

A new species of *Trichomyia* (Diptera: Psychodidae: Trichomyiinae) and report of antennal sensilla in adult

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Abstract. This paper describes and illustrates *Trichomyia muiraquita* Araújo & Bravo sp. nov. from the state of Amazonas, Brazil. Furthermore, with the aid of a scanning electron microscope and light microscope, we report for the first time the presence of two small sensilla in flagellomeres of the *Trichomyia* species.

Key-Words. SEM; Morphology; Psychodid fly; Neotropics.

INTRODUCTION

Trichomyiinae is a worldwide distributed subfamily of the Psychodidae, and *Trichomyia* Haliday in Curtis, 1839 is the single genus of the five proposed to the subfamily with extant species (Azar *et al.*, 2015a, b). The remaining four genera, *Axenotrichomyia* Azar, Huang, Cai & Nel, 2015; *Eatonisca* Meunier, 1905; *Eotrichomyia* Nel, Meunier & De Plöeg, 2002; and *Xenotrichomyia* Azar, Mouawad & Salame, 2015, include only fossil species (Meunier, 1905; Nel *et al.*, 2002; Azar *et al.*, 2015a, b). *Trichomyia* is easily distinguished from other Psychodidae by the presence of eyes without an ocular bridge, palpus with three or four segments, one or two sensorial pits with short sensilla in the first palpus segment, a wing with four radial (R) veins (Quate, 1996), and a long Cu_{A2} vein ending long before the medial fork (Duckhouse, 1972; Hennig, 1972; Wagner, 1982).

Throughout the world, 198 extant species of *Trichomyia* have been described, 127 of which are Neotropical (Araújo & Bravo, 2016; Araújo *et al.* 2017a, b) with 96 of those recorded in Brazil (Araújo *et al.* 2017a, b; Shimabukuro *et al.*, 2018). These numbers should increase when new collections come to be realized in unexplored areas of the world.

The presence of different types of antennal sensilla is well-documented in insects, but less information is particularly found in psychodid flies (Fauchaux & Gibernau, 2011). Ilango (2000) and Fernandes *et al.* (2008) described the sensilla for species of Phlebotominae of medical importance, and Fauchaux & Gibernau (2011) described the

sensilla of five species of Psychodinae, Psychodini of economic interest.

Here, we describe a new species of *Trichomyia* from Brazil and report, for the first time, the presence of antennal sensilla in the genus based on photographs obtained by Scanning electron microscope (SEM).

MATERIAL AND METHODS

The specimens described were collected with a Malaise trap. The specimens were processed in 10% potassium hydroxide (KOH), dehydrated in ethanol and mounted in Canada balsam. General morphological terminology follows that of Cumming & Wood (2009). Terminology for the antenna of *Trichomyia* follows that of Ibañez-Bernal (2004), while terminology for the wings and male terminalia follows that of Duckhouse (1972) and Wagner & Ibañez-Bernal (2009). Drawings were made with a camera lucida and digitally prepared them with the free and open source software Inkscape 0.91.

Three dry *Trichomyia* specimens were studied by SEM: *Trichomyia* sp. 1, male, Brazil, Bahia, Igrapiuna, RESEC Michelin, Pancada Grande, 13°47'4"S, 39°10'23"W, 80 m, 15.VI.2013, M. Aragão & E. Menezes coll.; *Trichomyia* sp. 2 and *Trichomyia* sp. 3, females, Brazil, Pernambuco, Bonito, Cachoeira Véu da Noiva, 08°32'4"S, 35°42'53.9"W, 510 m, 25.III.2015 M.X. Araújo & E. Menezes coll. The specimens were glued on double-sized carbon tape, deposited on aluminum stubs, and coated with gold. The photos were ob-

tained by the JEOL JSM-6360LV SEM located at the Centro de Microscopia Eletrônica/Setor de Ciências Biológicas/Universidade Federal do Paraná (UFPR). The identification by specific level of the specimens used in the SEM was not possible since the gold coating, implemented in the process, made it impossible to assemble the material, and the photos of the genitalia did not allow a satisfactory comparison with species previously described.

