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Trautomutilla gemella (André, 1906), male, Brazil, Sao Paulo, EMUS. Photo: K. A. Williams.

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ABSTRACT

Traumatomutilla André, 1901 is a genus of Mutillidae Latreille, 1802 with 14 species-groups, of which the *T. gemella* group is one of the most poorly known. The hitherto unknown males of *Traumatomutilla diophthalma* (Klug, 1821), *T. chuza* Casal, 1969, and *T. gemella* André, 1906 are described and illustrated. The females of *T. andrei* (Cresson, 1902), *T. angustata* (André, 1906), *T. chuza* Casal, 1969, *T. diophthalma* (Klug, 1821), and *T. gemella* (André, 1906) are redescribed. A new species, *T. peismatara* Bartholomay & Cambra, n. sp. (female from Peru, male from Brazil) is described. Two host records (*Podium* sp. from Sphecidae Latreille, 1802 and *Trypoxylon* sp. from Crabronidae Latreille, 1802) are provided for *T. diophthalma* based on trap nest data. *Traumatomutilla rastra* Casal, 1969 is recognized as a new synonym of *T. angustata* (André, 1906).

KEY WORDS

Sphaerophthalminae,
Dasymutillini,
velvet ants,
Neotropics,
South America,
new species,
new synonymy,
new host records.

RÉSUMÉ

Révision du groupe d'espèces de *Traumatomutilla gemella* (Hymenoptera, Mutillidae) avec la description des mâles jusqu'alors inconnus.

Traumatomutilla André, 1901 est un genre de Mutillidae Latreille, 1802 avec 14 groupes d'espèces, dont le groupe *T. gemella* est l'un des plus mal connus. Les mâles jusqu'alors inconnus de *Traumatomutilla diophthalma* (Klug, 1821), *T. chuza* Casal, 1969 et *T. gemella* André, 1906 sont décrits et illustrés. Les femelles de *T. andrei* (Cresson, 1902), *T. angustata* (André, 1906), *T. chuza* Casal, 1969, *T. diophthalma* (Klug, 1821) et *T. gemella* (André, 1906) sont redécrites. Une nouvelle espèce, *T. peismatara* Bartholomay & Cambra, n. sp. (femelle du Pérou, mâle du Brésil) est décrite. Deux hôtes (*Podium* sp. appartenant aux Sphecidae Latreille, 1802 et *Trypoxylon* sp. appartenant aux Crabronidae Latreille, 1802) sont signalés pour *T. diophthalma* sur la base des données des nids pièges. *Traumatomutilla rastra* Casal, 1969 est reconnu comme un nouveau synonyme de *T. angustata* (André, 1906).

MOTS CLÉS

Sphaerophthalminae,
Dasymutillini,
fourmis de velours,
Néotropiques,
Amérique du Sud,
espèce nouvelle,
synonymie nouvelle,
signalisation d'hôtes.

INTRODUCTION

Velvet ants (Mutillidae Latreille, 1802) are solitary wasps whose larvae act as parasitoids of encapsulated immatures of other insects, especially other solitary Hymenoptera (Brothers 2006). Females of this family are always wingless while the males are usually fully winged, rarely brachypterous or apterous (Brothers 2006). This remarkable sexual dimorphism has resulted in many species being described based only on males or females and usually differentiated solely on color and setae characters (Gerstaecker 1874; Cresson 1902; Casal 1969). The reliability of such characters alone for differentiating species in *Traumatomutilla* André, 1901 was brought into question by research on the closely related *Dasymutilla* Ashmead, 1899, which demonstrated the existence of Müllerian mimicry complexes within these wasps (Williams *et al.* 2011a, 2012; Wilson *et al.* 2012, 2013). The influence of such mimicry complexes in the coloration of these wasps is such that several species, once thought to be distinct, have been found to belong to a single widespread and highly variable species (Williams *et al.* 2011a, 2012). Similar results have already been found in recent revisions of other *Traumatomutilla* species-groups (Bartholomay *et al.* 2019a, b). These revisions were facilitated by Williams *et al.* (2017), who organized the 135 species of *Traumatomutilla* based on females into 14 species-groups based on shared structural characters or shared combinations of structural characters. With only six known species, the *Traumatomutilla gemella* species-group is one of the smallest, rarest, and most morphologically distinct species-groups within *Traumatomutilla* (Williams *et al.* 2017). In this study we review and provide the first sex associations for the *T. gemella* species-group, as well as two novel host records for the genus.

MATERIAL AND METHODS

In the current work, we studied approximately 100 specimens, which belong to the institutions listed below.

General morphological terminology, definitions, abbreviations, and measurements followed that of Cambra *et al.* (2018) and Bartholomay *et al.* (2018, 2019a). Additionally, sculpture terminology follows Harris (1979).

Under the description and redescription sections, because of the highly variable nature of the coloration and setal patterns in *Traumatomutilla*, we provide a separate section titled “Coloration and variations”, in which we provide an overall description of the known color and setal patterns for a given species.

In the Material examined section, abbreviations, acronyms, and additional or corrected data by the authors are given in brackets. The total number of males and females examined is provided in brackets at the beginning of each Material examined section.

ABBREVIATIONS

Morphology

T1–6 (in females), T1–8 (in males): metasomal tergites 1 to 6 and 1 to 8;

S1–6 (in females), S1–8 (in males): metasomal sternites 1 to 6 and 1 to 8;

IOD interocellar distance (males only);

OOD ocellar-ocular distance (males only);

DLO diameter of lateral ocellus (males only).

Institutions

AMNH American Museum of Natural History, New York;
BMNH British Museum of Natural History, London;
CESC Coleção Entomológica da Universidade de Santa Cruz do Sul, Santa Cruz do Sul, Rio Grande do Sul;

CMNH Carnegie Museum of Natural History, Pittsburgh;
EMUS Department of Biology Insect Collection, Utah State University, Logan, Utah;

IAvH Instituto Alexander Von Humboldt, Villa de Leyva, Boyacá;

INPA Coleção de Invertebrados do Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas.

