

# *Triplocania* Roesler (Psocodea: 'Psocoptera': Ptiloneuridae): review of the internal classification, new species, and new records for the state of Bahia, Brazil

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**Abstract.** Four species of *Triplocania* collected in the Brazilian state of Bahia, are described and illustrated, based on male specimens, namely: *T. annyae* sp. nov., *T. diamantina* sp. nov., *T. lauzie* sp. nov. and *T. miltoni* sp. nov. They differ from the other species in the genus, in which the males are known by hypandrium and phallosome structures. New records of *T. capixaba* Silva-Neto, García Aldrete & Rafael, 2016 and *T. manueli* Silva-Neto, García Aldrete & Rafael, 2016 for the state of Bahia are presented. In addition, an update on the *Triplocania* internal classification is proposed.

**Keywords.** Psocomorpha; Taxonomy; Neotropics; Psocids.

## INTRODUCTION

*Triplocania* Roesler, 1940 is one of 12 genera in the psocopteran family Ptiloneuridae. It is the most speciose genus of the family, presently including 98 described species, with 42 species known only from males, 23 species known only from females, and 33 species known from both sexes (González *et al.*, 2017; Silva-Neto *et al.*, 2020). Brazil includes 26 states and a Federal District. A total of 30 species of *Triplocania* have been recorded in 11 of these states (Table 1). The most diverse state for *Triplocania* species is the state of Amazonas, in the North region of Brazil (Table 1). Among the Brazilian regions, the Northeast region has the lowest number of *Triplocania* species records, with only three species records, one species in the state of Ceará (*Triplocania manueli* Silva-Neto, García Aldrete & Rafael) and two species in the state of Bahia (*Triplocania ariasi* New and *Triplocania calori* Silva-Neto, García Aldrete & Rafael) (Silva-Neto & García Aldrete, 2020).

Recently, two of us (AMSN and DML) have found specimens of four *Triplocania* undescribed species and specimens of *T. capixaba* Silva-Neto, García Aldrete & Rafael, 2016 and *T. manueli* Silva-Neto, García Aldrete & Rafael, 2016 in the state of Bahia. This study aims, based on male specimens, to describe and illustrate these species to include new *Triplocania* species records in the state of Bahia, and to update the *Triplocania* species list in Brazil. In addition, we propose an update on the *Triplocania* internal classification.

## MATERIAL AND METHODS

Thirteen male specimens and three female specimens were available for study. They were dissected in 80% ethanol, and their parts were mounted on slides in Canada balsam. Standard measurements (in  $\mu\text{m}$ ) were taken with a filar micrometer. Abbreviations of parts measured are as follows: FW and HW: right fore- and hind- wing

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lengths; F, T, t1, t2 and t3: lengths of femur, tibia and tarsomeres 1, 2, and 3 of right hind leg; f1...fn: lengths of flagellomeres 1...n of right antenna; Mx4: length of fourth segment of right maxillary palpus; IO: minimum distance between compound eyes in head dorsal view; D and d: antero-posterior and transverse diameter, respectively, of right compound eye in head dorsal view; PO: d/D. The specimens studied were stored in CD boxes, as described by Silva-Neto *et al.* (2016a).

Photographs of the parts mounted were taken with a Leica DFC500 digital camera attached to a Leica M205C stereomicroscope, connected to a computer with the Leica Application Suite LAS V3.6 software, which includes an Auto-Montage module (Syncroscopy software). All specimens used in this study will be deposited in the Entomological collection Prof. Johann Becker of the Museu de Zoologia of the Universidade Estadual de Feira de Santana, Feira de Santana, Bahia, Brazil (MZFS).

## RESULTS

### *Triplocania annyae* sp. nov. Male (Figs. 1-7)

**Diagnosis:** Forewings with a pale brown spot darkening the pathways through which it passes, around the vein that joins R-R<sub>5</sub>, passing through the junctions between M and R<sub>5</sub>, M and Cu, and part of Cu; a pale brown band distally in the pterostigma; a small brown spot distally on R<sub>4+5</sub> and M<sub>1</sub> (Fig. 2). Hypandrium of one sclerite, glabrous, with sides deeply concave in the middle, anteriorly almost trapeziform, heavily sclerotized, posteriorly elliptic, less sclerotized, with irregular posterior border (Fig. 5); Phallosome (Fig. 6) anteriorly membranous, scaly, organized like reptile skin; three pairs of endophallic sclerites, an anterior chain-shaped pair, behind the side struts; an antero-lateral pair small, narrow, anteriorly rounded, posteriorly acuminate; posterior pair stout, elongate, anteriorly heavily sclerotized, almost rectangular, narrowing in the middle and dilated posteriorly.

**Color (in 80% ethanol):** Compound eyes black, ocelli hyaline, with black centripetal crescents, head pattern (Fig. 1). Scape and pedicel brown, f1 yellow, with apex pale brown, f2-f6 pale brown. Mx4 yellow to pale brown. Coxae pale brown, trochanters yellow, femora yellow, tibiae yellow with apex pale brown, tarsomere 1 yellow, with the apex pale brown, tarsomeres 2-3 pale brown. Forewings veins pale brown to brown (Fig. 2). Hindwings almost hyaline, brown areas as illustrated (Fig. 3).

**Morphology:** Head vertex almost straight, well below the compound eyes' upper border, these without interommatidial setae (Fig. 1). Outer cusp of lacinial tips broad, with four denticles (Fig. 4). Forewing pterostigma wider in the middle, anteriorly narrow; areola postica wide, broadly triangular, apically rounded, slanted posteriorly; M stem slightly sinuous, M<sub>1</sub> slightly sinuous, M<sub>2</sub> sinuous, M<sub>3</sub> almost straight; R<sub>2+3</sub> almost straight, R<sub>4+5</sub> slightly

sinuous (Fig. 2). Hindwing R<sub>5</sub> straight, R<sub>2+3</sub> straight, R<sub>4+5</sub> slightly concave, almost straight; M stem slightly concave proximally, distally convex (Fig. 3). Hypandrium (Fig. 5); Phallosome (Fig. 6), side struts independent, V-shaped, fused to the external parameres, proximally convex, then concave, convex in the middle, concave at the external parameters' beginning, these convex in the middle, with a membranous part with translucent spots in its interior; apex proximally narrow, wider distally with spiniform micro projections; three pairs of endophallic sclerites (Fig. 6). Epiproct triangular; paraprocts almost triangular, with a dense setal field distally, sensory fields with 30 trichobothria on basal rosettes (Fig. 7).