All specimens examined in this study are deposited in Coleção Entomológica Professor Johann Becker, of the Museu de Zoologia da Universidade Estadual de Feira de Santana, Bahia, Brazil (MZFS), and the Natural History Museum, London (BMNH).

Taxonomy

Trichomyia muiraquita Araújo & Bravo sp. nov. (Figs. 1A-F; 2A-D)

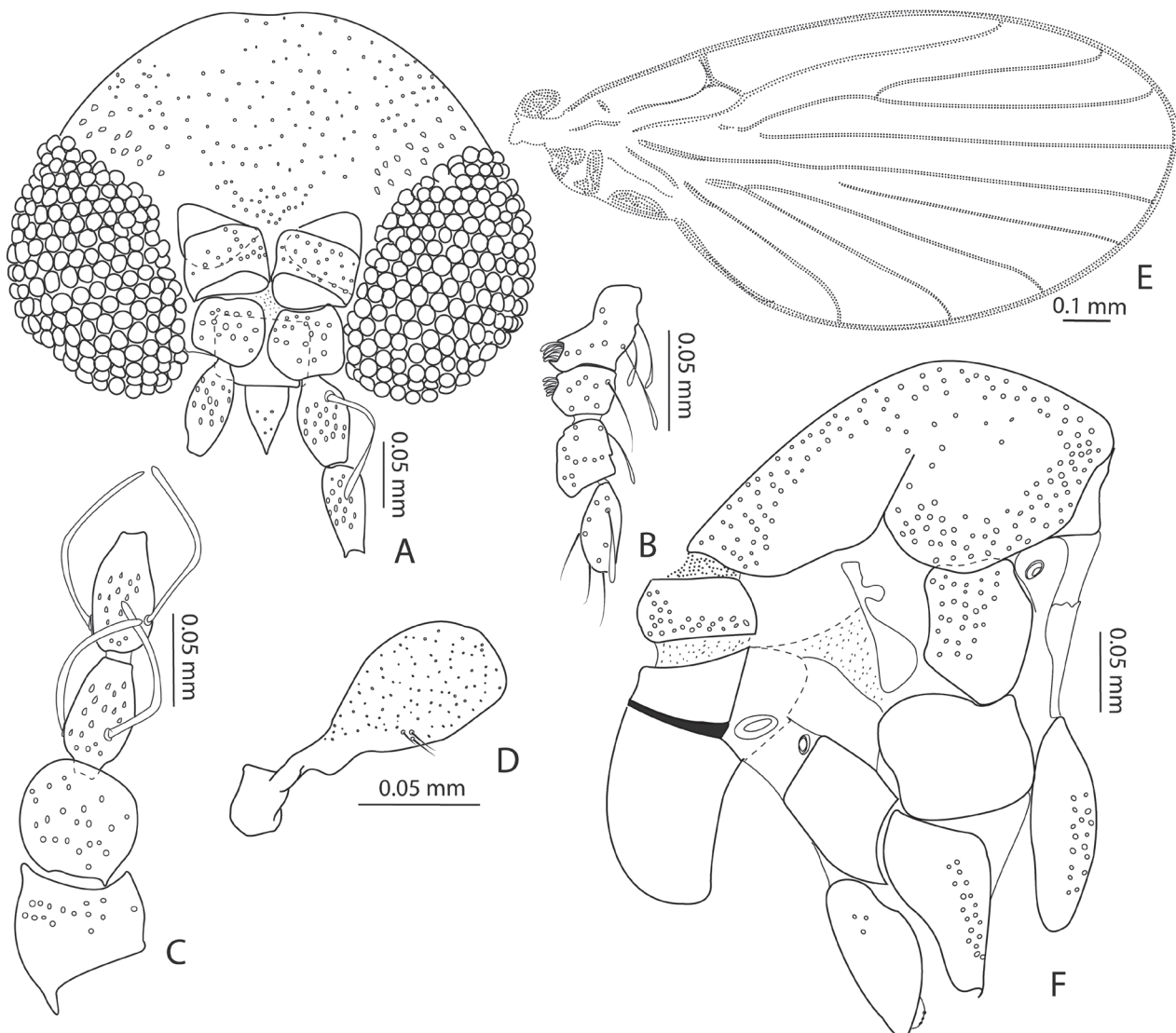
Material examined: Brazil, Amazonas, Manaus, Mata da Universidade Federal do Amazonas (UFAM), 15-30.