HNHM Hungarian Natural History Museum, Budapest;
MIUP Museo de Invertebrados G.B. Fairchild, Universidad de Panamá;

MNCN Museo Nacional de Ciencias Naturales, Madrid;

MNHN Muséum national d'Histoire naturelle, Paris;

MPEG Museu Paraense Emílio Goeldi, Belém, Pará;

MZUSP Museu de Zoologia da Universidade de São Paulo, São Paulo, São Paulo;

UFES Universidade Federal do Espírito Santo, Vitória, Espírito Santo;

UMMZ University of Michigan Museum of Zoology, Ann Arbor, Michigan;

ZMB Museum für Naturkunde Berlin, Berlin.

RESULTS

Ordre HYMENOPTERA Linnaeus, 1758

Family MUTILLIDAE Latreille, 1802

Genus *Traumatomutilla* André, 1901*Traumatomutilla gemella* species-group

DIAGNOSIS. — **Females.** Females of this species-group can be distinguished by a single autapomorphy: the pygidial plate with projected flange-like lateral carina restricted to apical fourth. The following combination of characters is unique to the *T. gemella* group females, though some characters may occur in other groups as well: body generally slender, elongate; head unarmed posterolaterally; clypeus shallowly but conspicuously bilobate on apical/ventral margin, longitudinally elevated medially; vertex and/or front frequently with medial longitudinal carina; pronotal collar with vestigial transverse rugosities anteriorly; anterior face of pronotum short, shorter than or as long as pronotal collar; lateral face of pronotum with subacute tubercle anteroventral in relation to pronotal spiracle; pronotal and propodeal spiracles almost flat against lateral margin of mesosoma; mesosoma almost straight laterally, at most slightly divergent anterad, not constricted anterior to propodeal spiracle; dorsal face of propodeum much longer than posterior face; scutellar scale and anterolateral carinae absent; scabrous intervals absent on scutellar area; and apex of middle and hind femora rounded.

Males (hitherto unknown). The males can be distinguished by a unique genitalic autapomorphy: the cuspis is at most $0.6 \times$ the length of the paramere, abruptly upcurved at midlength, with long twisted setae along the ventral surface of the apical half. The following combination of characters is unique to the *T. gemella* group males, though some characters may occur in other groups as well: integument black to reddish-black with contrasting black and silvery-white to silvery-golden setae patterns varying in density; head transversely subrectangular in dorsal view; parapsis and notaulus vestigial, restricted to posterior margin of mesoscutum; axilla pronounced as twisted oblique and acute projection; scutellum gibbose, without posterior transverse carina, frequently with weak medial longitudinal carina anteriorly; mesopleuron simply swollen on dorsal half, without any projections or tubercles; meso- and metafemora rounded apically; S2 without setae-filled pit; pygidial plate strongly concave apically, apical margin strongly deflected upward; hypopygium rectangular, longer than broad, latero-apical corners angulate and slightly projected.

INCLUDED TAXA. — *Traumatomutilla gemella* (André, 1906) ♀, ♂; *Traumatomutilla angustata* (André, 1906) ♀; *Traumatomutilla andrei* (Cresson, 1902) ♀; *Traumatomutilla chuzza* Casal, 1969 ♀, ♂; *Traumatomutilla diophthalma* (Klug, 1821) ♀, ♂; and *Traumatomutilla peismatara* Bartholomay & Cambra n. sp. ♀, ♂.

DISTRIBUTION. — Panama and South America (except Chile).

REMARKS

At first glance, females of the *T. gemella* species-group are similar to those of the *Dasymutilla paradoxa* (Gerstaecker, 1874) species-group, which was recently revised by Luz *et al.* (2016). They differ in the presence of flange-like projections apicolaterally on the pygidial plate, absent in the *D. paradoxa* species-group, and the sub-petiolate T1 shape which is globose, subcylindrical in the *D. paradoxa* species-group. Additionally, females of the *T. gemella* species-group have only one pair of integumental spots on T2 while those of the *D. paradoxa* species-group have two pairs. Males of the *T. gemella* species-group can be easily separated by their axil-

lae, which are produced posteriorly as short acute projections and the all black integument of T2; this contrasts with the axillar projections connected with the lateral margins of the mesoscutellum and T2 predominantly yellowish observed in males of the *D. paradoxa* species-group. Among the *Traumatomutilla* species-groups, there are no females that can be easily confused with those of the *T. gemella* species-group. There are males of the *T. indica* group that, as with the males of the *T. gemella* group, have the axillar projections acute and the mesopleuron unarmed. These, however, can be readily recognized by having a setae-filled pit on S2 and/or a relatively straight cuspis that lacks long sinuous setae.

Traumatomutilla andrei (Cresson, 1902)

(Fig. 1)

Mutilla andrei Cresson, 1902: 55.*Ephuta (Traumatomutilla) andrei* – André 1902: 54.*Traumatomutilla andrei* – André 1904: 40.

TYPE MATERIAL. — **Holotype.** Brazil • ♀; [Mato Grosso], Chapada [dos Guimarães]; CMNH (examined).

ADDITIONAL MATERIAL EXAMINED. — Brazil • 1 ♀; Maranhão, São Luis, Floresta Sacavem, CAEMA [Companhia de Água e Esgoto do Maranhão]; 30.IX.1992; R. Cambra & D. Quintero leg.; MIUP • 1 ♀; Bahia, Portello Machado [Machado Portela]; 19.VI.2015; USNM.

DIAGNOSIS. — **Female.** T2 marked with a pair of narrow longitudinal yellowish stripes abruptly curved outward posteriorly in dorsal view. **Male.** Unknown.

DISTRIBUTION. — Brazil (Bahia, Maranhão, Mato Grosso).

DESCRIPTION

*Female***Body length.** 12 mm.

Head (Fig. 1). Posterior margin almost straight. Occipital carina conspicuously swollen and smoothly curved dorso-laterally. Vertex width $0.9 \times$ pronotal width. Eye almost circular, its height in frontal view $1.1 \times$ distance from its ventral margin to mandibular condyle. Head densely and coarsely foveolate-punctate to areolate-punctate, intervals aligned so as to form a vestigial longitudinal carina medially starting at middle of front and extending into vertex. Mandible with conspicuous subapical tooth. Dorsal scrobal carina well-defined, separated from antennal tubercles; lateral scrobal carina virtually absent. Antennal tubercle finely and irregularly rugose. Flagellomere 1: $2.2 \times$ pedicel length; flagellomere 2: $2.0 \times$ pedicel length.

