bands (Fig. 13B), 1st flagellomere 0.28-0.31 mm long (N = 3), 2nd flagellomere 0.22-0.25 mm long (N = 3), 3rd flagellomere 0.21-0.23 mm long (N = 3), 4th flagellomere 0.21-0.24 mm long (N = 3), 5th flagellomere 0.22-0.24 mm long (N = 3), 6th flagellomere 0.21-0.24 mm long (N = 3), 7th flagellomere 0.22-0.23 mm long (N = 3), 8th flagellomere 0.20-0.22 mm long, 9th flagellomere 0.16-0.18 mm long, 10th flagellomere 0.10-0.13 mm long, 11-12th flagellomeres 0.06-0.07 mm long (Fig. 13C), proportion flagellomere neck-node 1:11; mouthparts: labrum 0.08-0.10 mm long, 0.035 mm wide (N = 1), hypopharynx 0.14 mm long, 0.035 mm wide (N = 1), labellum 0.06-0.07 mm long, 0.03 mm wide at midlength (N = 2), palpus 0.24 mm long (N = 3): 1st segment globose 0.03 mm long and 0.03-0.04 mm wide (N = 3), 2nd segment cylindrical 0.05 mm long, 0.03 mm wide at midlength (N = 3), 3rd segment ellipsoidal, 0.16 mm long, 0.025-0.03 mm wide at midlength (N = 3). **Thorax:** wing length: 2.80-3.10 mm (N = 3) (Fig. 13D). **Abdomen (Fig. 13E):** trichoid sensillae not visible, 1st-7th tergites as in male, 8th tergite with posterior margin with lobes 0.12-0.14 mm long (N = 3), 2, sternites 2nd-6th sternites as in male, 6th sternite 0.35-0.39 mm long (N = 2), 7th sternite 0.56-0.59 mm long, 1.51-1.60 × length of 6th sternite, setose, mostly covered elsewhere with scales; sternite 8 not sclerotized; ovipositor: needle part 1.13-1.16 mm long, 1.16-2.02 × length sternite 7 (N = 2). Other characters as in male.

Pupa (Fig. 14A): Color: brownish. Body length: 3.50-4.00 mm (N = 4). Head (Fig. 14B): dorsal plate 0.43 mm long, 0.17 mm wide (N = 2), antennal horn 0.23-0.29 mm long (N = 3), conical, rounded apically, inner margin serrated, distal part shorter than basal part; apical seta 0.025 mm long (N = 1); antennal width 0.08 mm (N = 3), one upper facial horn conical, 0.04 mm long

(N = 3); three lower facial horns aligned, 0.03 mm long (N = 3); two pairs of lower facial papillae: one pair setose, the other bare; three pairs of lateral facial papillae: one pair setose, two bare; upper cephalic margin thickened laterally, face with lateral projection. **Thorax:** prothoracic spiracle 0.11-0.13 mm long (N = 4), 1.37-1.62 × antennal width, setiform, conspicuously curved (N = 2) (Fig. 14C), integument wrinkled (Fig. 14D). **Abdomen (Fig. 14E):** segments 2-8 with transverse rows of crescent dorsal spines at basal half; posterior row with 11-15 spines in the 2nd segment, 13-16 in the 3rd, 12-16 in the 4th, 11-17 in the 5th, 10-17 in the 6th, 9-12 in the 7th and 6-9 in the 8th.

Larva: unknown.

Gall: on leaf, globose, green, hairy, complex, one-chambered on *Lantana fucata* Lindl. (Verbenaceae) (Fig. 14F).

Material examined: Holotype male, BRAZIL: Rio de Janeiro State, Mangaratiba, Ilha da Marambaia, Praia do Kutuca, 21.VI.2010, Rodrigues, A. col. (MNRJ-ENT1-69810). Paratypes: same data as holotype: 1 ♂ (MNRJ-ENT1-69811); 3 ♀♀ (MNRJ-ENT1-69812, MNRJ-ENT1-69813, MNRJ-ENT1-69814), and 5 pupal exuviae (2: MNRJ-ENT1-69815, 3: MNRJ-ENT1-69816).

Etymology: The name “*marambaiensis*” refers to the type-locality.

Geographic distribution (based on gall records on the host plant): Brazil, Rio de Janeiro State, Mangaratiba (Ilha da Marambaia) (Rodrigues *et al.*, 2014), Arraial do Cabo (Carvalho-Fernandes *et al.*, 2016); Espírito Santo State, Santa Teresa (Maia *et al.*, 2014); and Minas Gerais State, Serra do Cipó (Coelho *et al.*, 2009).

Remarks: In the Neotropical Region, *Asphondylia camarac* Möhn 1959, known from El Salvador and Colombia, is the only congeneric species associated with the genus *Lantana*. It induces galls on unopened flowers of *Lantana camara* and *Lantana urticifolia* (Verbenaceae) (Gagné & Jaschhof, 2021). *Asphondylia marambaiensis* differs from *A. camarac* in the following morphological characters: (1) male: body, antennomeres and 3rd segment of palpi shorter in *A. camarac* than in *Asphondylia marambaiensis*; 1st and 2nd segments of palpi longer in *A. camarac* than in *Asphondylia marambaiensis*; (2) female: body, pedicel, and 1st, 5th, 9th and 12th flagellomeres shorter in *A. camarac* than in *Asphondylia marambaiensis*, scape longer or equal (Table 3). The pupa of *A. camarac* is unknown.

Asphondylia varroniae Maia, sp. nov. (Figs. 15A-18C)

Diagnosis: Male hypoproct simple, pointed apically ovipositor with needle part about 1.89-200 × length 7th sternite; pupa: antennal horn 0.24-0.27 mm long, upper facial horn single and conical, three lower frontal horns aligned, 8th abdominal segment with 10-11 dorsal spines

Table 3. Comparative length of adults of *Asphondylia marambaiensis* Maia, **sp. nov.** and *A. camarae* Möhn 1959 (Diptera, Cecidomyiidae). Data on *A. camarae* were obtained from literature.

Length:	<i>Asphondylia marambaiensis</i> Maia, sp. nov.	<i>Asphondylia camarae</i> Möhn, 1959
Male		
Body	3.50-3.65 mm	2.80 mm
Scape	120μ	120μ
Pedicel	60-70μ	54μ
1 st flagellomere	250-260μ	201μ
5 th flagellomere	200-220μ	155μ
9 th flagellomere	200-210μ	136μ
10 th flagellomere	190μ	127μ
11 th flagellomere	180-190μ	126μ
12 th flagellomere	170μ	124μ
Palpus		
1 st segment	22μ	32-33μ
2 nd segment	50μ	72-73μ
3 rd segment	110-120μ	103μ
Female		
Body	4.00-4.50 mm	3.00 mm
Scape	130-140μ	142μ
Pedicel	70-80μ	62μ
1 st flagellomere	280-310μ	278μ
5 th flagellomere	220-250μ	210μ
9 th flagellomere	160-180μ	144μ
10 th flagellomere	100-130μ	100μ
11 th flagellomere	60-70μ	69μ
12 th flagellomere	60-70μ	42μ
Palpus		
1 st segment	30μ	44μ
2 nd segment	50μ	90μ
3 rd segment	160μ	153μ

in the posterior row, larva: spatula with lateral and mesal teeth subequal in length, mesal teeth rounded apically, three setose lateral papillae on each side of spatula.

