

# A new species of *Marganana* (*Declivana*) (Hemiptera: Cicadellidae: Gyponini), the first record of the genus from Brazil

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**Abstract.** *Marganana* DeLong, 1948 currently includes three species known to occur in the United States, Mexico and Guyana. In this paper, we describe a new species from Brazil – *Marganana* (*Declivana*) *tetramaculata* sp. nov. – which represents the first record of this genus for the country. A revised diagnosis of the subgenus *Declivana* is provided, along with detailed descriptions and illustrations of males and females of the new species. A key to the four species of *Marganana* is also provided.

**Keywords.** Auchenorrhyncha; lassinae; Neotropical region; Taxonomy.

## INTRODUCTION

The New World tribe Gyponini Stål, 1870 is the largest of the 12 tribes of lassinae Walker, 1870, currently comprising 1,448 described species classified into 75 genera. To date, 347 species and 42 genera are known to occur in Brazil (Domahovski & Cavichioli, 2021, 2022; Domahovski, 2021; Gonçalves *et al.*, 2021, Laranjeira *et al.*, 2022, Silva *et al.*, 2022 Takiya *et al.*, 2022). These leafhoppers can be collected by sweeping shrubs, trees, grasses or herbaceous vegetation in the understory. However, light and Malaise traps are the most effective methods for sampling this group (Domahovski & Cavichioli, 2018). The tribe appears to be much more diverse than currently known, as 11 genera and 71 new species have been discovered in the last six years (*e.g.*, Domahovski & Cavichioli, 2017, 2019, 2020; Domahovski *et al.*, 2019, 2020; Freytag, 2018, 2022; Gonçalves *et al.*, 2017). Based on the large number of undescribed species deposited in Brazilian collections, it is estimated that Gyponini likely includes over 2,000 species (Gonçalves *et al.*, 2021). Despite its substantial diversity, their life history, ecology, behavior, host plants and natural enemies remain poorly known. Although these records are scarce, known parasites of gyponines include species in Pipunculidae, Strepsiptera, and Dryinidae (Martins *et al.*, 2020).

The genus *Marganana* was erected by DeLong (1942) under the name *Margana* to accommodate

the type species, *Ponana marginifrons* var. *suilla* Ball, 1935, from Arizona, United States. Because the generic name had been used by Walker (1865) in Lepidoptera, DeLong (1948) proposed *Marganana* as a new name for this leafhopper group. DeLong & Freytag (1963) later described a new subgenus, *Declivana*, and two new species: *M. (Marganana) mexicana* (from Mexico) and *M. (Declivana) equata* (from Guyana). Gonçalves *et al.* (2021) synonymized the monotypic genus *Freytagana* DeLong, 1975 with *Marganana* and *Freytagana gibsoni* DeLong, 1975 with *M. (Marganana) mexicana*. According to DeLong & Freytag (1963), *Marganana* can be recognized by the following features: head nearly as broad as pronotum; anterior margin of crown thick and carinate; face short and broad; crown sloping forward with surface transversely striated; ocelli closer to the median line than to eye margin; pronotum broad and transversely striate; forewing with venation not reticulate (except in *M. mexicana*, reticulate), with veins clearly visible; appendix developed; row AD of metatibia lacking small setae between macrosetae; aedeagus without apodemal processes, and gonopore apical.

In this paper, we describe the second species of *Marganana* (*Declivana*) based on representatives collected in the Brazilian states of Amazonas, Pará, Mato Grosso and Maranhão. This new species constitutes the first record of the genus *Marganana* for the country, which now includes records for

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44 genera in the tribe Gyponini (Takiya *et al.*, 2022). A revised diagnosis is provided for the subgenus *Declivana*, in addition to a key for the males of *Marganana*.

## MATERIAL AND METHODS

Examined specimens are deposited in the following Brazilian collections: *Coleção Entomológica Pe. Jesus Santiago Moure*, Universidade Federal do Paraná, Curitiba, Paraná (DZUP), *Coleção Zoológica do Maranhão*, Universidade Estadual do Maranhão, Caxias, Maranhão (CZMA), Instituto Nacional de Pesquisa da Amazônia, Manaus, Amazonas (INPA), Museu Paraense Emílio Goeldi, Belém, Pará (MPEG), and *Coleção Zoológica Didático-Científica Dr. Joachim Adis*, Belém, Pará (CZJA).