**Measurements (in microns):** FW: 3188, HW: 2093, F: 891, T: 1275, t1: 446, t2: 87, t3: 114, f1: 398, f2: 263, f3: 631, f4: 567, Mx4: 164, IO: 210, D: 323, d: 259, PO: 0.80.

**Material examined:** Holotype male (MZFS). BRAZIL. Bahia, Milagres. 12°51'34.8"S, 39°52'06.4"W, 28-29. III.2012. Light trap. Leg. Silva-Neto, A.M.

**Etymology:** This species is dedicated to the newly born daughter of AMSN, Anny Kanzaki Moreira da Silva, who came to the world in this difficult time bringing light and joy.

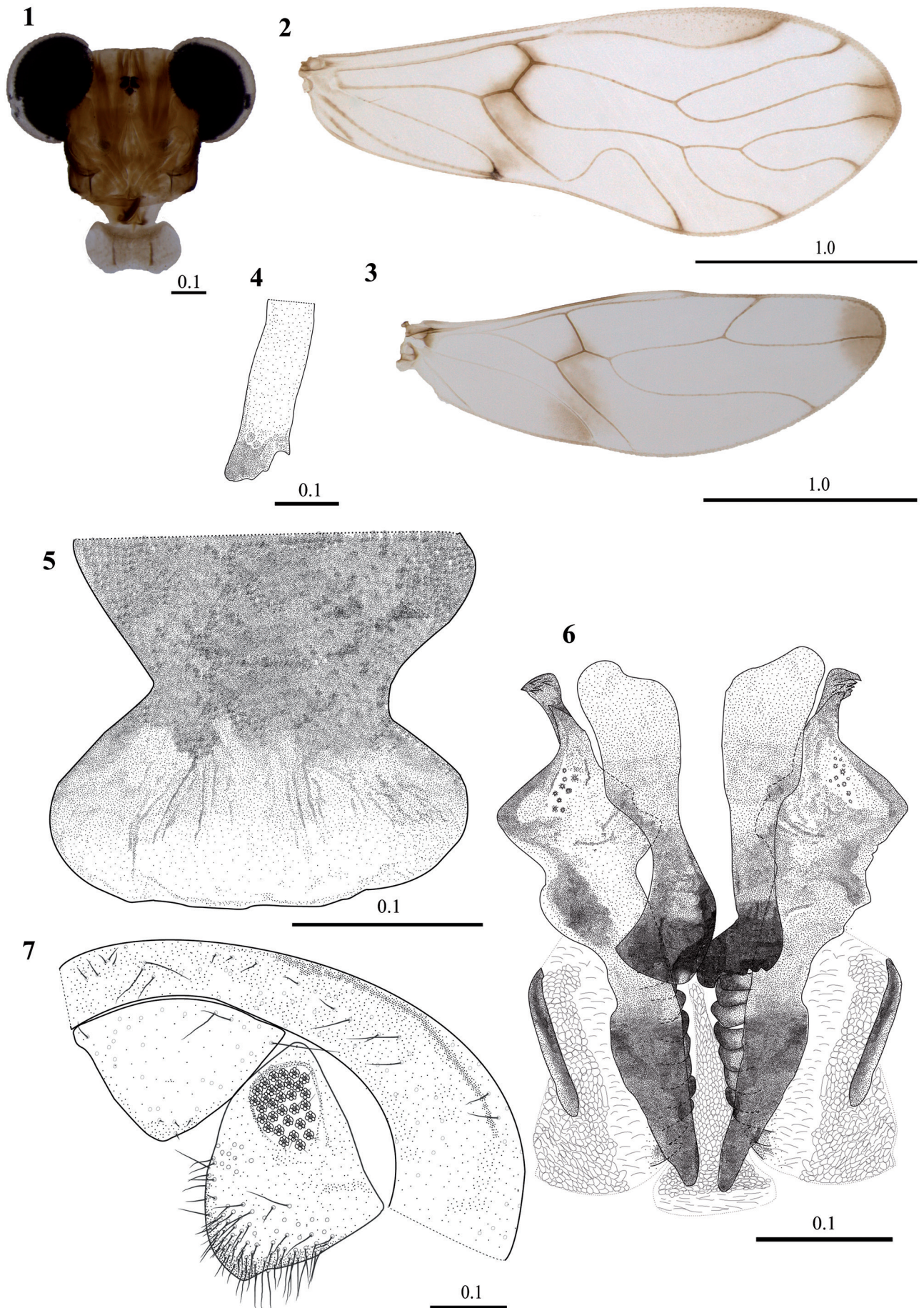
### *Triplocania diamantina* sp. nov. Male (Figs. 8-14)

**Diagnosis:** Forewing pterostigma brown, with a lighter triangular spot in the middle; a pale brown marginal band from R<sub>4+5</sub> to the areola postica, a brown spot on vein ends, from R<sub>2+3</sub> to Cu1b, and a brown area distally of 1A (Fig. 9). Central piece of the hypandrium anteriorly with a small projection in the middle, posteriorly with two robust projections, with the inner border strongly sclerotized, with two inward-facing processes (Fig. 12). Phallosome (Fig. 13) with side struts basally fused, U-shaped, not fused to external parameters, mesal sclerite wide, W-shaped, anteriorly strongly sclerotized, with a median concavity, narrow in the middle, then widening, with two stout posterior processes, distally curved inward and with blunt apices. Lateral endophallic sclerites bow-shaped, anteriorly wider, narrowing posteriorly, with apices dilated, bent outward, acuminate.

**Color:** Compound eyes black, ocelli hyaline, with ochre centripetal crescents, head pattern (Fig. 8). Scape pale brown, pedicel pale brown, f1-f3 pale brown, with apices white. Mx4 pale brown. Coxae pale brown, trochanters pale brown in the middle and lighter at the ends, femora proximally pale brown, tibiae pale brown; tarsomeres 1-3 brown. Forewings with pterostigma brown, veins brown (Fig. 9). Hindwing hyaline; veins brown (Fig. 10).