Male: Body length: 2.70-2.80 mm (N = 3). **Head (Fig. 15A):** 0.40 mm long, 0.40 mm wide (N = 2), eye facets hexagonal, closely appressed; antennae: flagellomeres 1 and 2 not fused, scape obovate, setose, 0.10-0.11 mm long, 0.05 mm wide (N = 3), pedicel globose, setose, 0.05-0.06 mm long, 0.05-0.06 mm wide (N = 3), 1st-10th flagellomeres cylindrical (11th-12th flagellomeres missing), circumfila longitudinally sinuous, equally spread along segments (Fig. 15B), 1st flagellomere 0.16-0.20 mm long, 0.05-0.06 mm wide (N = 4), 2nd flagellomere 0.19-0.20 mm long, 0.04 mm wide (N = 3), 3rd flagellomere 0.17-0.18 mm long, 0.04-0.05 mm wide (N = 3), 4th flagellomere 0.15-0.17 mm long, 0.04 mm wide (N = 3), 5th flagellomere 0.16-0.19 mm long, 0.04 mm wide (N = 3), 6th flagellomere 0.16-0.17 mm long, 0.04 mm wide (N = 2), 7th flagellomere 0.16 mm long, 0.04 mm wide (N = 2), 8th flagellomere 0.15-0.16 mm long, 0.04 mm wide (N = 2), 9th flagellomere 0.15 mm long, 0.04 mm wide (N = 2), 10th flagellomere 0.14 mm long, 0.04 mm wide (N = 1), proportion flagellomere neck-node: 1:10; frons corrugated; mouthparts: labrum long-attenuate 0.07 mm long, 0.03 mm wide; hypopharynx of the same shape

as labrum, 0.10 mm long, 0.03 mm wide (N = 1) with long, anteriorly-directed lateral setulae; labella elongate and convex, with lateral and mesal setae (labella length and width not measured as they are smashed); palpus 0.12-0.14 mm (N = 2), 1st segment globoid, 0.02 mm long, 0.2 mm wide (N = 2), 2nd segment cylindrical, 0.04-0.05 mm long, 0.02-0.025 mm wide (N = 2), 3rd segment cylindrical. 0.06-0.07 mm long, 0.025 mm wide (N = 2), all segments with setae. **Thorax:** scutum with two dorsocentral rows of setae, setae more abundant anteriorly, and one irregular lateral row of setae on each side, scales intermixed; scutellum with scattered setae; anepimeron and anepisternum setose; remaining pleural sclerites bare; legs: tarsal claws curved beyond midlength, isomorphic, empodium as long as claws (Fig. 15C); wing (Fig. 15D): length 1.90-2.50 mm (N = 4). **Abdomen (Fig. 15E):** trichoid sensillae not visible; 1st-7th tergites sclerotized, rectangular with a posterior row of setae, few lateral setae, and mostly covered elsewhere with scales, 1st tergite shorter than other tergites, ½ × length of 2nd tergite, tergite 8th band-like, bare; 2nd-8th sternites more sclerotized than tergites, rectangular; 2nd-6th sternites with a posterior row of setae, several setae at midlength, few lateral setae, and mostly covered elsewhere with scales; 7th sternites with a posterior row of setae, several mesal setae, few lateral setae, 8th sternite entirely covered with setae, more abundant posteriorly, and mostly covered elsewhere with scales. **Terminalia (Fig. 15F):** gonocoxite short and stout, 0.12-0.13 mm long (N = 3), gonostylus spherical, 0.04 mm long, 0.04 mm wide (N = 1), hypoproct simple, pointed apically.

Female: Body length: 2.50-2.70 mm (N = 3). **Head:** 0.40 mm long, 0.40 mm wide (N = 1), antennae: scape 0.10 mm long, 0.06 mm wide (N = 2), pedicel 0.05 mm long, 0.05 mm wide (N = 2), 1st-11th flagellomeres cylindrical, 12th spheroid, all 0.04 mm wide, circumfila comprising two longitudinal bands connected subbasally and apically by two transverse bands (Fig. 16A), 1st flagellomere 0.21-0.23 mm long (N = 3), 2nd flagellomere 0.17-0.21 mm (N = 3), 3rd flagellomere 0.16-0.18 mm (N = 3), 4th flagellomere 0.16-0.17 mm (N = 3), 5th flagellomere 0.14-0.17 mm long (N = 3), 6th flagellomere 0.14-0.16 mm (N = 3), 7th flagellomere 0.13-0.14 mm long (N = 3), 8th flagellomeres 0.11 mm (N = 3); 9th flagellomere 0.09-0.10 mm (N = 3), 10th flagellomere 0.07-0.08 mm long (N = 3), 11th flagellomere 0.06 mm long (N = 3), 12th flagellomere 0.04 mm long (N = 3) (Fig. 16B); proportion flagellomere neck-node: 1:13; mouthparts: labrum 0.07 mm long, 0.04 mm wide, hypopharynx 0.11 mm long, 0.04 mm wide, labellum 0.05 mm long, 0.03 mm wide at midlength (N = 3), palpus 0.15 mm long (N = 1): 1st segment globoid 0.03 mm long and 0.02 mm wide (N = 1), 2nd segment cylindrical 0.05 mm long, 0.015 mm wide at midlength (N = 1), 3rd segment fusiform, 0.07 mm long and 0.015 mm wide at midlength (N = 1). **Thorax:** wing length: 1.90-2.00 mm (N = 2); legs: isomorphic, tarsal claw more robust than in male (Fig. 16C). **Abdomen (Fig. 16D):** trichoid sensillae not visible, 1st-7th tergites sclerotized, rectangular with a posterior row of setae,