The terminology used in the descriptions mainly follows Young (1968, 1977), except for features of the head (Hamilton, 1981; Mejdalani, 1998), wings (Dietrich, 2005), and legs (Rakitov, 1997). Techniques used for the dissection of male genitalia follow Oman (1949), with a few modifications proposed by Cavichioli & Takiya (2012). The term gonoplac is used according to Mejdalani (1998). Digital habitus images were obtained with a Leica MZ12.5 stereomicroscope with attached digital cam SCMOS 14000KPA. Photos were stacked using the CombineZ5 software. Illustrations of the male genitalia were drawn with Adobe Illustrator CS6 software. The gonoplac and first and second valvulae were separated and mounted on a temporary slide, immersed in glycerin and stabilized with a cover slip. Digital images were taken with a Nikon optical microscope attached to a digital camera (SCMOS 05100KPB).

Verbatim label data are transcribed between quotation marks, with a backslash (\) indicating line breaks. Abbreviations used in the descriptions are as follows: AD = anterodorsal; AV = anteroventral; PD = posterodorsal; PV = posteroventral; IC = Intercalary.

## RESULTS

### Taxonomy

#### *Marganana (Declivana) DeLong & Freytag, 1963*

**Type species:** *Marganana (Declivana) equata* DeLong & Freytag, 1963: 262.

**Diagnosis:** (1) Pronotum and crown strongly sloping anterad; (2) pronotum, in dorsal view, more than 3× as long as crown length; (3) pygofer with apical process; (4) \*subgenital plate with inner margin not excavated; (5) style whit blade long; (6) aedeagal shaft long and slender; (7) \*aedeagus with pair of processes arising at apex or slightly sub apically.

**Remarks:** This revised diagnosis is based on the original description of DeLong & Freytag (1963) and excludes the following features: (1) "anterior margin of crown thick",

which is observed in all species of the genus; (2) "pygofer short and robust" which is slightly longer in *M. tetramaculata* **sp. nov.** compared to *M. equata* but does not differ in length from the other congeners; (3) "pygofer with apical process spine-like" which in *M. tetramaculata* **sp. nov.** is rounded apically and serrated ventrally; (4) "subgenital plate elongate and flattened" which does not differ from the other species; and (5) "aedeagus with a pair of very short terminal processes" which in *M. tetramaculata* **sp. nov.** are long. Features marked with an asterisk (\*) are new inclusions to the genus diagnosis. It is important to emphasize that the feature "pronotum more than 3× as long as crown length", as characterized by DeLong & Freytag (1963), needs to be observed in dorsal view. The median length of the crown is about 2.5× as long as the median length of pronotum in both species, if measured in lateral view.

### List of species of *Marganana*

- M. (Marganana) mexicana* DeLong & Freytag, 1963: 260. Mexico.  
*M. (Marganana) suilla* (Ball, 1935): 503. (*Ponana*). USA and Mexico.  
*M. (Declivana) equata* DeLong & Freytag, 1963: 262. British Guiana.  
*M. (Declivana) tetramaculata* **sp. nov.** Brazil.

#### *Marganana (Declivana) tetramaculata* **sp. nov.**

##### Figs. 1-24

**Diagnosis:** Pronotum (Fig. 1) with four round black spots; apex of pygofer (Fig. 7) bearing rounded process with ventral margin serrated; style (Fig. 12) with ventral margin of blade serrated and produced subapically; aedeagus (Fig. 14) with pair of long filiform subapical processes, approximately half the length of shaft.

**Measurements (mm):** Total length: Holotype male: 8.8. Paratype males (n = 9): 7.9-9.1. Paratype female (n = 3): 8.9-9.8.