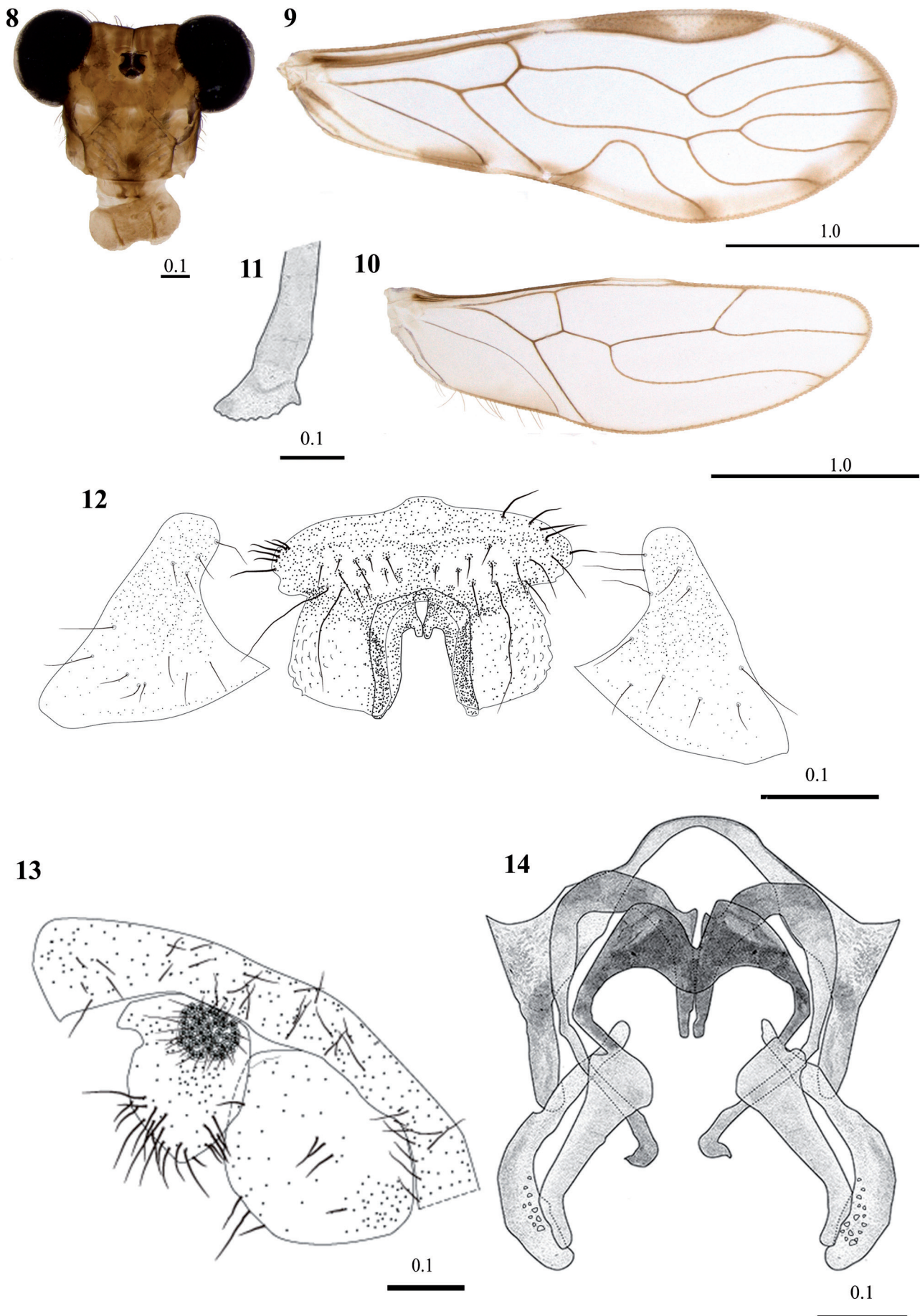
**Morphology:** Head vertex slightly concave in the middle, below the level of the compound eyes' upper border, these without interommatidial setae (Fig. 8). Outer cusp





**Figures 1-7.** *Triplocania annyae* sp. nov. (Holotype male). (1) Front view of head. (2) Forewing. (3) Hindwing. (4) Lacinial tip. (5) Hypandrium. (6) Phallosome. (7) Clunium, right paraproct and epiproct. Scales in mm.





**Figures 8-14.** *Triplocania diamantina* sp. nov. (Holotype male). (8) Front view of head. (9) Forewing. (10) Hindwing. (11) Lacinial tip. (12) Hypandrium. (13) Clunium, left paraproct and epiproct. (14) Phallosome. Scales in mm.

of lacinial tips broad, with six denticles (Fig. 11). Forewing pterostigma wider in the middle, narrow anteriorly; areola postica wide, slanted posteriorly, apically round; M stem slightly concave,  $M_1$  almost straight,  $M_2$  slightly sinuous,  $M_3$  proximally convex, then almost straight to the end,  $R_5$  stem convex,  $R_{2+3}$  proximally straight then distally concave,  $R_{4+5}$  slightly concave proximally, then almost straight (Fig. 9). Hindwing  $R_5$  stem straight,  $R_{2+3}$  straight, and  $R_{4+5}$  slightly concave proximally, then almost straight, M stem sinuous, proximally slightly convex (Fig. 10). Hypandrium (Fig. 12) of three sclerites with central piece anteriorly with two less sclerotized circular parts and bristles distributed over the surface, a small projection in the middle, also round. Phallosome (Fig. 13). Epiproct concave in connection with the clunium, obtuse on the sides, almost straight at the apex, with three mesal macrosetae (Fig. 14). Paraprocts broad, broadly triangular, setose as illustrated; sensory fields with 33 trichobothria on basal rosettes (Fig. 14).

**Measurements (in microns):** FW: 3070, HW: 2129, F: 948, T: 1384, t1: 601, t2: 48, t3: 99, f1: 607, f2: 531, f3: 451, Mx4: 215, IO: 271, D: 319, d: 244, PO: 0.76.

**Material examined:** Holotype male (MZFS). BRAZIL. Bahia. Morro do Chapéu. Morrão. 11°35'35.9"S, 41°11'56.0"W, 02-03.X.2009. Alvim, E., Silva-Neto, A.M., Mota, E & Zacca, T. Paratype: 1 male (MZFS). BRAZIL. Bahia. Morro do Chapéu. Lagoa Preta. 23-24.VI.2009. Leg. Silva-Neto, A.M.

**Etymology:** The specific name refers to the Chapada Diamantina region, in the state of Bahia, where the specimens were found.

#### *Triplocania lauziae* sp. nov. Male (Figs. 15-21)

**Diagnosis:** Forewings with a brown marginal pigmented band, from  $R_{4+5}$  to wing base, with hyaline fenestrae at wing margin as illustrated; pterostigma with a small proximal brown band, and a large, distal brown band, with a central, hyaline area (Fig. 16). Hypandrium of one sclerite, anteriorly straight, with mesal lateral processes, posteriorly with sides converging to broad apex, with an almost triangular, acuminate process on each side, directed outward, leaving a wide concavity between them (Fig. 19). Phallosome (Fig. 20) with side struts independent, inverted Y-shaped, not fused posteriorly to external parameres; anterior pair of endophallic sclerites broadly elliptic, with irregular outer borders, the left one with three short discrete posterior projections and a rounded apex; a mesal pair, small, strongly sclerotized, almost touching in the middle; posterior pair scythe-shaped.