Mesosoma (Fig. 1). Dorsal thoracic length slightly shorter than mesosomal width. Mesosomal dorsum densely and coarsely areolate-punctate to foveolate-punctate, with conspicuous medial longitudinal carina extending from anterior margin of mesonotum to posterior margin of dorsal face of propodeum; carina less defined on propodeum, sinuous, irregular; integument adjacent to longitudinal carina on mesonotum

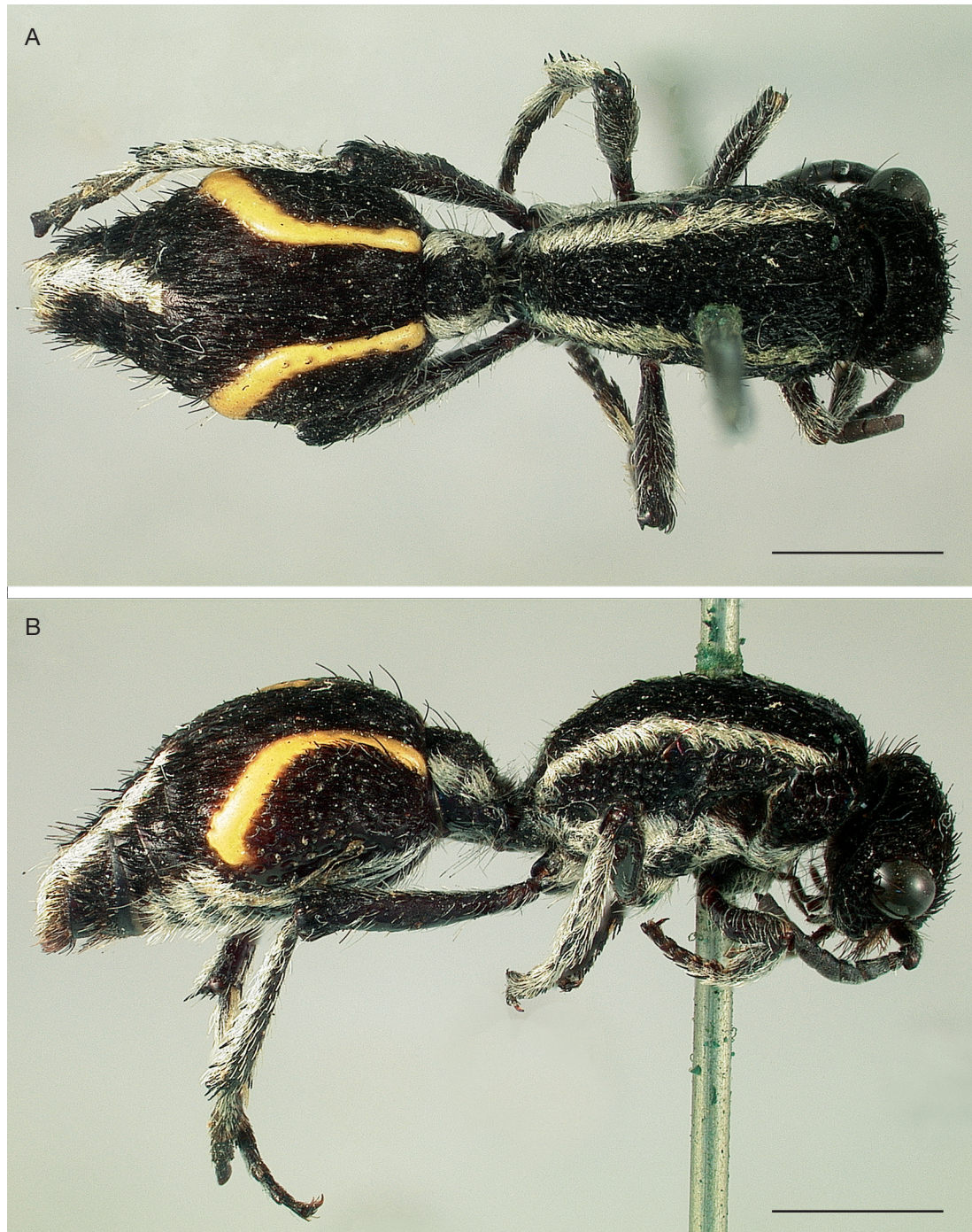


FIG. 1. — *Traumatotutilla andrei* (Cresson, 1902), female, holotype, Brazil, CMNH: **A**, dorsal habitus; **B**, lateral habitus. Scale bars: 2 mm. Photos: K. A. Williams.

devoid of areolations, simply densely punctate. Anterior face of pronotum defined, short, its height equal to pronotal collar length, vestigially and coarsely striated longitudinally with interspersed scattered punctures; dorsal face roundly angulate into anterior face in lateral view. Humeral carina well-defined, broadly separated from well-defined raised, subangulate epaulet, anterolateral corners of pronotum subangulate in dorsal view. Pronotal spiracle slightly projected from lateral margin of pronotum, rounded. Lateral face of pronotum

sparsely punctate with sparse interspersed micropunctures; mesopleuron sculpture mostly concealed by dense setation, micropunctate anteriorly and foveolate-punctate along mesopleural ridge where visible; metapleuron sculpture mostly concealed by dense setation, except dorsal third asetose, smooth, unsculptured. Lateral face of propodeum densely, coarsely and homogeneously areolate-punctate throughout. Ratios of widths of mesosoma at humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum

and propodeum immediately posterior to propodeal spiracles: 73:86:68:67:64. Lateral margin of mesonotum simply divergent anterior to propodeal spiracle, slightly diverging anterad. Propodeal spiracle almost flat against lateral margin of mesosoma; post-spiracular area absent. Scutellar scale and anterolateral carinae absent; scabrous intervals absent on scutellar area. Propodeum conspicuously elongate, dorsal face much longer than and well differentiated from posterior face.