IV.2014, holotype, male, A. Silva-Neto coll. (MZFS). 2 males paratypes, same locality, data and collector than holotype (BMNH); 4 males paratypes, Amazonas, Manaus, Rodovia AM 010 km 26, Reserva Florestal Adolpho Ducke, IX.2001, J.F. Vidal coll. (MZFS).

Etymology: From Tupi, *muyrá*, "tree", "wood" and *quitã*, "node", "object rounded shape", for an amulet sculpture in stone or wood produced by the Brazilian Indigenous people of the Lower Amazon, and it refers to the compact shape of the male terminalia of the new species.

Distribution: Known only from Brazil, state of Amazonas.

Diagnosis: Maxillary palpus with four segments, the first two separated by a narrow articular area; sensorial pit present in the first two segments of the palpi. Halter with three small spiniform bristles in the medium posterior area. Gonocoxite with robust arm, perpendicular to aedeagus. Presence of post-hypandrial plate. Gonostylus apically bifurcated. Hypoproct bilobed.



Figures 1A-G. *Trichomyia muiraquita* sp. nov. (A) Head, anterior view; (B) Palpus; (C) Scape, pedicel and basal flagellomeres; (D) Halter; (E) Right wing; (F) Thorax.

Female: Unknown.

Description

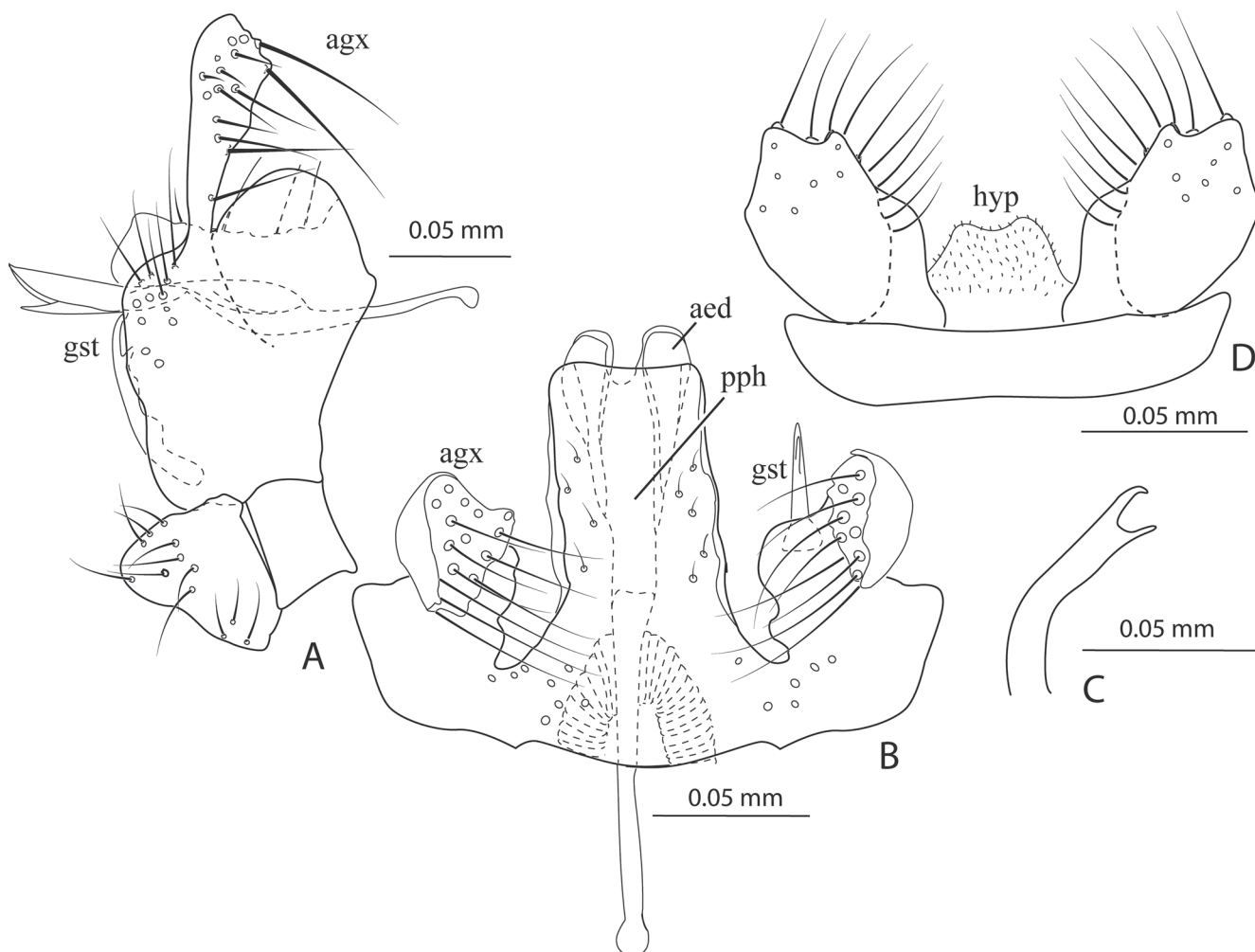
Head: Head subcircular in frontal view, rounded eyes, without eye bridge. Supraocular bristles arranged in two rows. Antennal sockets quadrangular (Figs. 1A). Palpus with four segments, with the first two proximal separated by a narrow articular area; first and second segment with sensilla in concave pit on medial surface; palpus formula 1.0:0.5:0.7:1.0 (Fig. 1B). Antenna incomplete in the studied specimens; scape subcylindrical; pedicel subspherical; basal flagellomeres fusiform and centric; ascoids long and C-shaped, larger than the flagellomeres (Fig. 1C).

Thorax: Presence of bristles in the scutum, scutellum, and anepimeron; postnotum quadrangular and katepisternum wider than long (Fig. 1F).