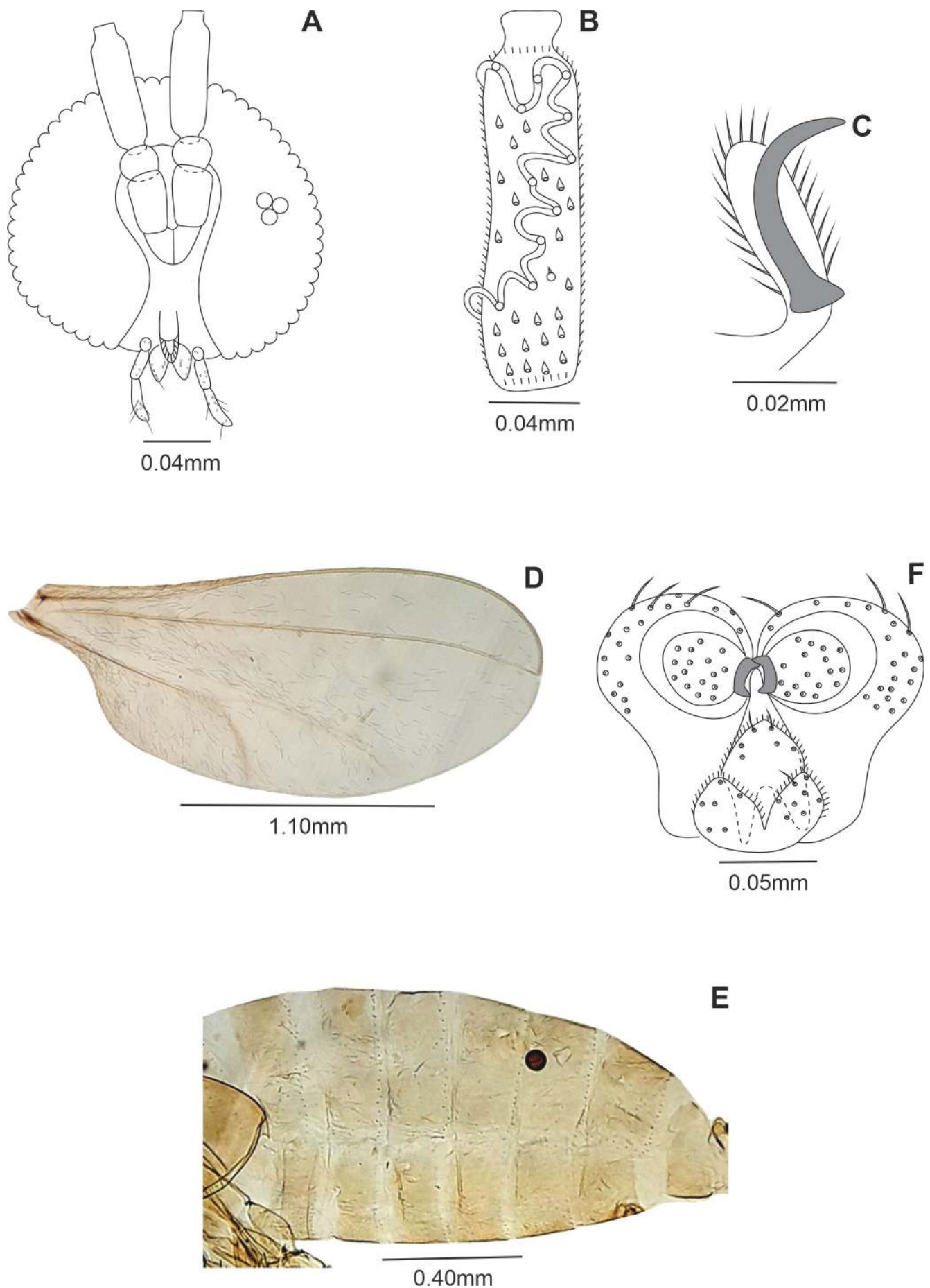


Figure 15. *Asphondylia varroniae* Maia, **sp. nov.**, male: (A) Head, ventral view, (B) 5th flagellomere, (C) Wing, (D) Foreg, tarsal claw and empodium, lateral view, (E) Abdomen, lateral view, (F) Terminalia, dorsal view.

few lateral setae and mostly covered elsewhere with scales, 8th tergite with distal margin with lobes 0.09 mm long (N = 1), 2nd-6th sternites as in male, 6th sternite 0.20-0.21 mm long (N = 3); 7th sternite 0.40-0.45 mm long, 2.00-2.14 × length sternite 6 (N = 3), setose and mostly covered elsewhere with scales; sternite 8 not sclerotized; ovipositor: needle part 0.80-0.85 mm long, 1.89-2.00 × length sternite 7 (N = 3). Other characters as in male.

Pupa: **Color:** brownish. Body length: 2.80-3.30 mm (N = 5). **Head (Fig. 17A):** dorsal plate 0.40-0.42 mm long,

0.15-0.20 mm wide (n = 4), antennal width 0.07-0.08 mm (N = 5), antennal horn 0.24-0.28 mm long (N = 4), conical, pointed, inner margin serrated, distal part shorter than basal part; apical seta 0.03 mm long (N = 2); one upper facial horn conical, 0.02-0.03 mm long (N = 4); three lower facial horns aligned, 0.015 mm long (N = 4); two pairs of lower facial papillae: one pair setose, the other bare; three pairs of lateral facial papillae: one pair setose, two bare; upper cephalic margin thickened laterally, face with lateral projection. **Thorax:** integument wrinkled (Fig. 17B), prothoracic spiracle 0.08-0.09 mm long (N = 5), setiform,

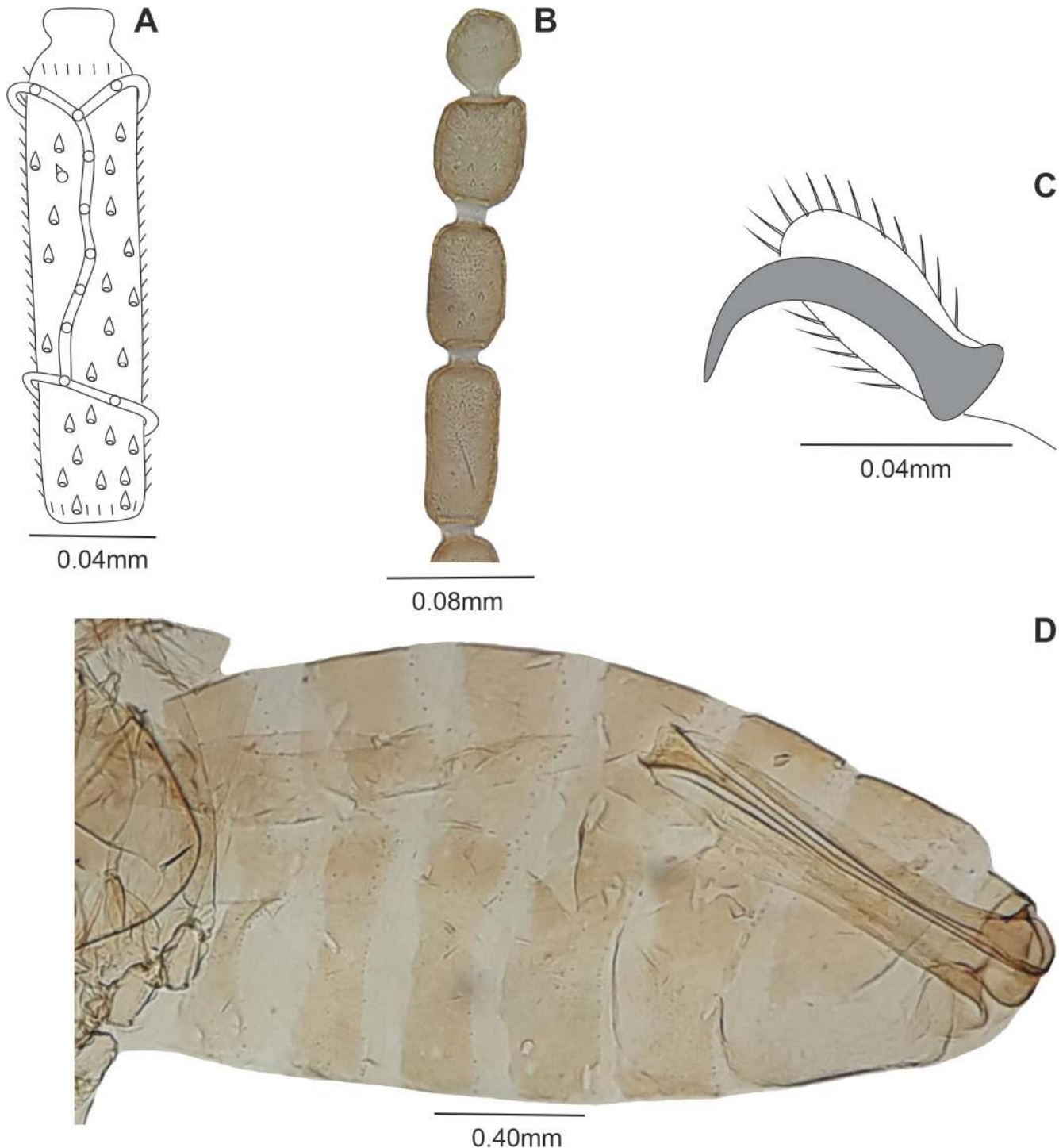


Figure 16. *Asphondylia varroniae* Maia, **sp. nov.**, female: (A) 5th flagellomere, (B) 9th-12th flagellomeres, (C) Foreg, tarsal claw and empodium, lateral view, (D) Abdomen, lateral view.