**Color (in 80% ethanol):** Compound eyes black, ocelli hyaline, with dark brown centripetal crescents; head pattern (Fig. 15). Scape and pedicel dark brown, f1 brown, with apex dark brown, f2 pale brown, f3 brown, f4 pale

brown. Mx4 dark brown. Coxae pale brown, trochanters yellow, femora yellow, tibiae pale brown, with apices brown, tarsomere 1 yellow, with the apex brown, tarsomeres 2 and 3 pale brown. Forewings veins brown,  $R_{2+3}$  with a brown spot at wing margin (Fig. 16). Hindwings almost hyaline, veins brown, M and  $R_{4+5}$  with a brown spot at wing margin (Fig. 17).

**Morphology:** Head with vertex slightly concave in the middle, slightly above the compound eyes' upper border, these without interommatidial setae (Fig. 15). Outer cusp of lacinial tips slender, with four denticles (Fig. 18). Forewing pterostigma wider in the middle, narrow anteriorly; areola postica tall, wide, slanted posteriorly, apex rounded, almost reaching the M stem, this anteriorly concave,  $M_1$ - $M_3$  as illustrated (Fig. 16). Hindwing  $R_5$  stem straight,  $R_{2+3}$  straight and  $R_{4+5}$  slightly convex; M stem slightly concave proximally, then convex from the middle to the end (Fig. 17). Hypandrium of one sclerite (Fig. 19). Phallosome (Fig. 20) with side struts independent, Y-shaped, not fused posteriorly to external parameres. Epiproct sclerotized, almost trapeziform, anteriorly rounded, setae as illustrated (Fig. 21). Paraproct broadly semi-elliptic, sensory fields with 32 trichobothria on basal rosettes, setae as illustrated (Fig. 21).

**Measurements (in microns):** FW: 3211, HW: 2107, F: 902, T: 1397, t1: 654, t2: 98, t3: 143, f1: 979, f2: 754, f3: 767, Mx4: 286, IO: 445, D: 385, d: 315, PO: 0.81.

**Material examined:** Holotype male (MZFS). BRAZIL. Bahia, Camaçan. 15°23'28"S, 39°33'56"W, III.2012. Malaise Trap. Calor, A.R. Paratype. 1 male (MZFS): same data as the holotype.

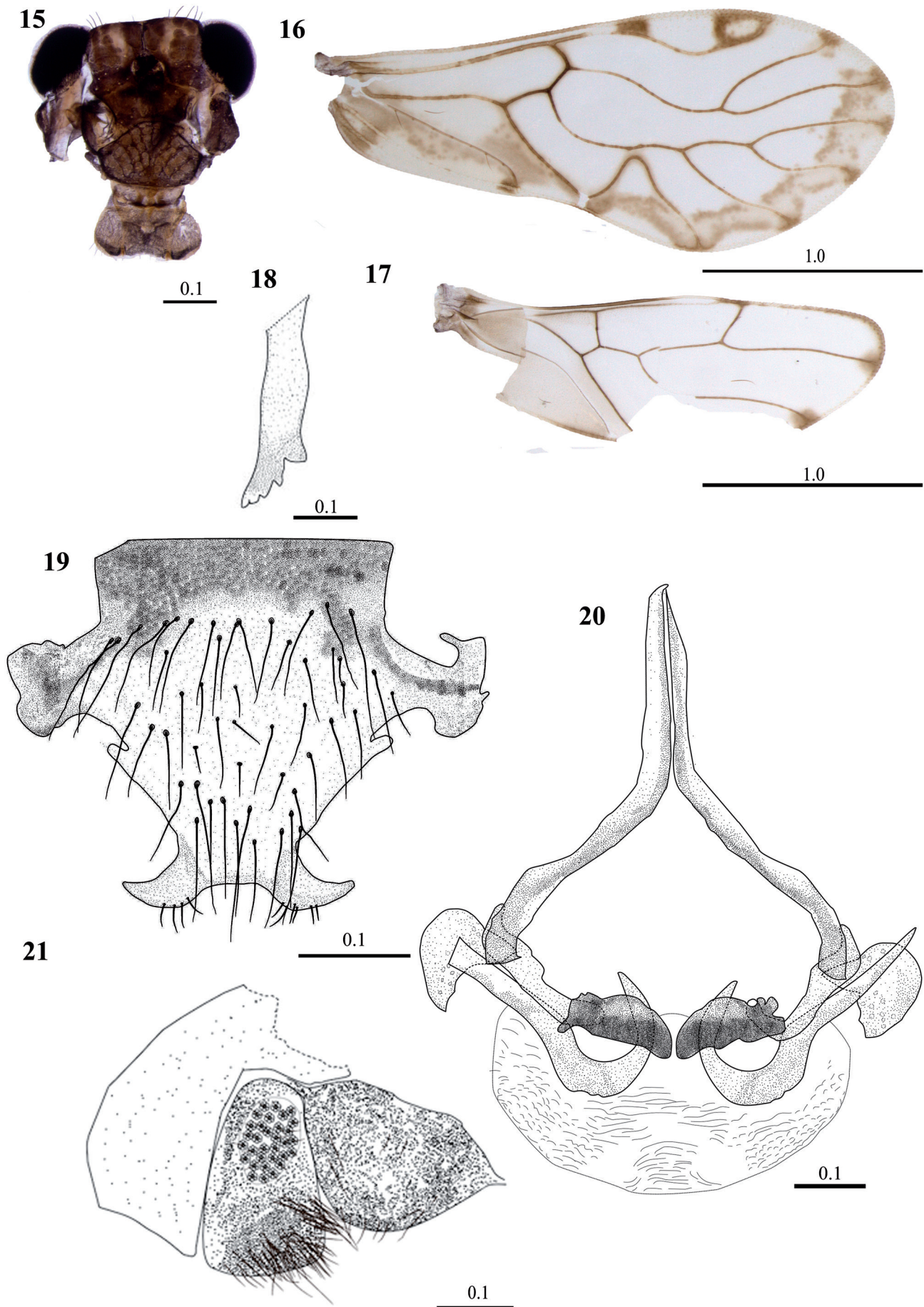
**Etymology:** This species is dedicated to DML's mother, Lauzi Santos Moura, for raising and educating him, even in difficult times, for being an example of mother and woman, and an inspiration for his work.