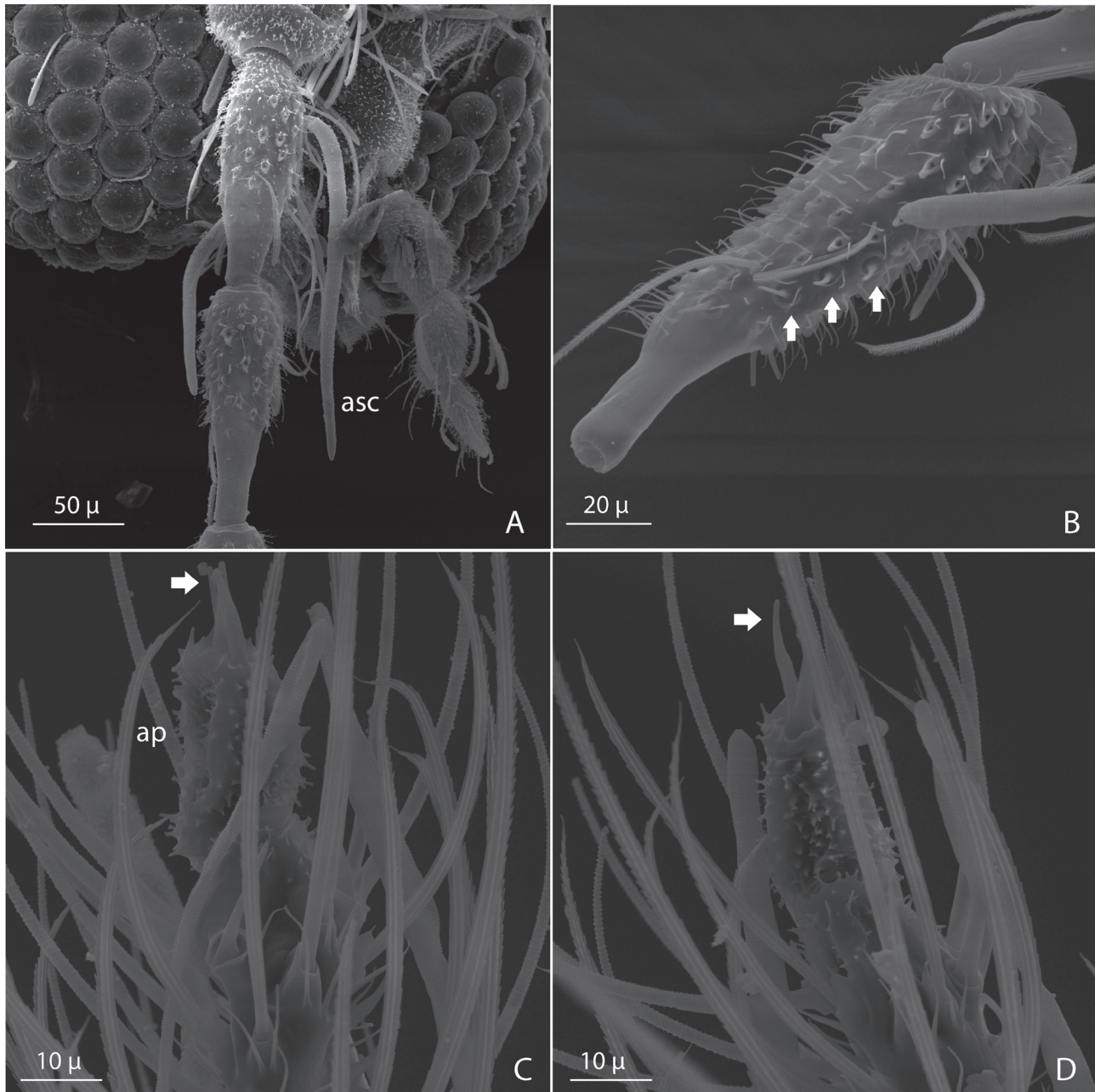
Wing: Wing broad and oval; radial fork apical to the apex of the vein CuA_2 ; medial fork incomplete at base, basal to radial fork; r-m and m-cu absent (Fig. 1E). Halter with three short spiniform bristles in the medium posterior area (Fig. 1D).

Male terminalia: Hypandrium fused to gonocoxites and expanded posteriorly as a plate covering the aedeagus, slightly sclerotized, with lateral short bristles. Arm of gonocoxite directed to the dorsal region of the genitalia, perpendicular to aedeagus, with long bristles in the internal and external sides (Figs. 2A, 2B). Gonostylus articulated ventrally to gonocoxite, strongly sclerotized, without bristles, curved and bifurcated at apex (Figs. 2A, 2B, 2C). Hypoproct slightly bilobed with apical micropilosity. Epandrium wider than long, without bristles. Cercus ovoid with curved margin in ventral view (Fig. 2D).