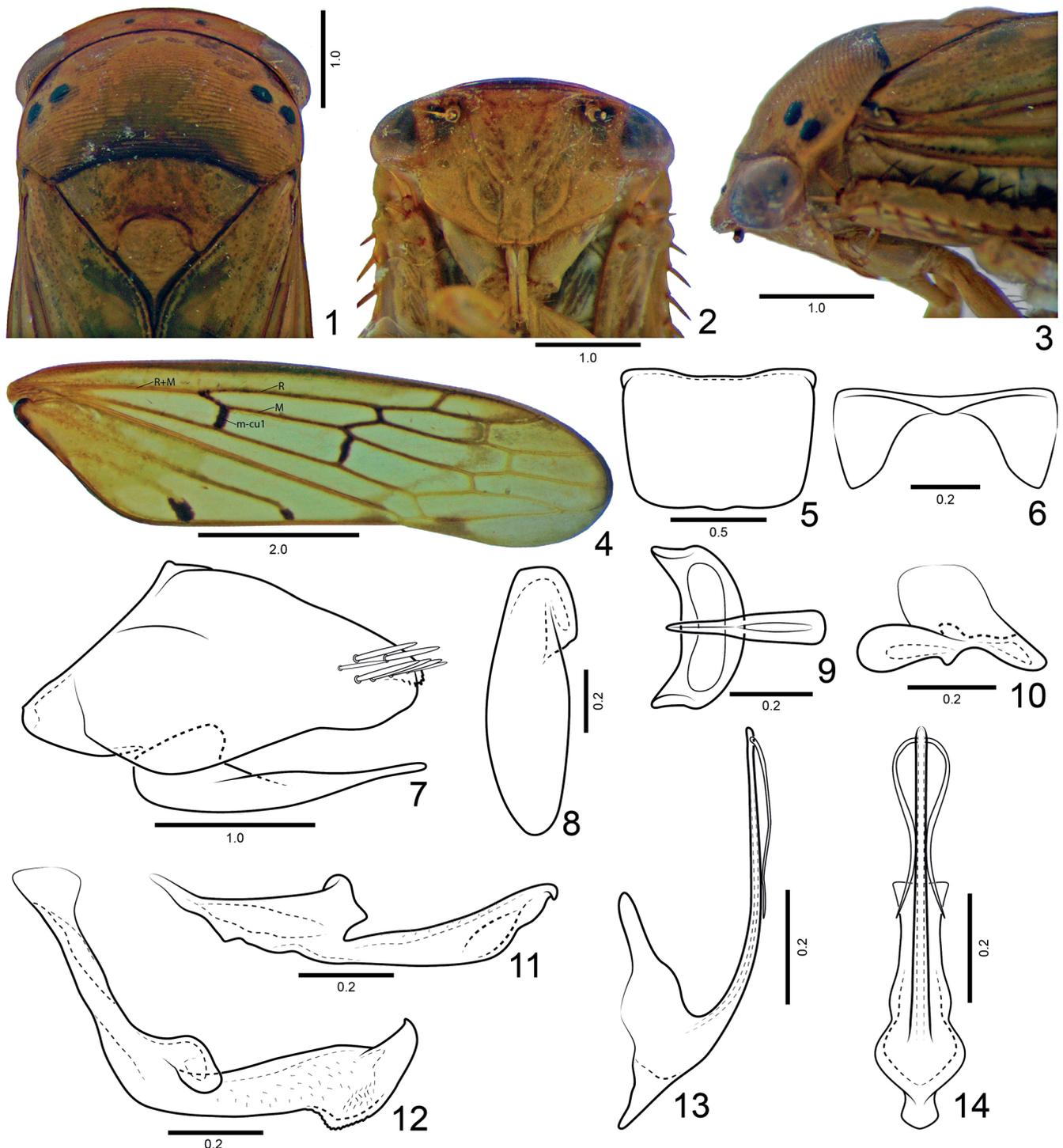
### Description

**Coloration:** Head and thorax (Figs. 1, 23) yellowish-brown. Crown (Fig. 1) without maculae, black striae on anterior margin. Ocellus black. Pronotum (Fig. 1) with four black spots, one pair behind each eye, near anterior margin; posterior margin black. Proepimeron (Fig. 3) without maculae. Face (Fig. 2) yellow; black maculae between base of antenna and eye margin. Forewing (Figs. 4, 23) translucent yellow; black markings on base of clavus, apex of anal veins and crossveins of discal cells; apex of clavus and base of appendix smoky hyaline. Legs (Fig. 24) entirely yellow, metatibia AD row with few black macrosetae.