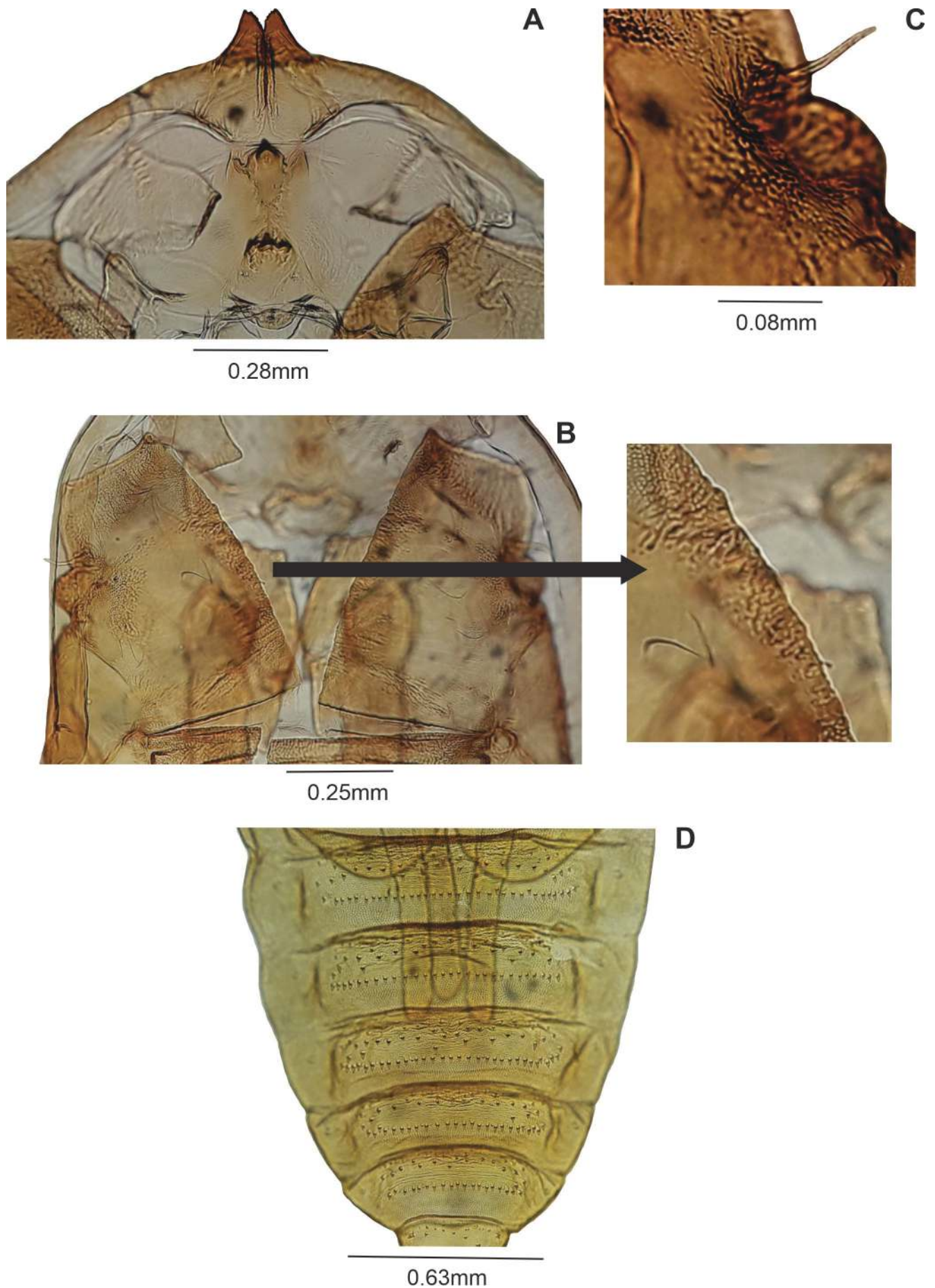


Figure 17. *Asphondylia varroniae* Maia, **sp. nov.**, pupa: (A) Head, frontal view, (B) Prothoracic spiracle, (C) Thoracic integument, dorsal view, (D) 4th-7th abdominal segments, dorsal view.