Metasoma (Fig. 1). Ratios of width of T1, width of T2 and length of T2, 30:73:75. Disc of T2 densely and coarsely foveolate-punctate with dense interspersed micropunctures; foveolae sparser and micropunctures absent laterally and over integumental spots; foveolae less defined to virtually absent posteromedially. T3–5 sculpture predominantly concealed by dense setation, densely and coarsely foveolate-punctate to simply punctate with dense interspersed micropunctures where visible; T6, except pygidial plate, densely and coarsely foveolate-punctate. Pygidial plate broadly subpyriform, defined by strong, projected, flange-like lateral carinae at apical fourth of plate; surface mostly irregularly and confusedly rugose on apical half, interstices apparently granulose; basal half of pygidial plate simply granulose. S1 sparsely punctured, surface wedge-like, ending anteriorly in a rounded longitudinal carina, conspicuously higher anteriorly. S2 sparsely foveolate-punctate, foveolae sparser and smaller anterad and mediad; anteromedial crest-fold vestigial. S3–4 densely and coarsely foveolate-punctate with sparse micropunctures; S5–6 densely and coarsely foveolate-punctate.

Male

Unknown.

Coloration and variations

Female (Fig. 1). Integument black, except mandible and antennal flagellum reddish-brown ventrally, and T2 with a pair of longitudinal yellowish integumental stripes abruptly curved outward at posterior third. Body setae predominantly silvery-white varying in density except for the following areas with black setae varying in density: head (except ventral surface), mesosomal dorsum medially, dorsal half of lateral face of propodeum and mesopleuron, femora apicodorsally, T1 medially, disc of T2 (except integumental stripes), fringe of T2–4 sublaterally, fringe of T5–6 medially, fringe of S4, and S5–6.

Male. Unknown.

REMARKS

The unique coloration of this species is, presently, the most reliable means of distinguishing it from other species in the group. This pattern (Fig. 1), with longitudinal yellowish integumental stripes on T2, though rare, is not exclusive to *T. andrei*. It is also known in *T. rectilineata* (André, 1898) — *T. trochanterata* species-group — and *T. ipanema* (Cresson, 1902) — *T. inermis* species-group — which also occur in Chapada do Guimarães. Although there are no consistent

structural characters to separate *T. andrei* from its relatives in the *T. gemella* species-group, no variations or intermediate color forms have been recorded so far. The rarity of this species contrasts with its apparent wide distribution in Brazil, spanning from Mato Grosso in the Midwest, to Bahia in the East and Maranhão in the Northeast. No males of the *T. gemella* species-group have been recorded from the same localities as the three females examined, despite the fact that many of these areas are relatively well sampled in Brazil (PRB pers. obs.). This is further evidence for the rarity of this species-group.

Traumatomutilla angustata (André, 1906) (Figs 2–4)

Ephuta (*Traumatomutilla*) *angustata* André, 1906: 43.

Traumatomutilla angustata — Casal 1969: 286. — Nonveiller 1990: 75.

Traumatomutilla rastra Casal, 1969: 285, n. syn.

TYPE MATERIAL. — **Syntypes of *M. angustata*.** Brazil • ♀; Brasília [Brazil]; Rio Grande [do Sul]; id. 153106, Hym. coll.; HNHM • ♀; Bresil [Brazil]; Rio Grande do Sul; MNHN (examined).

Holotype of *T. rastra*. Brazil • ♀; S. [Santa] Catarina, Nova Teutônia; IV.1953, F. Plaumann leg.; AMNH_IZC 00323269; AMNH (examined).

ADDITIONAL MATERIAL EXAMINED. — **Argentina** • 1 ♀; Corrientes, Ituzaingo; I.1985, M. A. Fritz leg.; AMNH • 1 ♀; Entre Rios; 5.XII.1996–15.I.1997; L. Caire leg.; MIUP • 1 ♀; Misiones, Puerto Esperanza; X.1978; M. A. Fritz leg.; AMNH.

Brazil • 1 ♀; Rio Grande do Sul, Porto Alegre; CESC • 1 ♀; Santa Catarina, Nova Teutônia; MNCN • 2 ♀; XI.1968; F. Plaumann leg.; DGM, PMNH • 1 ♀; Santa Catarina, Nova Teutônia; 5.IV.1941; MNRJ.

DIAGNOSIS. — **Female.** In lateral view propodeum evenly convex throughout, dorsal face rounded into posterior face; lateral face of propodeum predominantly foveolate-punctate, most intervals smaller than foveolae diameter.

Male. Unknown.

DISTRIBUTION. Brazil (Rio Grande do Sul and Santa Catarina) and Argentina (Corrientes, Entre Rios, and Misiones).

DESCRIPTION

Female

Body length. 10–12 mm.

Head (Figs 2A, C; 3A, C; 4A, C). Posterior margin almost straight. Occipital carina conspicuously equally wide throughout. Vertex width $0.9 \times$ pronotal width. Eye almost circular, its height in frontal view $1.5 \times$ the distance from its ventral margin to mandibular condyle. Head sculpture partially obscured by dense setation, densely and coarsely foveolate-punctate with smooth rounded intervals where visible. Mandible with conspicuous subapical tooth. Ventral margin of clypeus raised and emarginated medially. Dorsal scrobal carina present, connected to lateral scrobal carina. Antennal tubercle finely, sparsely, and irregularly rugose to micropunctate. Flagellomere 1: $2.0 \times$ pedicel length; flagellomere 2: $1.3 \times$ pedicel length.