**Head:** In dorsal view (Figs. 1, 23), not produced; median length approximately 1/3 of interocular width; transocu-

lar width slightly wider than maximum pronotum width; crown with parallel transverse striae; anterior and posterior margins nearly parallel; anterior margin not produced over margin of eye. Ocellus small, distinctly closer to median line than to eye margin and equidistant to anterior and posterior margins of crown. In ventral view (Fig. 2), face almost 2× as wide as long; distance between frontogenal suture and eye margin equivalent to 1.5× clypeus width, suture extending toward antennal ledge but not reaching

anterior margin of crown; antennal ledge carinate, almost parallel to anterior margin; frons small and triangular, approximately as long as wide, surface with texture shagreen, not excavated below anterior margin of crown; epistomal suture indistinct; maxillary plate projected ventrally, extended as far as clypeus apex; gena wide with short pubescence, ventrolateral margin rounded and weakly excavated below eye margin; clypeus 1.7× longer than wide, lateral margins weakly divergent towards apex. In



**Figures 1-14.** *Marganana tetramaculata* sp. nov., holotype male. (1) head and thorax, dorsal view. (2) head, ventral view. (3) head and thorax, lateral view. (4) forewing. (5) sternite VIII, ventral view. (6) valve, ventral view. (7) pygofer, valve and subgenital plate, lateral view. (8) subgenital plate, ventral view. (9) connective, dorsal view. (10) connective, lateral view. (11) style, dorsal view. (12) style, lateral view. (13) aedeagus, lateral view. (14) aedeagus, posterior view. Scale bars: in mm.

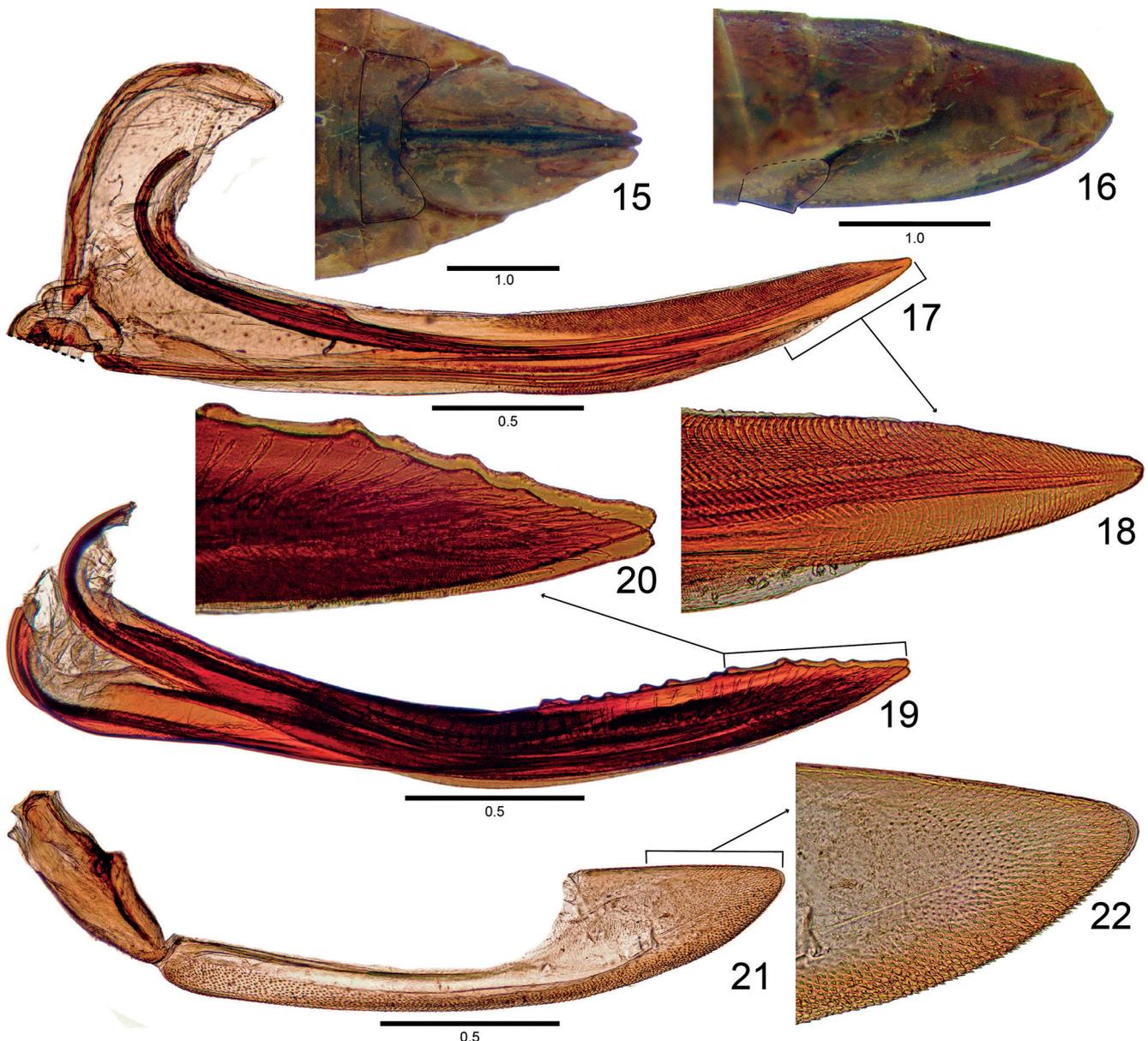
lateral view (Figs. 3, 24), crown-face transition thick, with 6-7 parallel striae; frons and clypeus not inflated.