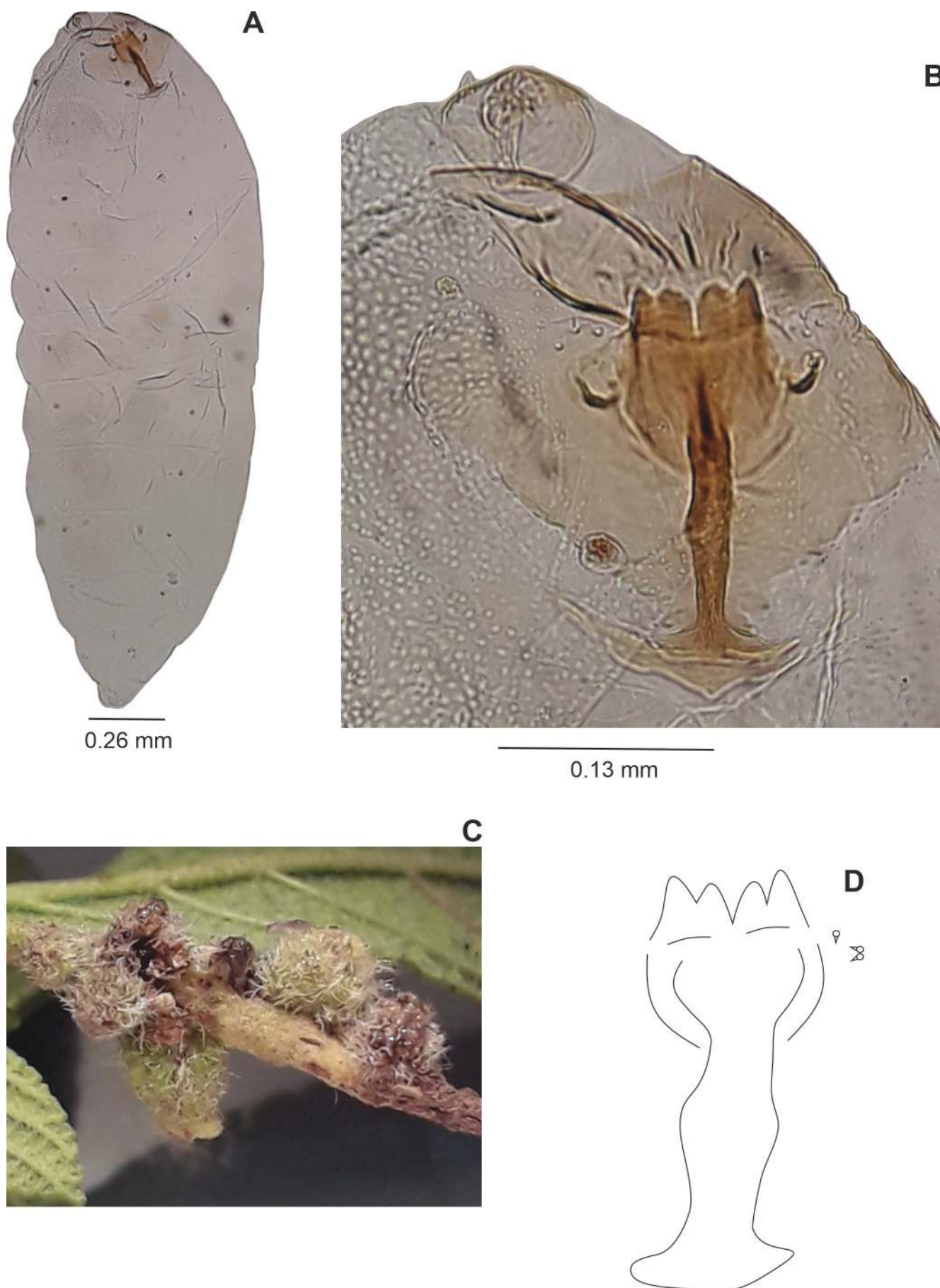


Figure 18. *Asphondylia* spp.: (A-C) *Asphondylia varroniae* Maia, **sp. nov.**: (A) General aspect, (B) Spatula and associated papillae, ventral view, (C) Flower bud galls on *Varronia curassavica* Jacq. (Cordiaceae), (D) *Asphondylia cordiae* Möhn, 1959, redrawn from Möhn, 1959, spatula and associated papillae, ventral view (original drawing without scale).

slightly curved, as long as antennal width (Fig. 17C). **Abdomen (Fig. 17D):** segments 2-8 with transverse rows of crescent dorsal spines; posterior row with 21-27 spines in the 2nd segment, 25-32 in the 3rd, 25-30 in the 4th, 25-29 in the 5th, 21-30 in the 6th, 16-19 in the 7th and 10-11 in the 8th (N = 6).

Larva (Fig. 18A): Body length: 1.90-2.40 mm (N = 2); head 0.06 mm long, 0.07 mm wide (N = 1). Spatula (Fig. 18B) quadridentate, 0.22-0.24 mm long (N = 2), lateral and mesal teeth subequal in length, 0.025 mm long, mesal teeth rounded apically, lateral teeth pointed apically; three setose lateral papillae on each side of spatula, terminal segment 0.18 mm long (N = 1), four pairs of terminal papillae (three setose, one shorter than the others, and one corniform).

Gall: On flower bud, green, globoid, with white trichomes, one-chambered on *Varronia curassavica* Jacq. (Boraginaceae) (Fig. 18C). The host plant was reported as *Cordia verbenacea* D.C. (synonym of *Varronia curassavica*) and the gall-inducer misidentified as *Asphondylia cordiae* Möhn 1959 in Maia, 2001.

Material examined: Holotype male, BRAZIL, São Paulo, Bertioga, Jardim São Lourenço, 25.IV.2005, V. Maia col. (MNRJ-ENT1-69817). Paratypes: MALES – Fazenda Pinto, 26.IV.2005: 2 ♂♂ (MNRJ-ENT1-69818, MNRJ-ENT1-69820); Itaguaré, 24.VI.2005: 1 ♂ (MNRJ-ENT1-69819); FE-MALES – Itaguaré, 22.II.2005: 1 ♀ (MNRJ-ENT1-69821); 30.VII.2004: 1 ♀ (MNRJ-ENT1-69823); Fazenda Pinto, 26.IV.2005: 1 ♀ (MNRJ-ENT1-69822); PUPAL EXUVIAE – Fazenda Pinto, 26.IV.2005: 1 pupal exuvia (MNRJ-ENT1-69820); Itaguaré, 22.II.2005: 1 pupal exuvia (MNRJ-ENT1-69821), Jardim São Lourenço, 15.V.2005: 1 pupal exuvia (MNRJ-ENT1-69825); Itaguaré, 24.VI.2004: 3 pupal exuviae (MNRJ-ENT1-69826); 16.V.2005: 1 pupal exuvia (MNRJ-ENT1-69827); 30.VII.2004: 2 pupal exuviae (MNRJ-ENT1-69828); Rio de Janeiro, APA de Maricá, 03.VII.1998: 1 pupal exuvia (MNRJ-ENT1-69824); Carapebus, 26.IX.1998: 1 pupal exuvia (MNRJ-ENT1-69829); THIRD INSTAR LARVAE – APA de Maricá, 05.VI.1998: 1 larva (MNRJ-ENT1-69830); Carapebus, 26.IX.1998: 1 larva (MNRJ-ENT1-69829).

Additional material: Rio de Janeiro, APA de Maricá, VII.1998: 1 ♀ (MNRJ-ENT1-69831); Bertioga, Jardim São Lourenço, 25.IV.2005: 2 pupal exuviae (MNRJ-ENT1-69832).

Etymology: The name “*varroniae*” is the genitive of the plant genus.

Geographic distribution (based on gall records on the host plant): Brazil: Minas Gerais, Lagoa Santa (Cerrado); Espírito Santo, Anchieta-Piúma (Atlantic Forest) Rio de Janeiro State, Rio de Janeiro, Maricá, Reserva Biológica União, Saquarema, Araruama, Arraial do Cabo, Quissamã, Carapebus, Campos de Goitacazes, São João da Barra (Atlantic Forest); São Paulo State, Bertioga, Ubatuba (At-

Table 4. Comparative length of adults and larva of *Asphondylia cordiae* Möhn, 1959 and *A. varroniae* Maia, sp. nov. (Diptera, Cecidomyiidae). Data on the first species were obtained from literature.

Length:	<i>Asphondylia cordiae</i> Möhn, 1959	<i>Asphondylia varroniae</i> Maia, sp. nov.
Male		
Body	2.10 mm	2.70-2.80 mm
Scape	100μ	100-110μ
Pedicel	46-48μ	50-60μ
1 st flagellomere	195μ	160-200μ
5 th flagellomere	158-160μ	160-190μ
9 th flagellomere	—	150μ
10 th flagellomere	—	140μ
11 th flagellomere	—	—
12 th flagellomere	—	—
Palpus		
1 st segment	19-20μ	20μ
2 nd segment	28-30μ	40-50μ
3 rd segment	72μ	60-70μ
Female		
Body	2.20-2.30 mm	2.50-2.70 mm
Scape	112-114μ	100μ
Pedicel	48-50μ	50μ
1 st flagellomere	198μ	210-230μ
5 th flagellomere	130μ	140-170μ
9 th flagellomere	86μ	90-100μ
10 th flagellomere	63μ	70-80μ
11 th flagellomere	50-52μ	60μ
12 th flagellomere	32-34μ	40μ
Palpus		
1 st segment	19-20μ	30μ
2 nd segment	48-52μ	50μ
3 rd segment	70-72μ	70μ
Larva		
Body	1.70-1.80 mm	1.90-2.40 mm
Spatula	198μ	220-240μ

lantic Forest); Santa Catarina, Babitonga (Atlantic Forest); Rio Grande do Sul, Porto Alegre (Atlantic Forest) (Maia, 2021).

Remarks: There is only one previously known species of *Asphondylia* on Cordiaceae, *Asphondylia cordiae* Möhn, 1959 on *Cordia dentata* Poir. described from El Salvador. The new species differs from *Asphondylia cordiae* in the following characters: (1) larva: body longer, spatula with mesal teeth wider, stalk thinner and anterior end longer in the new species than in *A. cordiae* (Fig. 18B × Fig. 18D); (2) adults: body and female flagellomeres longer in the new species than in *A. cordiae* (Table 4); (3) male: hypoproct simple only in *A. varroniae*. The pupa of *A. cordiae* is unknown.