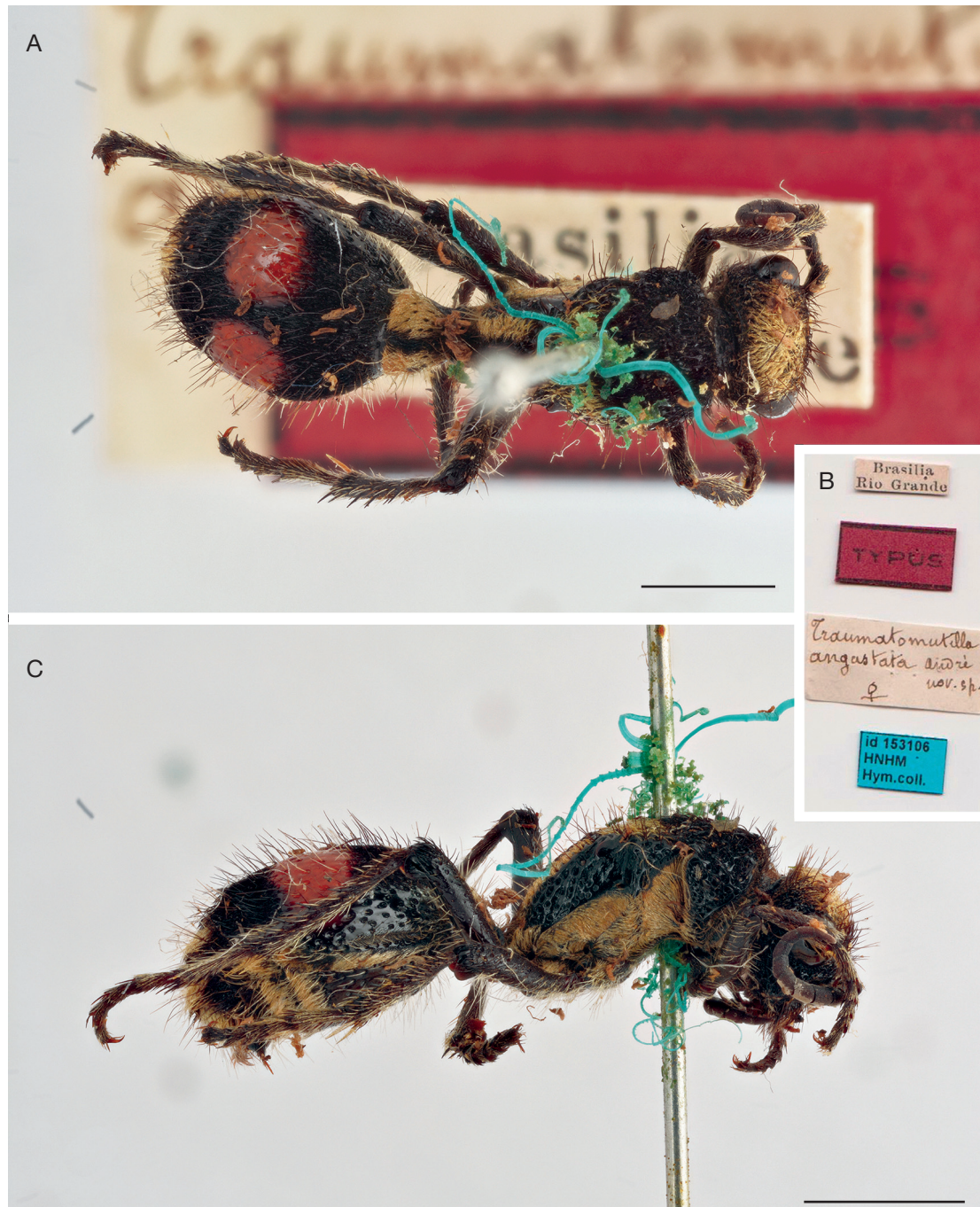


FIG. 2. — *Traumatomutilla angustata* (André, 1906), female, syntype, Brazil, Rio Grande do Sul, HNHN: **A**, dorsal habitus; **B**, type labels; **C**, lateral habitus. Scale bars: 2 mm. Photos: T. Németh.

Mesosoma (Figs 2A, C; 3A, C; 4A, C). Dorsal thoracic length slightly longer than width. Mesosomal dorsum densely and coarsely areolate-punctate, with smooth rounded intervals and clear medial longitudinal carina from anterior margin of mesonotum to dorsal face of propodeum; carina less defined posterad. Anterior face of pronotum poorly defined, short, shorter than pronotal collar, vestigially and coarsely striated longitudinally with interspersed scattered punctures; dorsal face roundly angulate into anterior face in lateral view. Humeral carina well-defined, separated from well-defined

raised epaulet, anterolateral corners of pronotum angulate in dorsal view. Pronotal spiracle almost flat against lateral margin of pronotum. Lateral face of pronotum densely foveolate-punctate; sculpture of mesopleuron and metapleuron completely obscured by dense setation, except smooth and unsculptured dorsal fourth of metapleuron. Lateral face of propodeum with sculpture densely foveolate-punctate, intervals smooth and shining predominantly less than width of surrounding sculpture. Ratios of widths of mesosoma at humeral angles, pronotal spiracles, widest point of mesono-