#### *Triplocania miltoni* sp. nov. Male (Figs. 22-28)

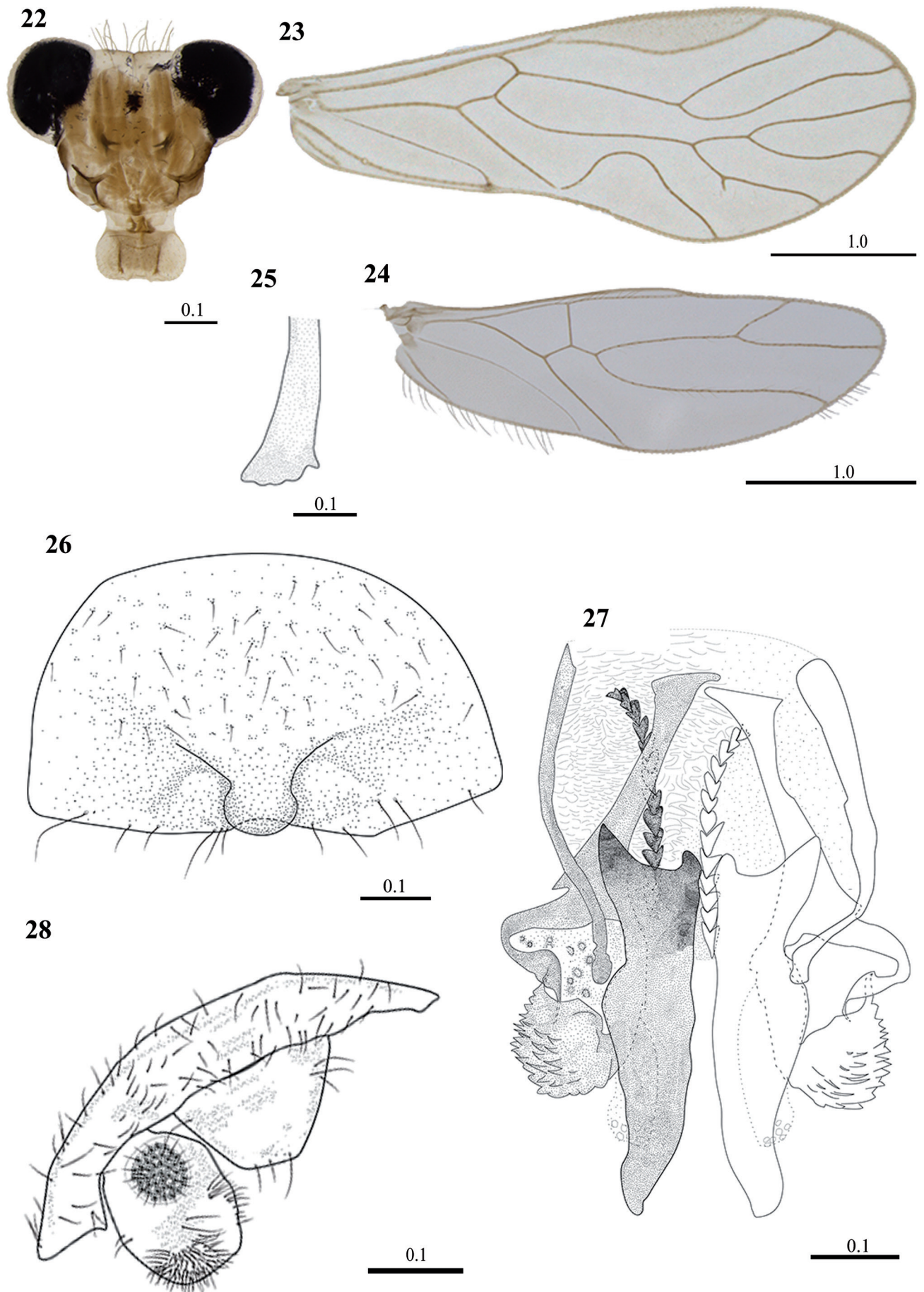
**Diagnosis:** Forewings hyaline (Fig. 23); hypandrium of one sclerite, anteriorly convex, posteriorly almost straight with a posterior median projection, wide at base, constricted in the middle and rounded distally (Fig. 26); phallosome with anterior mesal pair of endophallic sclerites subdivided into small V-shaped pieces, chain-shaped, external parameres posteriorly with small, pointed projections distributed over the surface (Fig. 27).

**Color (in 80% ethanol):** Compound eyes black, ocelli hyaline, with dark brown centripetal crescents, head pattern (Fig. 22). Scape and pedicel brown, f1 yellow, with apex brown, f2 pale brown, f3 brown, with apices pale yellow. Mx4 pale brown, with apex brown. Coxae pale brown, trochanters yellow, femora proximally pale brown and then yellow, tibiae yellow with apices pale





**Figures 15-21.** *Triplocania lauziae* sp. nov. (Holotype male). (15) Front view of head. (16) Forewing. (17) Hindwing. (18) Lacinal tip. (19) Hypandrium. (20) Phallosome. (21) Clunium, left paraproct and epiproct. Scales in mm.



**Figures 22-28.** *Triplocania miltoni* sp. nov. (Holotype male). (22) Front view of head. (23) Forewing. (24) Hindwing. (25) Lacinial tip. (26) Hypandrium. (27) Phallosome. (28) Clunium, left paraproct and epiproct. Scales in mm.