Remarks: Twenty seven species of *Trichomyia* with four segments, with the first and second segments close together and separated by reduced articular membrane, are known, and they are exclusive to the Neotropics (Araújo & Bravo, 2016; Araújo *et al.*, 2017a). Between these 27 species of *Trichomyia*, only in seven species the gonocoxite fused with hypandrium is expanded posteriorly as a plate, all of them included in the subgenus *Opisthotrichomyia* Bravo, 2001: *T. brevitarsa* (Rapp, 1945); *T. festiva* Bravo, 2001; *T. fluminensis* Bravo, 2001; *T. nocturna* Bravo, 2001; *T. pantanensis* Araújo & Bravo,



Figures 2A-D. *Trichomyia muiraquita* sp. nov. (A) Male terminalia, lateral: gonocoxite, arm of gonocoxite, gonostylus, epandrium, post-hypandrial plate; cerci and aedeagus; (B) Male terminalia, dorsal: arm of gonocoxites, post-hypandrial plate, aedeagus, right gonostylus; (C) Apex of gonostylus, lateral; (D) Cerci, epandrium and hypoproct. (Abbreviations: agx = arm of gonocoxite, aed = aedeagus, gst = gonostylus, hyp = hypoproct, pph = plate pos-hipandrial).



Figures 3A-D. (A) Ascoid of *Trichomyia* sp. 1; (B) Flagellomere of *Trichomyia* sp. 3 and three short sensilla (arrows pointing the bristles); (C) Apiculus of *Trichomyia* sp. 1 with apical sensillum (arrow showing the sensillum); (D) Apiculus of *Trichomyia* sp. 2 with apical sensillum (arrow showing the sensillum). (Abbreviations: ap = apiculus, asc = ascoid).

2017; *T. riocensis* Alexander, Freitas & Quate, 2001 and *T. vargasi* (Barretto, 1954). *Trichomyia muiraquita* sp. nov. differentiated from the seven species of *Trichomyia* (*Opisthotrichomyia*) because in the new species the gonocoxite has a perpendicular arm in relation to aedeagus that is absent in all species of *Opisthotrichomyia*. At this moment, it is impossible to place this new species in any known subgenus.

Antennal sensilla in *Trichomyia*

The ascoids (Fig. 3A), an antennal sensilla, are paired, hyaline structures that can vary in size, number, and shape (Kvifte, 2011) and were proposed as a synapomor-

phy of Psychodidae (Wood & Borkent, 1989). According to Faucheux & Gibernau (2011), these sensilla are thin-walled structures that act as olfactory receptors.

The electron microscopy revealed short trichoid sensilla in the flagellomeres (Fig. 3B), visible like small bristles via the optical microscope (Fig. 4). They were observed in males of 11 species and females of two species: males of *T. armata* Barretto, 1954; *T. annae* Bravo, 2001; *T. pseudosilvatica* Araújo & Bravo, 2016; *T. incrustabilis* Araújo & Bravo, 2006; *T. confusa* Araújo & Bravo, 2016; *T. figueroai* Duckhouse, 1972; *T. pua* Araújo & Bravo, 2016; *T. mani* Duckhouse, 1972; *T. nuda* Dyar, 1926; *T. styloryncha* Curler & Moulton, 2010; and *T. acanthostylis* Quate, 1996; a female of *T. armata*; and a female of an unidentified species. These sensilla are present in one to three of the



Figure 4. Flagellomere of *Trichomyia* sp. with two short sensilla (arrows showing the sensilla).

flagellomeres and must provably have olfactory function (see Faucheux & Gibernau, 2011 for discussion about the function of antennal sensilla). It is provable that these sensilla have a wider distribution in the species of the genus.

Other types of sensilla present in some species of *Trichomyia* are located in pairs at the apex of the last reduced segment of the antenna (apiculus). These sensilla are robust and appear as short spines with thick walls (Figs. 3C, 3D), and by the morphology of them states these sensilla can be compared to the “non-porous chaetic sensilla,” according to the nomenclature of Faucheux & Gibernau (2011). These types of sensilla provably are tactile mechanoreceptors, but they are absent in some species of *Trichomyia*.

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