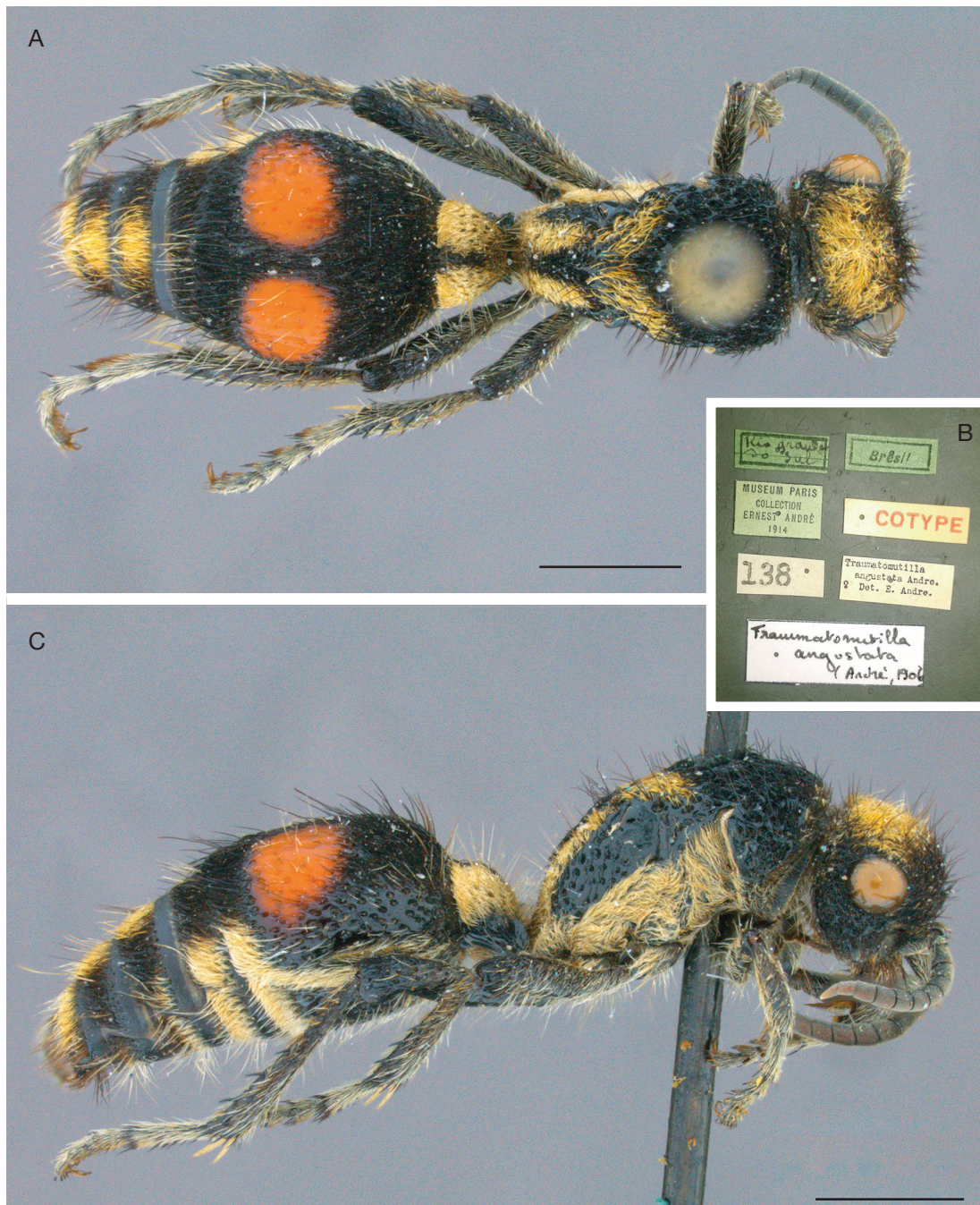


FIG. 3. — *Traumatomutilla angustata* (André, 1906), female, syntype, Brazil, Rio Grande do Sul, MNHN: **A**, dorsal habitus; **B**, type labels; **C**, lateral habitus. Scale bars: 2 mm. Photos: P. R. Bartholomay.

tum, narrowest point of mesonotum and propodeum immediately posterior to propodeal spiracles, 64:76:71:52:50. Lateral margin of mesonotum inconspicuously constricted anterior to propodeal spiracle, slightly diverging anterad. Propodeal spiracle slightly pronounced from lateral margin of mesosoma; post-spiracular area indistinguishable. Scutellar scale and anterolateral carinae absent; scabrous intervals absent on scutellar area. Propodeum conspicuously elongate, dorsal face much longer than and poorly differentiated from posterior face.

Metasoma (Figs 2A, C; 3A, C; 4A, C). Ratios of width of T1, width of T2 and length of T2, 30:67:66. Disc of T2 densely and coarsely foveolate-punctate to punctate with dense interspersed micropunctures; foveolae sparser and micropunctures absent laterally and over integumental spots. T3–6 sculpture, except pygidial plate, predominantly concealed by dense setation, sparsely and coarsely foveolate-punctate to simply punctate with dense interspersed micropunctures where visible; pygidial plate broadly subpyriform, defined by strong, projected, flange-like lateral carinae at apical fourth of



FIG. 4. — *Traumatomutilla rastra* Casal, 1969 n. syn., female, holotype, Brazil, Santa Catarina, Nova Teutônia, AMNH: **A**, dorsal habitus; **B**, type labels; **C**, lateral habitus. Scale bars: 2 mm. Photos: Steve Thurston.

plate; surface mostly irregularly rugose; interstice apparently granulose. S1 sparsely punctured, surface wedge-like, ending in a rounded longitudinal carina, equally high throughout. S2 densely foveolate-punctate, punctures slightly sparser posterad; anteromedial crest-fold almost absent. S3–6 densely and coarsely foveolate-punctate with sparse micropunctures at S3–4; sculpture denser on S6.

Male

Unknown.

Coloration and variations

Female (Figs 2A, C; 3A, C; 4A, C). Integument black to brownish-black except for mandibles and antennal flagella partially reddish-brown, and T2 with a pair of large subcircular orange to reddish integumental spots. Body setae predominantly silvery-yellow to golden varying in density, except for the following areas with black to brownish-black setae varying

in density: gena, malar space, and ventral half of frons; pronotal dorsum, anterior half of mesonotum, propodeal dorsum medially, and femora apicodorsally; T1 medially, disc of T2 (except over integumental spots), fringe of T2 medially, fringe of T3–4 sublaterally (medial area of silvery-golden setae on T3 sometimes greatly reduced), fringe of T5 laterally, and S6. Vertex with or without a medial spot of silvery-yellow setae.

Male. Unknown.

REMARK

Traumatomutilla angustata specimens have a single inconspicuous difference in relation to specimens of *T. diophthalma* which is the propodeum somewhat simply sloping posterad in lateral view (Figs 2C; 3C; 4C) as opposed to the more angulate propodeum of *T. diophthalma* (Fig. 7B). This propodeal structure is also seen in *T. rastra*, which differs from *T. angustata* by having the transverse band of silvery setae on



FIG. 5. — *Traumatomutilla chuza* Casal, 1969, female, holotype, Brazil, Pará, Óbidos, AMNH: **A**, dorsal habitus; **B**, type labels; **C**, lateral habitus. Scale bars: 2 mm. Photos: Steve Thurston.

the vertex reduced to a medial spot; the longitudinal setae markings of the mesonotum are linear instead of oblique as in *T. angustata*; and the fringe of T3 has medial spot of silvery setae instead of being completely black as in *T. angustata*. Such characters have been revealed as polymorphic within other *Traumatomutilla* species (Bartholomay *et al.* 2019a). The remaining structural features of *T. angustata* (including *T. rastra* n. syn.), are identical to those of *T. diophthalma*. Since the few differences between *T. angustata* and *T. rastra* are restricted to minor color and setae characters which are highly variable within *Traumatomutilla*, we propose *T. rastra* as a junior synonym of *T. angustata*.