**Table 1.** Brazilian *Triplocania* species, sexes known and geographic distribution.

SPECIES	SEX KNOWN	GEOGRAPHIC DISTRIBUTION
<i>T. annyae</i> sp. nov.	Male	Brazil (Bahia)
<i>T. ariasi</i> New, 1980	Female	Brazil (Amazonas, Bahia)
<i>T. brancoi</i> Silva-Neto, García Aldrete, Rafael & Ferreira, 2021	Male	Brazil (Minas Gerais)
<i>T. calcarata</i> New, 1980	Male	Brazil (Amazonas)
<i>T. calori</i> Silva-Neto, García Aldrete & Rafael, 2016b	Both	Brazil (Bahia)
<i>T. capixaba</i> Silva-Neto, García Aldrete & Rafael, 2016b	Both	Brazil ( <b>Bahia*</b> , Espírito Santo)
<i>T. caudata</i> New, 1980	Male	Brazil (Amazonas)
<i>T. diamantina</i> sp. nov.	Male	Brazil (Bahia)
<i>T. fapeam</i> Silva-Neto, García Aldrete & Rafael, 2016b	Male	Brazil (Amazonas)
<i>T. ferratilis</i> Silva-Neto, García Aldrete, Rafael & Ferreira, 2021	Male	Brazil (Minas Gerais)
<i>T. furcata</i> New, 1972	Both	Brazil (Mato Grosso), Colombia
<i>T. immaculata</i> New, 1980	Male	Brazil (Amazonas)
<i>T. inpa</i> Silva-Neto, García Aldrete & Rafael, 2016b	Male	Brazil (Amazonas)
<i>T. lamasi</i> Silva-Neto, Rafael & García Aldrete, 2014	Both	Brazil (Mato Grosso), Colombia
<i>T. lamasoides</i> Silva-Neto, Rafael & García Aldrete, 2015	Both	Brazil (Rondônia), Colombia
<i>T. lauziae</i> sp. nov.	Male	Brazil (Bahia)
<i>T. lucida</i> Roesler, 1940	Male	Brazil (Santa Catarina)
<i>T. lunulata</i> New, 1980	Female	Brazil (Amazonas)
<i>T. magnifica</i> Roesler, 1940	Both	Brazil (Santa Catarina, Paraná)
<i>T. manauara</i> Silva-Neto, García Aldrete & Rafael, 2016b	Both	Brazil (Amazonas)
<i>T. manueli</i> Silva-Neto, García Aldrete & Rafael, 2016b	Both	Brazil ( <b>Bahia*</b> , Ceará)
<i>T. mariaelinae</i> Silva-Neto, García Aldrete & Rafael, 2016b	Both	Brazil (Pará)
<i>T. mariateresae</i> Silva-Neto, Rafael & García Aldrete, 2014	Male	Brazil (Rio de Janeiro)
<i>T. miltoni</i> sp. nov.	Male	Brazil (Bahia)
<i>T. newi</i> Silva-Neto, Rafael & García Aldrete, 2014	Male	Brazil (Amazonas e Tocantins)
<i>T. pains</i> Silva-Neto, García Aldrete, Rafael & Ferreira, 2021	Male	Brazil (Minas Gerais)
<i>T. paranaensis</i> Silva-Neto, García Aldrete & Rafael, 2016b	Male	Brazil (Paraná)
<i>T. plaumanni</i> Silva-Neto, Rafael & García Aldrete, 2014	Male	Brazil (Santa Catarina)
<i>T. reflexa</i> Roesler, 1940	Male	Brazil (Santa Catarina)
<i>T. rondoniensis</i> García Aldrete, 1999	Male	Brazil (Rondônia)
<i>T. rosae</i> Silva-Neto, García Aldrete & Rafael, 2016b	Both	Brazil (Paraná, Minas Gerais)
<i>T. trifida</i> Silva-Neto, Rafael & García Aldrete, 2015	Male	Brazil (Mato Grosso e Rondônia)
<i>T. umbrata</i> New, 1980	Female	Brazil (Amazonas)
<i>T. zaire</i> Silva-Neto, García Aldrete, Rafael & Ferreira, 2021	Male	Brazil (Minas Gerais)

\* New records from Brazilian state of Bahia.

brown, tarsomeres 1-3 pale brown. Forewings hyaline, veins pale brown (Fig. 23). Hindwings hyaline, veins pale brown (Fig. 24).

**Morphology:** Head with vertex slightly concave in the middle, slightly below the compound eyes' upper border, these without interommatidial setae (Fig. 22). Outer cusp of lacinial tips broad, with four denticles (Fig. 25). Forewing pterostigma wider in the middle, narrow anteriorly; areola postica wide, slanted posteriorly, apex widely rounded,  $M_1$  almost straight,  $M_2$  anteriorly concave, posteriorly convex,  $M_3$  slightly convex with a spur vein closer to M stem than to the wing margin,  $R_s$  stem slightly convex proximally, then almost straight,  $R_{2+3}$  almost straight,  $R_{4+5}$  sinuous (Fig. 23). Hindwing  $R_s$  stem almost straight, slightly concave,  $R_{2+3}$  and  $R_{4+5}$  straight; M stem straight proximally, then concave distally (Fig. 24). Hypandrium of one sclerite (Fig. 26). Phallosome with side struts independent, V-shaped, fused posteriorly to external parameres, these curved outwards, tip slender anteriorly, broad posteriorly, with small spiniform projections distributed over the apical border's surface, with pores in the middle.

Three pairs of endophallic sclerites, an antero-mesal pair slender, sinuous, subdivided into pieces V-shaped organized in chain (catenulate), a lateral-pair slender, straight anteriorly, slightly curved inwards from three quarters of its length to the apex, this rounded; a posterior pair, stout, elongated, basally wide, with a medial concavity, which give rise almost triangular projections, on each side antero-lateral, narrowing distally, with apex almost triangular (Fig. 27). Epiproct almost trapezoidal, posteriorly slightly concave in the middle, anteriorly rounded with some bristles, other setae as illustrated (Fig. 28). Paraprocts broadly elliptic, sensory fields with 32 trichobothria on basal rosettes, setae as illustrated (Fig. 28).

**Measurements (in microns):** FW: 2978, HW: 2199, F: 914, T: 1430, t1: 635, t2: 73, t3: 110, f1: 817, f2: 673, Mx4: 210, IO: 278, D: 383, d: 301, PO: 0.78.

**Material examined:** Holotype male (MZFS). BRAZIL. Bahia. Milagres. 20-29.III.2012. Leg. Silva-Neto, A.M. & Menezes, E. Light trap. Paratype: 1 male (MZFS). Same data as the holotype, except (Isla 10285). 13.V.2014.



**Etymology:** This species is dedicated to DML's father, Milton Robson Ribeiro Lima, for guiding him through different life situations, investing in his education, believing in his potential, and encouraging him.

### New records

#### *Triplocania capixaba*

Silva-Neto, García Aldrete & Rafael, 2016

*Triplocania capixaba* Silva-Neto, García Aldrete & Rafael, 2016b: 253, Figs. 16-29; Silva-Neto & García Aldrete, 2020: 4 (catalog), Silva-Neto et al., 2020: 4 (checklist).

**Distribution:** Brazil. Espírito Santo (Fundão); Bahia (Igrapiúna). **New record.**

**Material examined:** 1 female (MZFS). BRAZIL. Bahia. Igrapiuna, Reserva Ecológica Michelin, Cachoeira Pancada Grande. 03°47'04.2"S, 39°10'23.5"W, 22.VII-19.VIII.2012. Malaise trap.