**Thorax:** Pronotum, in dorsal view (Fig. 1, 23), with transverse striae except near anterior margin, lateral margins shorter than eye length, almost parallel, anterior margin broadly rounded, posterior margin slightly excavated; in lateral view (Figs. 3, 24), strongly declivous and convex, continuous with head declivity. Exposed portion of mesonotum (Figs. 1, 23) approximately as long as wide. Scutellum inflated in lateral view (Fig. 3).

**Wings:** Forewing (Fig. 4) narrow, 4× longer than wide; venation distinct, extra numerary veins absent; section of vein M between R+M fork and crossvein *m-cu*<sub>1</sub> as long as the length of *m-cu*<sub>1</sub>; 3 subapical cells and 5 apical cells (R1 vein present); appendix well developed, wider than

maximum width of first apical cell and bordering first and second apical cells; apex rounded.

**Legs:** Profemur 3× longer than wide; AD, AM, and PD rows reduced and poorly defined, except for apical setae AD<sub>1</sub>, AM<sub>1</sub> and PD<sub>1</sub> respectively; AV and PV rows formed by 5-6 setae; IC row formed by slightly arched comb of fine setae, beginning at distal third of femur and extending to AM<sub>1</sub>. Protibia, in cross-section, more or less cylindrical, with longitudinal carina adjacent to PD row; AV row with setae of basal half short and thin, apical half with 4 long and thick setae; AD row formed by several small, undifferentiated setae; PD row with 3 long setae and undifferentiated setae; dorsal surface with apical setae AD<sub>1</sub> and PD<sub>1</sub> developed; PV row with undifferentiated setae and 4 long setae on apical half. Metafemur with setal formula 2:2:1. Metatibia rows PD, AD, and AV with 21-22, 12, and



**Figures 15-22.** *Marganana tetramaculata* sp. nov., paratype female. (15) distal portion of abdomen, ventral view. (16) distal portion of abdomen, lateral view. (17) first valvifer and first valvula, lateral view. (18) apical portion of first valvula. (19) second valvula, lateral view. (20) apical portion of second valvula. (21) second valvifer and gonoplac, lateral view. (22) apical portion of gonoplac. Scale bars: in mm.



**Figures 23-24.** Habitus of holotype. (23) dorsal view. (24) lateral view. Scale bars: in mm.

10-11 macrosetae respectively; AD row without intercalary setae between macrosetae; PV row with setae of apical half formed by sequence of 1 thicker and 4-5 thinner setae, ending with 2 small and thin setae after the last long and thick seta. Metatarsomere I inner row of plantar surface with 5-6 very small non-cucullate setae; outer row absent; apex with 4 patellae flanked by tapered lateral seta. Metatarsomere II pecten with 2 platellae flanked by 2 tapered lateral setae on inner and 1 on external corner.