Traumatomutilla chuza Casal, 1969 (Figs 5; 6)

Traumatomutilla chuza Casal, 1969: 286.

TYPE MATERIAL. — **Holotype**. Brazil • ♀; Pará, Óbidos; VII.1953; José Brazilino leg.; AMNH_IJC 00323247; AMNH (examined).

ADDITIONAL MATERIAL EXAMINED. — **French Guiana** • 1 ♂; [Cayenne], Bélizon; XI.2015; J. Giuglaris leg.; MIUP • 1 ♂; Matiti; V.2015, J. Giuglaris leg.; INPA.

Colombia • 2 ♂; IAvH • 1 ♀; Amazonas, Leticia; 14-15.VIII.1974; M. Cooper leg.; BMNH • 1 ♀; Amazonas, La Chorrera; 02.VIII.1976; M. Cooper leg.; BMNH • 1 ♂; Bolívar, Zambrano; F. Fernandez leg.; AMNH.

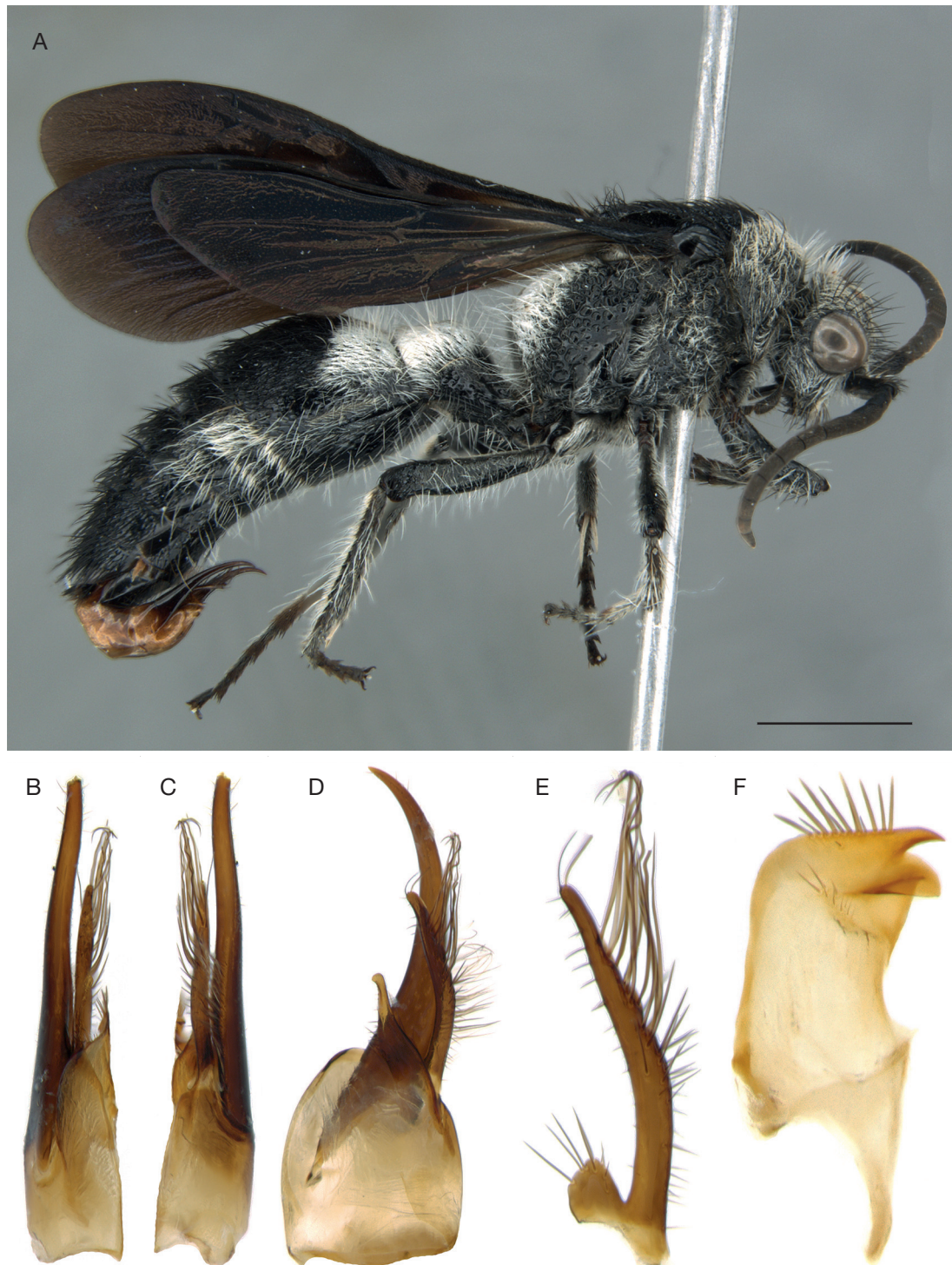


FIG. 6. — *Traumatotutilla chuza* Casal, 1969, male, French Guiana, Cayenne, INPA : **A**, lateral habitus; **B-F**, genitalia; **B**, dorsal view (halved); **C**, ventral view (halved); **D**, lateral/inner view (penis valve removed); **E**, cuspis, lateral/inner view (removed not to scale); **F**, penis valve, lateral/outer view (removed, not to scale). Scale bars: A, 2 mm. Photos: P. R. Bartholomay.