#### *Triplocania manueli*

Silva-Neto, García Aldrete & Rafael, 2016

*Triplocania manueli* Silva-Neto, García Aldrete & Rafael, 2016b: 269, Figs. 72-86; Silva-Neto & García Aldrete, 2019: 2, Figs. 8, 11 (subgeneric classification); Silva-Neto & García Aldrete, 2020: 4 (catalog).

**Distribution:** Brazil. Ceará (Crato); Bahia (Elísio Medrado). **New record.**

**Material examined:** 2 females (MZFS). Brazil. Bahia. Serra da Jibóia. Elísio Medrado. Reserva Gamba. 39°27'51"S, 12°55'32"W, Malaise trap. IX.2017. Leg. Calor, A. & Gamba group. 6 males, same data as the females, except: III.2017.

## DISCUSSION

The species here described raise to 102 the number of species in the genus and raise to 34 the species recorded in Brazil (33% of the total) (Table 1).

Silva-Neto et al. (2015) recognized two species groups in *Triplocania*, as follows:

- **MPB group:** characterized by having forewing venation caeciliusid, that is, with  $R_s$  of two branches, and M with only three primary branches, and without secondary branches.
- **MSB group:** characterized by having forewing M with three primary and secondary branches, this group is here referred as MSB group and it is divided in two subgroups:
  - **Subgroup MSB1:** characterized by having more than one M vein with secondary branches, the

branches originating closer to the wing margin than to the main M.

- **Subgroup MSB2:** characterized by having only one secondary branch, in  $M_3$ , resulting in  $M_{3a}$  and  $M_{3b}$ , and with branches originating closer to the main M than to the wing margin.

In a monograph on Colombian *Triplocania*, González et al. (2017), recognized two species groups in the genus, but the authors forgot that there was already a classification previously made by Silva-Neto et al., 2015, abovementioned.

Later Silva-Neto & García Aldrete (2019) created the subgroup *magnifica* within the group MPB, characterized by having forewing with a U-shaped band from the areola postica's apex to the basal and distal pterostigma part. Forewing M deeply concave before its first bifurcation, areola postica low, very wide, side struts proximally expanded forming a shield; v1 stout, wider in the middle.

Here we propose a modification of the subgroups' classification present in the MSB and MPB groups proposed by Silva-Neto et al. (2015). In addition, we also propose some 'Sub subgroups' to homogenize the *Triplocania* internal classification, as follows:

- **MSB group** (Equivalent to the group II of González et al. (2017): characterized by having forewing M with three primary and secondary branches, this group is divided in two subgroups:
  - **Subgroup MSB1:** characterized by having more than one M vein with secondary branches or more than two secondary branches in  $M_3$ . **Species included:** *T. palaciosi* García Aldrete & Casasola González and *T. otunquimbayaensis* Gonzalez, Carrejo & García Aldrete.
  - **Subgroup MSB2:** characterized by having only one secondary branch, in  $M_3$ , resulting in  $M_{3a}$  and  $M_{3b}$ . **Species included:** *T. calcarata* New, 1980, *T. newi* Silva-Neto, Rafael & García Aldrete, *T. furcata* New, *T. furcatoides* Gonzalez, Carrejo & García Aldrete, *T. huilaensis* Gonzalez, Carrejo & García Aldrete, *T. lamensuraensis* Gonzalez, Carrejo & García Aldrete, *T. leguizamoensis* Gonzalez, Carrejo & García Aldrete, *T. mariateresae* Silva-Neto, Rafael & García Aldrete, *T. plaumanni* Silva-Neto, Rafael & García Aldrete, *T. lamasii* Silva-Neto, Rafael & García Aldrete, *T. lamasoides* Silva-Neto, Rafael & García Aldrete, *T. pains* Silva-Neto, García Aldrete, Rafael & Ferreira, *T. sarriae* Gonzalez, Carrejo & García Aldrete. Among these 13 Subgroup MSB2 species, two species are known only to females (*T. huilaensis* and *T. sarriae*).

From the Subgroup MSB2 species with known males, the following three Sub subgroups are observed:

- **Sub subgroup MSB2A:** characterized by having hypandrium of one sclerite (Equivalent to the Subgroup II1 of González et al. (2017)): **Species included:** *T. newi* and *T. lamensuraensis*.

- **Sub subgroup MSB2B:** characterized by having hypandrium of three sclerites (Equivalent to the Subgroup II3 of González *et al.* (2017)): **Species included:** *T. calcarata*, *T. furcata*, *T. furcatoides*, *T. maria-teresa*, *T. pains* and *T. plaumanni*.
- **Sub subgroup MSB2C** (Equivalent to the Subgroup II4 of González *et al.* (2017)): characterized by having hypandrium of four sclerites. **Species included:** *T. lamasi*, *T. lamasoides* and *T. leguizamoensis*.
- **MPB group** (Equivalent to the group I of González *et al.* (2017)): characterized by having forewing with M with only three primary branches, and without secondary branches.

MPB group includes 79 species, 23 species these species are known only to females. Here we propose two new subgroups only for the species with known males, except for *Triplocania marginipicta* Roesler and *Triplocania chulumanensis* (Williner), the types of which are lost, the original publications have poor descriptions or do not have illustrations and we did not get additional specimens. In the future with the unknown males' description, the species only with known females could be included in their respective subgroups whose diagnoses are based on male genital characteristics:

- **Subgroup MPB1** (Equivalent to the subgroup IA. of González *et al.* (2017)): characterized by having hypandrium of one sclerite and side struts not expanded forming a shield. **Species included:** *T. awa* González, Carrejo & García Aldrete, *T. bravo* Silva-Neto, Rafael & García Aldrete, *T. caudata* New, *T. caudatoides* García Aldrete, *T. cervantesi* García Aldrete, *T. ferratilis* Silva-Neto, García Aldrete, Rafael & Ferreira, *T. halffterorum* García Aldrete, *T. immaculata* New, *T. chocoensis* Gonzalez, Carrejo & García Aldrete, *T. garciamarquezii* Gonzalez, Carrejo & García Aldrete, *T. huitota* Gonzalez, Carrejo & García Aldrete, *T. lithophila* Gonzalez, Carrejo & García Aldrete, *T. lucida* Roesler.
- **Subgroup MPB2** (Equivalent to the subgroup IB. of González *et al.* (2017)): characterized by having hypandrium of three sclerites and side struts not expanded forming a shield. **Species included:** *Triplocania alfonsoi* Silva-Neto, Moreira de Castro & Rafael, *T. amacayacuensis* González, Carrejo & García Aldrete, *T. anchicayaensis* González, Carrejo & García Aldrete, *T. andaqui* González, Carrejo & García Aldrete, *T. arhuaca* González, Carrejo & García Aldrete, *T. asisensis* González, Carrejo & García Aldrete, *T. bicornuta* González, Carrejo & García Aldrete, *T. bifida* García Aldrete, *T. brailovskyana* García Aldrete, *T. brancoi* Silva-Neto, García Aldrete, Rafael & Ferreira, *T. bubuae* González, Carrejo & García Aldrete, *T. calima* González, Carrejo & García Aldrete, *T. calori* Silva-Neto, García Aldrete & Rafael, *T. camentsa* González, Carrejo & García Aldrete, *T. cantatis* González, Carrejo & García Aldrete, *T. capixaba* Silva-Neto, García Aldrete & Rafael, *T. dimitrii* González, Carrejo & García Aldrete, *T. ecuatoriana* Silva-Neto, García Aldrete &