***Asphondylia xerezi* Maia, sp. nov.
(Figs. 19A-21C)**

Diagnosis: Male hypoproct rounded apically, deeply bilobed, ovipositor with needle part about 2.45 × length 7th sternite; pupa: antennal horn 0.20-0.25 mm long,

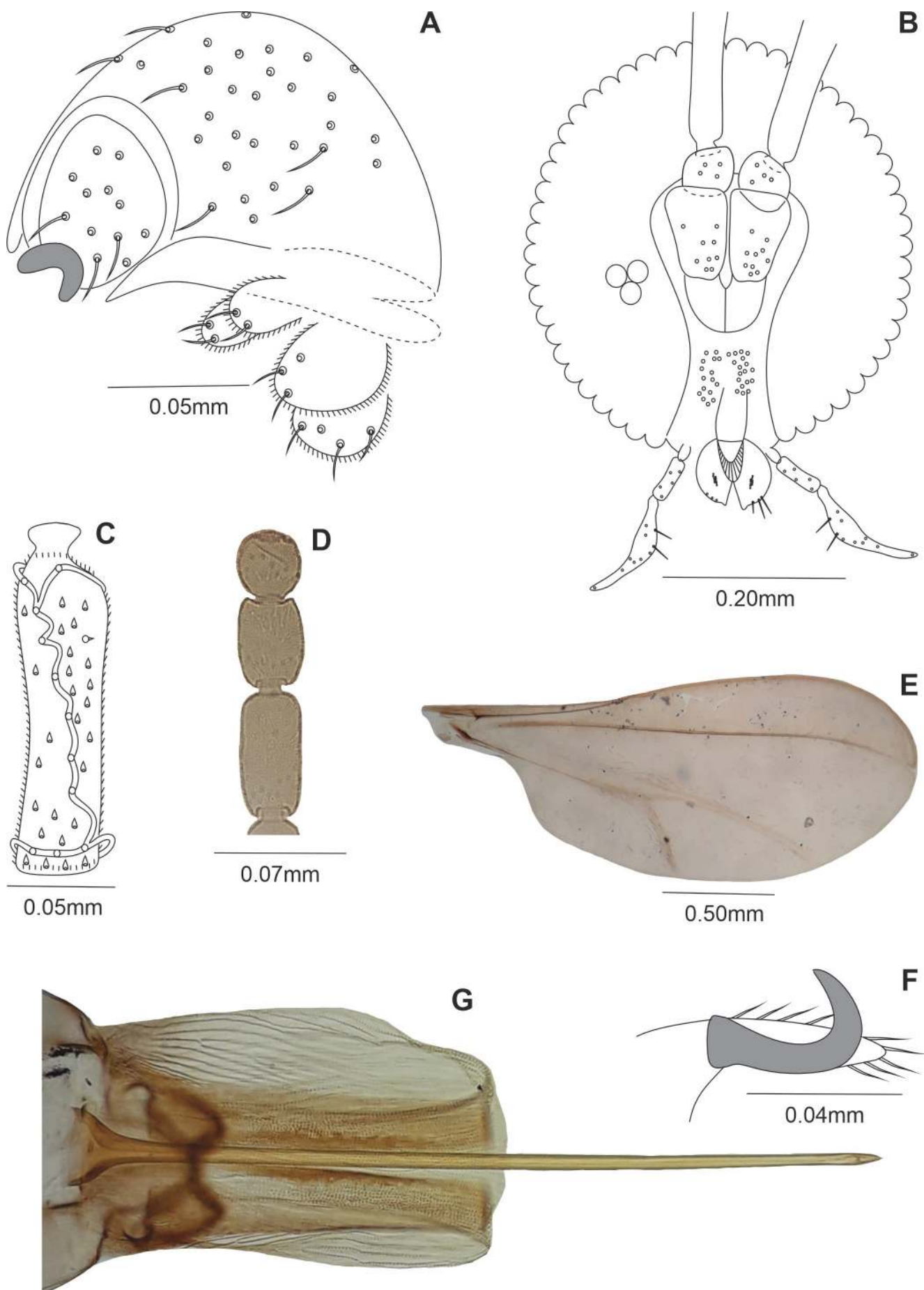


Figure 19. *Asphondylia xerezi* Maia, **sp. nov.**: (A) male terminalia, lateral view, (B-G) female, (B) head, ventral view, (C) 5th flagellomere, (D) 10th-12th flagellomeres, (E) Wing, (F) Hindleg, tarsal claw and empodium, lateral view, (G) Ovipositor, ventral view.

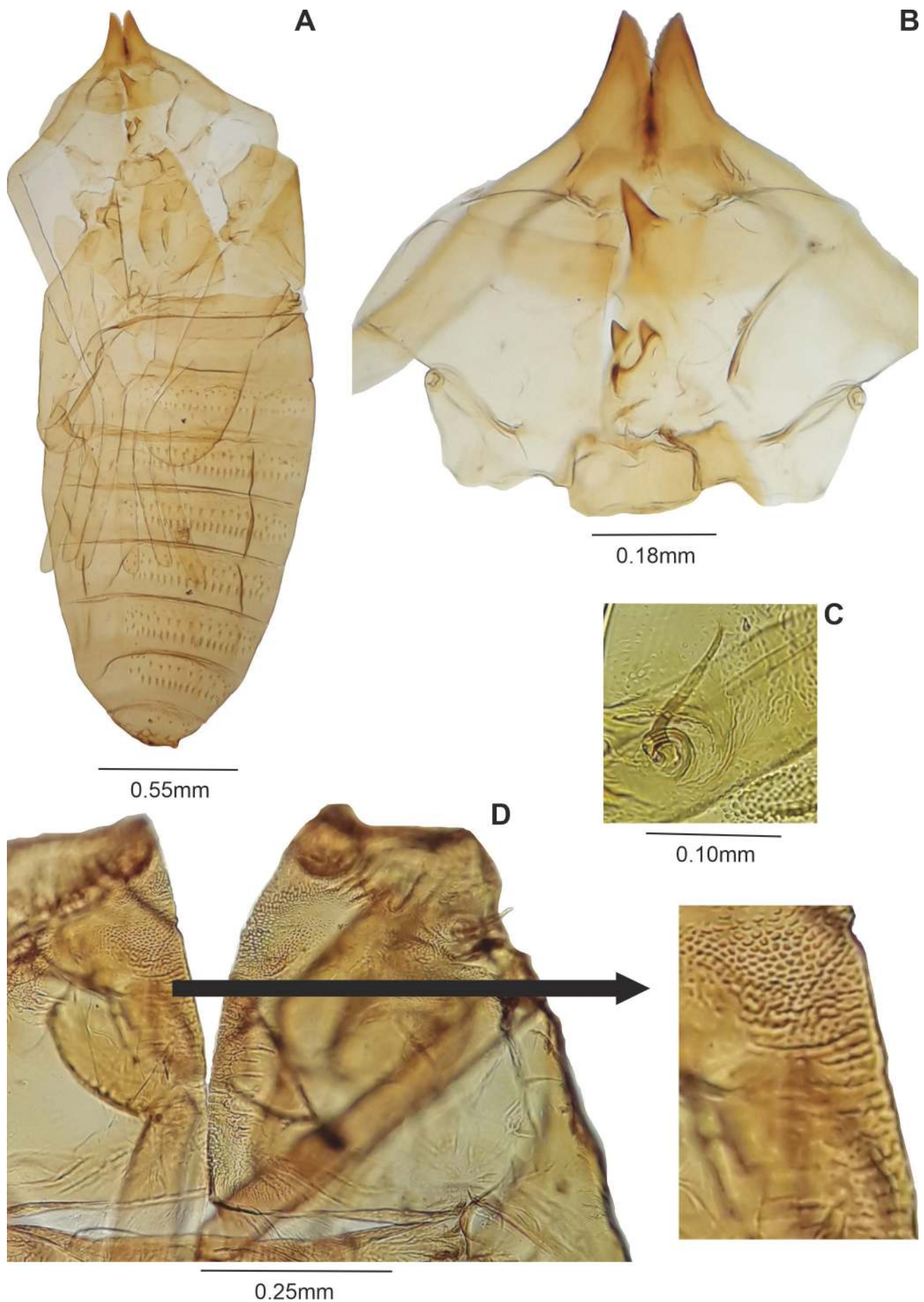


Figure 20. *Asphondylia xerezi* Maia, sp. nov., pupa: (A) General aspect, ventral view, (B) Head, frontal view, (C) Prothoracic spiracle, (D) Thoracic integument, dorsal view.