**Male terminalia:** Sternite VIII (Fig. 5) 1.4× wider than long; lateral margins weakly convergent posterad; posterior margin almost straight, with small round projection medially. Valve (Fig. 6) 2.2× wider than long; posterior margin deeply and broadly excavated. Pygofer (Fig. 7) 1.7× longer than maximum height; dorsal margin oblique and almost straight; anteroventral margin broadly rounded; apex tapered and rounded with few macrosetae, inner surface bearing rounded process with ventral margin serrated. Subgenital plate, in lateral view (Fig. 7), with apex not surpassing pygofer apex; in ventral view (Fig. 8), 3.3× longer than wide, without microsetae; lateral margins rounded; apex weakly tapered and rounded. Connective

(Figs. 9, 10) T-shaped, about as wide as long; dorsal keel strongly developed; stalk long and narrow, as long as arm length. Style, in dorsal view (Fig. 11), with outer lobe well developed and truncated; blade widened subapically; in lateral view (Fig. 12), with apodeme slender; blade approximately straight; ventral margin produced subapically and serrated; apex slightly curved dorsally and subacute. Aedeagus (Figs. 13, 14) preatrium weakly developed; dorsal apodeme developed and produced dorsally, dorsal margin straight, lateral margins not produced laterally; shaft long and thin, directed posterodorsally at base; apex with pair of long filiform subapical processes with half length of shaft, directed ventrally.

**Female terminalia:** Sternite VII (Figs. 15, 16) 2.6× wider than long; posterolateral angles rounded, posterior margin with median third deeply excavated. Pygofer (Figs. 15, 16) about 2× longer than maximum height; posterodorsal margin straight; ventral margin weakly rounded; few macrosetae dispersed on dorsoapical fourth and ventroapical half; apex obliquely truncated. Internal sternite VIII membranous. First valvifer (Fig. 17) triangular, 2.5× longer than wide, anterior and dorsal

margins rounded, posterior margin straight. First valvula (Fig. 17) slightly curved dorsally, slender, not broadened medially, 9× longer than wide, fused each other by sclerotized expansion of basal portion; ventral interlocking device long, extending over basal  $\frac{3}{4}$ ; dorsal sculptured area strigate; apical portion (Fig. 18) tapered and subacute. Second valvula (Fig. 19), 10× longer than wide, not broadened medially; dorsal protuberance absent; dorsal margin with about 10-12 rounded teeth on apical half of blade; apical portion (Fig. 20) gradually tapered to subacute apex; ventral margin without denticles. Second valvifer (Fig. 21) 2.8× longer than wide. Gonoploc (Fig. 21), 5× longer than wide; dorsoapical margin straight, with  $\frac{1}{3}$  length of gonoploc; ventral margin and apical portion (Figs. 21, 22) with dentiform cuticular projections and scattered short setae; apex tapered and rounded.

**Etymology:** The species epithet, *tetramaculata*, refers to the four black spots on the pronotum.

#### Material examined

**Holotype male:** "Brasil, MT, Nova Uiratã, E.S.E.C. Rio Ronuro, 13.1122°S 54.4436°W, 330m, light trap, 11-16.vi.2017, RR Cavichioli & AC Domahovski" (DZUP).

**Paratypes:** MATO GROSSO: 1♂, same data of holotype (DZUP); 1♂, "Brasil, Mato Grosso \ Sinop \ X.1975 \ M. Alvarenga" (DZUP); MARANHÃO: 1♂, "Brasil, MA, Caxias \