Rafael, *T. embera* González, Carrejo & García Aldrete, *T. erwini* Silva-Neto, Rafael & García Aldrete, *T. fapeam* Silva-Neto, García Aldrete & Rafael, *T. felidiaensis* González, Carrejo & García Aldrete, *T. humboldtiana* González, Carrejo & García Aldrete, *T. immaculata* New, *T. inpa* Silva-Neto, García Aldrete & Rafael, *T. kichwa* González, Carrejo & García Aldrete, *T. maesi* García Aldrete, *T. manauara* Silva-Neto, García Aldrete & Rafael, *T. mariacarmenae* González, Carrejo & García Aldrete, *T. mariaelinae* Silva-Neto, García Aldrete & Rafael, *T. mocoensis* González, Carrejo & García Aldrete, *T. panchei* González, Carrejo & García Aldrete, *T. paranaensis* Silva-Neto, García Aldrete & Rafael, *T. pericosensis* González, Carrejo & García Aldrete, *T. pumas* Silva-Neto, Castro & Rafael, *T. robusta* García Aldrete, *T. robustoides* González, Carrejo & García Aldrete, *T. rondoniensis* García Aldrete, *T. rugosa* González, Carrejo & García Aldrete, *T. saslayensis* García Aldrete, *T. spinosa* Mockford, *T. tambopatensis* García Aldrete, *T. triangularis* Silva-Neto, García Aldrete & Rafael, *T. trifida* Silva-Neto, García Aldrete & Rafael, *T. umbrata* New, *T. umbrataoides* Silva-Neto, García Aldrete & Rafael, *T. vazquezae* García Aldrete, *T. yanacona* González, Carrejo & García Aldrete, and *T. zaire* Silva-Neto, García Aldrete, Rafael & Ferreira.

- **Subgroup MPB3** (Equivalent to the *Magnifica* subgroup of Silva-Neto & García Aldrete (2019): characterized here by having hypandrium of three or five sclerites and side struts expanded forming a shield. **Species included:** *T. magnifica* Silva-Neto, García Aldrete & Rafael, *T. manueli* Silva-Neto, García Aldrete & Rafael and *T. rosae* Silva-Neto, García Aldrete & Rafael.

*Triplocania annyae* **sp. nov.**, *T. lauziae* **sp. nov.**, and *T. miltoni* **sp. nov.** belonging to the MPB group and MPB1 subgroup abovementioned, but differs from all other species included in MPB1 subgroup by having hypandrium and phallosome structures different from all other MPB1 subgroup's known species, as added in their respective diagnoses.

*Triplocania diamantina* **sp. nov.** belonging to the MPB group and MPB2 subgroup, and in this subgroup only twenty three species having endophalic mesal sclerite (*T. anchicayaensis* Gonzalez, Carrejo & García Aldrete, *T. andaqui* Gonzalez, Carrejo & García Aldrete, *T. arhuaca* Gonzalez, Carrejo & García Aldrete, *T. bicornuta* Gonzalez, Carrejo & García Aldrete, *T. bubuae* Gonzalez, Carrejo & García Aldrete, *T. calima* Gonzalez, Carrejo & García Aldrete, *T. camentsa* Gonzalez, Carrejo & García Aldrete, *T. cantatis* Gonzalez, Carrejo & García Aldrete, *T. chocoensis* Gonzalez, Carrejo & García Aldrete, *T. dimitrii* Gonzalez, Carrejo & García Aldrete, *T. dimitrii* Gonzalez, Carrejo & García Aldrete, *T. embera* Gonzalez, Carrejo & García Aldrete, *T. humboldtiana* Gonzalez, Carrejo & García Aldrete, *T. mariacarmenae* Gonzalez, Carrejo & García Aldrete, *T. mocoensis* Gonzalez, Carrejo & García Aldrete, *T. panchei* Gonzalez, Carrejo & García Aldrete, *T. pericosensis* Gonzalez, Carrejo & García Aldrete, *T. pumas* Silva-Neto, Castro & Rafael, *T. robustoides* Gonzalez,



Carrejo & García Aldrete, *T. rugosa* Gonzalez, Carrejo & García Aldrete, *T. trifida* Silva-Neto, Rafael & García Aldrete, and *T. yanacona* Gonzalez, Carrejo & García Aldrete. *Triplocania diamantina* **sp. nov.** differs from all other abovementioned species, by having the unique shape of central piece of the hypandrium, in particular by the shape and details of its posterior projections and by having only a pair of endophallic sclerite and in other details described in its diagnosis.

The recognition of species groups and subgroups is an important step to facilitate their identification and to understand relationships among these taxa, especially in taxons with many species, as in *Triplocania*. Future phylogenetic studies, using morphological and molecular data will be necessary to test the monophyly of these groups and subgroups and to understand the *Triplocania* evolution. However as mentioned by Yoshizawa (2002) and reminded by Silva-Neto *et al.* (2016b), the highly modified male genital structures present in the genera Ptiloneuridae could be generating significant synapomorphies for them, but unfortunately, they are extremely variable within the family and thus, it is difficult to decide on their homologies. This fact, along with the loss of the thorax or its destruction in part during the specimens' dissection, weakens phylogenetic analyzes in Ptiloneuridae using only morphological characteristics. Based on the abovementioned facts, species groups and subgroups in *Triplocania* are important in facilitating this genus' taxonomy, even without the support of a current phylogenetic analysis for the time being.

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#### AUTHORS' CONTRIBUTIONS

A.M.S.N., D.M.L. and A.N.G.A. identified the species. A.M.S.N. and D.M.L. prepared the figures. A.M.S.N., D.M.L., A.N.G.A and F.B. wrote and revised the manuscript.

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