upper facial horn single and conical, three lower frontal horns not aligned, 8th abdominal segment with 7-10 dorsal spines in the posterior row, larva: spatula with lateral and mesal teeth subequal in length, mesal teeth rounded apically, three setose lateral papillae on each side of spatula.

Male: Body: 3.20 mm long (N = 1). **Head:** 0.45 mm long, 0.45 mm wide (N = 1), eye facets circular, closely appressed; antennae: flagellomeres 1 and 2 not

fused, scape obovate, setose, 0.06 mm long, 0.06 mm wide (N = 1), pedicel globose, setose, 0.05 mm long, 0.06 mm wide (N = 1), 1st-7th flagellomeres cylindrical, all 0.04 mm wide (8th to 12th flagellomeres missing), circumfila longitudinally wavy, dense, anastomosing, equally spread along segments, 1st flagellomeres 0.22 mm long (N = 1), 2nd-7th flagellomeres 0.17-0.18 mm long (N = 1), proportion flagellomere neck-node 1:09; frons smashed; mouthparts smashed. **Thorax:** scutum with two dorsocentral rows of setae,

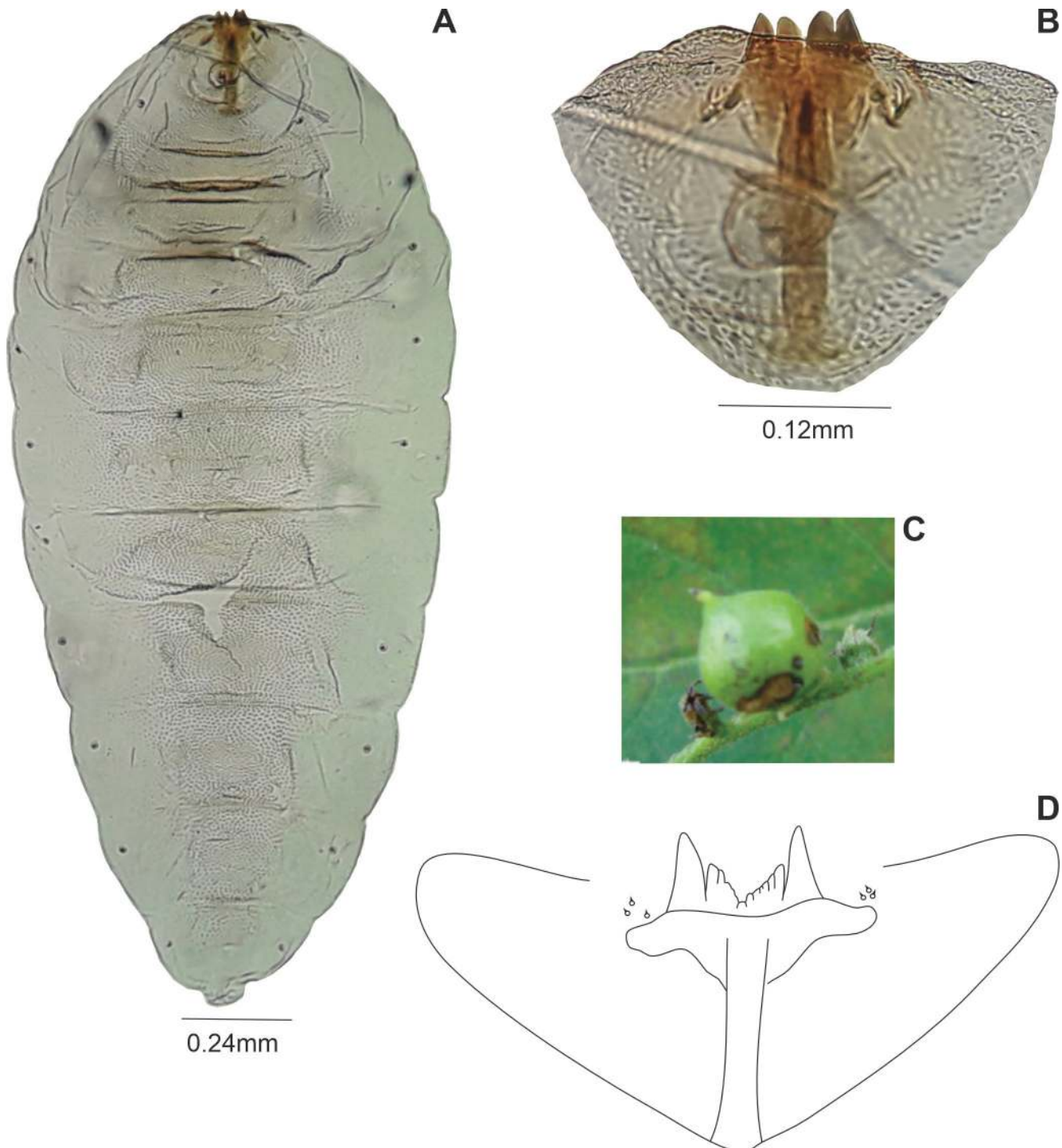


Figure 21. *Asphondylia* spp.: (A-C) *Asphondylia xerezi* Maia, **sp. nov.**, (A) General aspect, ventral view, (B) Spatula, ventral view, (C) Fruit gall on *Heliotropium* sp. (Heliotropiaceae), (D) *Asphondylia tournefortiae* Rübsaamen, 1915, larva, spatula and associated papillae, ventral view, redrawn from Rübsaamen, 1915 (original drawing without scale).

setae more abundant anteriorly, two groups of lateral setae more abundant anteriorly, extending from base to distal margin, scales intermixed; scutellum with scattered setae; anepimeron setose; remaining pleural sclerites bare; legs: tarsal claws curved beyond midlength, empodium as long as claws; wing smashed.

Abdomen: trichoid sensilla not visible; 1st-7th tergites sclerotized, rectangular with a posterior row of setae, few scattered lateral setae and mostly covered elsewhere with scales, 8th tergite tergite 8th band-like, bare; 2nd-8th sternites sclerotized, rectangular, narrower than tergites, with a posterior row of setae, several setae and midlength, few lateral setae, and mostly covered elsewhere with scales; 8th sternite with setae at $\frac{2}{3}$ distal and mostly covered elsewhere with scales. **Terminalia (Fig. 19A):** gonocoxite short and stout, 0.15 mm long, 0.07 mm wide (N = 1); gonostylus ovoid, 0.06 mm long, 0.05 mm wide (N = 1); hypoproct deeply bilobed, rounded apically.