Res. Ecol. Inhamum \ Lençol e luz mista \ 01-03.ix.2005 F. Limeira \ -de-Oliveira col." (CZMA); 1♂, "Brasil (MA), Carolina \ PARNA Chapada das Mesas, \ Riacho Corrente, 288m \ 07°04'24.2S / 47°05'25.2"W", "Armadilha de Malaise \ 10-20.vi.2014, J. A. Rafael, \ F. Limeira-de-Oliveira, T. L. Rocha & G. A. Reis, cols." (CZMA); 1♂, "Brasil (MA), Carolina \ PARNA Chapada das Mesas, \ Riacho Cancela, 225m \ 07°06'42.2S \ 47°17'56.8"W", "Armadilha de Malaise \ 20-31.viii.2013; J.A. Rafael \ F.Limeira-de-Oliveira & T.T.A. Silva, cols." (CZMA); 1♀, "Brasil (MA), Bom Jardim \ REBIO-Res. Biol Gurupi \ Armad. Luminosa", "02-11.ix.2010, F. Limeira \ ra-de-Oliveira J.C. Silva \ J.A. Silva & M.M. Abreu" (CZMA). AMAZONAS: 1♂, "Petrobras, RUC 31, rio \ Urucu, Coari, AM, Brasil \ 1.xi.2008 \ Fernandes, J.A.M.", "RCU 31 - Mata \ S04°50'16.3" \ W065°16'57.8" \ Armadilha luminosa Luz mista \ vapor Hg e Luz negra" (INPA). PARÁ: 1♂, "Brasil, Pará \ Melgaço ECFPn \ 30-IX a 09-X-97 \ M. Zanuto col.", "MPEG 05029286" (MPEG); 1♂, 2♀, "Brasil, Pará \ Melgaço \ Flona Caxiuanã \ 14.V.2011 Arm. Luminosa \ A.L. Nunes e equipe", "Acampamento \ Lat: 01°57'36.82"S \ Long: 51°36'47.61"W", "CZDC UEPA \ 00003697, 00003714 and 00003715" (CZJA); 1♂, "Brasil, Pará, Paragominas \ Parque Ambiental \ 14.V.2011 R. varredura \ C.E. Braga", "CZDC UEPA \ 00003297" (CZJA).

**Remarks:** The new species can be easily differentiated from *M. equata* by the diagnostics characters cited above, especially the style strongly expanded subapically (Fig. 12) and the aedeagus with long apical processes (Fig. 14).

#### Key to species of *Marganana* (males only)

1. Pronotum and crown (DeLong & Freytag, 1963: 259, fig. 2) moderately sloping anterad. Pygofer (DeLong & Freytag, 1963: 261, fig. 17) without apical process. Subgenital plate (DeLong & Freytag, 1963: 261, fig. 16) with inner margin excavated. Style (DeLong & Freytag, 1963: 261, fig. 15) whit blade short. Aedeagus (DeLong & Freytag, 1963: 261, figs. 12, 13) with shaft moderately long and widened subapically, bearing pair of subapical processes arising far from apex. Distribution: North and Central America (Subgenus *Marganana*) ..... 2
- Pronotum and crown (Fig. 3) strongly sloping anterad. Pygofer (Fig. 7) with apical process. Subgenital plate (Fig. 8) with inner margin not excavated. Style (Fig. 12) whit blade long. Aedeagus (Figs. 13, 14) with shaft long and slender, with pair of processes arising at apex or slightly subapically. Distribution: South America (Subgenus *Declivana*) ..... 3
2. Forewing (DeLong & Freytag, 1963: 259, fig. 1) with venation not reticulated. Subgenital plate (DeLong & Freytag, 1963: 261, fig. 16) inner margin excavated near mid-length, apex slightly tapered. Style, in lateral view (DeLong & Freytag, 1963: 261, fig. 14), very short, dorsal margin straight... *M. suilla* (Ball, 1935)
- Forewing (Gonçalves *et al.*, 2021: 88, fig. 7A, B) with venation reticulated. Subgenital plate (DeLong & Freytag, 1963: 261, fig. 10) inner margin excavated subapically, apex not tapered, rounded. Style, in lateral view (DeLong & Freytag, 1963: 261, fig. 14), longer, dorsal margin excavated.... *M. mexicana* DeLong & Freytag, 1963
3. Pronotum (DeLong & Freytag, 1963: 259, fig. 5) with several small black maculae near anterior margin. Pygofer (DeLong & Freytag, 1963: 261, fig. 23) apex bearing spine-like process. Style (DeLong & Freytag, 1963: 261, fig. 20) with ventral margin of blade not produced subapically. Aedeagus (DeLong & Freytag, 1963: 261, figs. 18, 19) with pair short apical processes, about one-sixth length of shaft..... *M. equata* DeLong & Freytag, 1963
- Pronotum (Fig. 1) with four black spots. Pygofer (Fig. 7) apex bearing rounded process with ventral margin serrated. Style (Fig. 12) with ventral margin of blade produced subapically. Aedeagus (Figs. 13, 14) with pair of long filiform subapical processes with half-length of shaft..... *M. tetramaculata* sp. nov.

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