Female: Body length: 3.20 mm (N = 1). **Head (Fig. 19B):** 0.40 mm long, 0.35 mm wide, antennae: scape 0.09 mm long, 0.05 mm wide, pedicel 0.05 mm long, 0.05 mm wide, 1st-11th flagellomeres cylindrical, all 0.04 mm wide, circumfila comprising two longitudinal bands connected subbasally and apically by two transverse bands (Fig. 19C), flagellomeres 1 and 2 not fused, 1st flagellomere 0.24 mm long, 2nd-6th flagellomeres 0.17-0.18 mm long, 7th flagellomere 0.15 mm long (N = 4), 8th flagellomere 0.14 mm long (N = 1), 9th flagellomere 0.09 mm long (N = 1), 10th flagellomere 0.07 mm long, 11th flagellomere 0.06 mm long, 12th flagellomere 0.04 mm long (Fig. 19D); proportion flagellomere neck-node 1:15; mouthparts: labrum 0.07 mm long, 0.04 mm wide (N = 1), hypopharynx 0.11 mm long, 0.04 mm wide (N = 1), labellum 0.07 mm long, 0.04 mm wide at midlength, with 5 pairs of mesal setae (N = 1); palpus 0.22 mm long (N = 1); 1st segment globose 0.02 mm long, 0.02 mm wide (N = 2), 2nd segment cylindrical 0.05 mm long, 0.02 mm wide at midlength (N = 2), 3rd segment claviform 0.15 mm long and 0.02-0.03 mm wide at midlength (N = 2). **Thorax:** wing length: 2.35 mm (N = 1) (Fig. 19E); tarsal claws more sclerotized and robust than in male (Fig. 19F). **Abdomen:** trichoid sensillae not visible, 1st-7th tergites as in male, 8th tergite with posterior margin with lobes 0.07-0.08 mm long (N = 2), 2nd-6th sternites as in male, 6th sternite 0.17-0.20 mm long (N = 2), 7th sternite 0.35-0.45 mm long (N = 1), 2.05-2.25 × length sternite 6 (N = 2), setose (except basally), mostly covered elsewhere with scales; sternite 8 not sclerotized; ovipositor (Fig. 19G): needle part 0.86 mm long (N = 1), 2.45x length sternite 7 (N = 1). Other characters as in male.

Pupa (Fig. 20A): Color: brownish. Body length: 2.90-3.20 mm (N = 3). **Head (Fig. 20B):** dorsal plate 0.38-0.40 mm long, 0.18-0.20 mm wide (N = 2); antennal horn 0.20-0.25 mm long (N = 3), conical, pointed, distal part longer than basal part, inner margin serrated; dorsal

plate 0.20 mm long, 0.39-0.40 mm wide (N = 3), apical seta 0.05 mm long (N = 3); one upper facial horn conical, 0.07-0.11 mm long (N = 3); three lower facial horns not aligned, 0.04 mm long (N = 2); two pairs of lower facial papillae: one pair setose, the other bare; three pairs of lateral facial papillae: one pair setose, two bare; upper cephalic margin thickened laterally; face with pronounced lateral projection. **Thorax:** prothoracic spiracle 0.10 mm long (N = 2), as long as antennal basal width, setiform, slightly curved (N = 5) (Fig. 20C), integument wrinkled (Fig. 20D). **Abdomen:** segments 2-8 with transverse rows of crescent dorsal spines at basal half; posterior row with 26-30 spines in the 2nd segment (N = 3), 24-31 in the 3rd (N = 3), 24-29 in the 4th (N = 3), 20-28 in the 5th (N = 3), 20-22 in the 6th (N = 3), 13-18 in the 7th (N = 3), 7-10 in the 8th (N = 3).

Larva (Fig. 21A): Body: 2.20 mm long (N = 1); head retracted. Spatula (Fig. 21B) quadridentate, 0.24 mm long (n = 1), lateral and mesal teeth subequal in length (0.02 mm long) (N = 1), lateral teeth more pointed than mesal; three setose lateral papillae on each side of spatula. Terminal segment smashed.

Gall: on fruit, globoid, green, glabrous, multichambered on *Heliotropium* sp. (Heliotropiaceae) (Fig. 21C).

Material examined: Holotype male, BRAZIL, Rio de Janeiro, Mangaratiba, Ilha da Marambaia, Praia Grande, 16.XII.2009, A.R. Rodrigues leg. (MNRJ-ENT1-69833). Paratypes: FEMALES – Praia do Kutuca, 18.VII.2010: 2 ♀♀ (MNRJ-ENT1-69834, MNRJ-ENT1-69835); PUPAL EXUVIAE – same data as holotype, 1 pupal exuvia (MNRJ-ENT1-69837); Praia do Kutuca, 18.VII.2020: 2 pupal exuviae (MNRJ-ENT1-69838); PUPA – 1 pupa (MNRJ-ENT1-69836); THIRD INSTAR LARVA – Praia do Kutuca, 25.II.2011: 1 larva (MNRJ-ENT1-69839).

Etymology: The species is named in honor of Dr. Roberto Xerez (Universidade Federal Rural do Rio de Janeiro) responsible for collection permission in the locality-type (area of the Brazilian Navy).

Geographic distribution: Brazil, Rio de Janeiro State, Mangaratiba municipality (Rodrigues *et al.*, 2014).

Remarks: There is only one previously known species of *Asphondylia* on Heliotropiaceae, *A. tournefortiae* Rübsaamen 1915 on *Heliotropium angustiflorum* (Ruiz & Pav.) Govaerts (reported as *Tournefortia angustiflora* Ruiz & Pav.) and *Myriopus volubilis* Small (reported as *T. volubilis* L.) from Brazil.

Adults of *Asphondylia xerezi* Maia, **sp. nov.** have longer body and shorter scape, pedicel and flagellomeres (Table 5) than in *A. tournefortiae*. The larval spatula of *A. xerezi* is longer than in *A. tournefortiae* Rübsaamen, 1915. In addition, mesal and lateral teeth are subequal in length the new species, while in *A. tournefortiae* mesal teeth are shorter than lateral ones (Fig. 21B × Fig. 21D).

Table 5. Comparative length of adults and larva of *A. tournefortiae* Rübsaamen 1915 and *A. xerezi* Maia, **sp. nov.** (Diptera, Cecidomyiidae). Data on the first species were obtained from literature.

Length:	<i>Asphondylia tournefortiae</i> Rübsaamen, 1915	<i>Asphondylia xerezi</i> Maia, sp. nov.
Male		
Body	2.90-3.00 mm	3.20 mm
Scape	118µ	60µ
Pedicel	72µ	50µ
1 st flagellomere	256µ	220µ
5 th flagellomere	216µ	170-180µ
9 th flagellomere	218µ	—
10 th flagellomere	—	—
11 th flagellomere	—	—
12 th flagellomere	—	—
Palpus		
1 st segment	28-30µ	—
2 nd segment	46-48µ	—
3 rd segment	100µ	—
Female		
Body	—	3.20 mm
Scape	—	90µ
Pedicel	—	50µ
1 st flagellomere	—	240µ
5 th flagellomere	—	170-180µ
9 th flagellomere	—	90µ
10 th flagellomere	—	70µ
11 th flagellomere	—	60µ
12 th flagellomere	—	40µ
Palpus		
1 st segment	—	20µ
2 nd segment	—	50µ
3 rd segment	—	150µ
Larva		
Body	—	2.20 mm
Spatula	212µ	240µ

CONFLICTS OF INTEREST: The author declares there are no conflicts of interest.

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