Brazil • 1 ♀, Amazonas, Lago Amana; 01.XI.1980; R. Best leg.; MIUP • 1 ♀; Amazonas, Manaus, Vicinal ZF2 [Zona Franca], Km 34, trilha do igarapé em frente a base do Km34; 22.VI.2012; J. A. Rafael leg.; INPA • 1 ♀; Amazonas, Manaus, Campus Universitário; 28.VII.1979; INPA • 2 ♂; Amazonas, Manaus, EMBRAPA [Empresa Brasileira de Pesquisa Agropecuária] Amazônia Ocidental;

2012; K. Schoeninger leg.; INPA • 1 ♂; Amazonas, Novo Airão, AM352, Km68; 02°48'58"S, 60°55'18"W; 14-28.X.2016; J. A. Rafael & F. F. Xavier-Filho leg.; INPA • 1 ♀; Pará, Serra Norte, Mina de Manganês, Rio Azul; 27.VII.1983; W. L. Overal leg.; MPEG • 1 ♀; Pará, Serra Norte, Estrada Manganês; 15.V.1984; M. F. Torres leg.; MPEG • 1 ♂; Melgaço, ECFPn [Estação Científica Ferreira

Pena] Caxiuanã, Mata da Sede; 16.XI.1998; O. Silveira & J. Pena leg.; MPEG • 1 ♀; Amapá, Mazagão, Fazendinha; 03.XII.1980; E. L. Oliveira leg.; MPEG • 3 ♂; Rondônia, 62 km SE [kilometers southeast of] Ariquemes; 08.XI.1994; W. J. Hanson leg.; EMUS • 2 ♂; Rondônia, 62 km SE [kilometers southeast of] Ariquemes; 01.XI.1997; B. K. Dozier leg.; EMUS • 1 ♂; Rondônia, 62 km SE [kilometers southeast of] Ariquemes; 22.X.1997; W. J. Hanson leg.; EMUS • 2 ♂, Rondônia, 62 km SE [kilometers southeast of] Ariquemes; 1.XI.1997; B. K. Dozier leg.; FSCA • 1 ♀; Rondônia, Itapuá D'Oeste, FLONA [Floresta Nacional] do Jamari; 7-15.VI.2013; Luz, D., Rosa, B., Williams, K. leg.; DZUP-299000; DZUP.

Ecuador • 1 ♂, Sucumbios, Rio Napo, Sacha Lodge; 14.III.1994; EMUS.

Bolivia • 1 ♂, Beni, Romancos [*sic!*], 1 km N [kilometer North of] Rio Itenez & Rio Paragua [confluence?]; 30.VII.1964, Bouseman & Lussenhop leg.; AMNH • 1 ♂; Beni, Rio Itenez near Costa Marques (Brazil); 01.IX.1964, Bouseman & Lussenhop leg.; AMNH • 1 ♂; Santa Cruz, Buena Vista; 26.II.1999, F. D. Parker leg.; EMUS.

DIAGNOSIS. — **Female.** Propodeal dorsum evenly convex throughout, dorsal face smoothly angulate into posterior face in lateral view; lateral face of propodeum predominantly unsculptured, smooth, shining, intervals always wider than surrounding foveae. **Male.** Pronotal dorsum with densely, coarsely, and confusedly areolate-punctate to foveolate-punctate with conspicuous interspersed micropunctures; sculpture of pronotum predominantly concealed by dense silvery-white setation.

DISTRIBUTION. — French Guiana (Cayenne-Roura), Colombia (Amazonas), and Brazil (Amapá, Amazonas, Pará, Rondônia)

DESCRIPTION

Female

Body length. 10-12 mm.

Head (Fig. 5A, C). Posterior margin almost straight. Occipital carina conspicuously equally wide throughout. Vertex width $0.9 \times$ pronotal width. Eye almost circular, its height in frontal view $1.5 \times$ the distance from its ventral margin to mandibular condyle. Head densely and coarsely foveolate-punctate with smooth rounded intervals. Mandible with conspicuous subapical tooth. Dorsal scrobal carina present, connected to lateral scrobal carina. Antennal tubercle finely, sparsely, and irregularly rugose to micropunctate. Flagellomere 1: $2.0 \times$ pedicel length; flagellomere 2: $1.3 \times$ pedicel length.

Mesosoma (Fig. 5A, C). Dorsal thoracic length $0.9 \times$ width. Mesosomal dorsum densely and coarsely areolate-punctate laterad to foveolate-punctate mediad, with smooth rounded intervals. Anterior face of pronotum defined, short, shorter than pronotal collar, vestigially and coarsely striated longitudinally with interspersed scattered punctures; dorsal face roundly angulate into anterior face in lateral view. Humeral carina well-defined, separated from well-defined raised sharp epaulet, anterolateral corners of pronotum sharply angulate in dorsal view. Pronotal spiracle almost flat against lateral margin of pronotum. Lateral face of pronotum sparsely foveolate-punctate; mesopleuron sculpture, micropunctate anteriorly and very sparsely and vestigially punctate along mesopleural ridge; metapleuron sculpture almost completely concealed by dense setation, except dorsal fourth smooth, unsculptured.

Lateral face of propodeum with sculpture sparsely foveolate-punctate, intervals smooth and shining predominantly more than twice the width of surrounding sculpture. Ratios of widths of mesosoma at humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum immediately posterior to propodeal spiracles, 93:100:105:84:79. Lateral margin of mesonotum vestigially constricted anterior to propodeal spiracle, slightly diverging anterad. Propodeal spiracle vestigially pronounced from lateral margin of mesosoma; post-spiracular area present. Scutellar scale and anterolateral carinae absent; scabrous intervals absent on scutellar area. Propodeum conspicuously elongate, dorsal face much longer than and well differentiated from posterior face.

Metasoma (Fig. 5A, C). Ratios of width of T1, width of T2 and length of T2, 65:125:124. Disc of T2 densely and coarsely foveolate-punctate to punctate with dense interspersed micropunctures; foveolae sparser and micropunctures absent laterally and over integumental spots. T3-6 sculpture, except pygidial plate, predominantly concealed by dense setation, sparsely and coarsely foveolate-punctate to simply punctate with dense interspersed micropunctures where visible; pygidial plate broadly subpyriform, defined by strong, projected, flange-like lateral carinae at apical fourth of plate; surface mostly irregularly longitudinally rugose; interstice apparently granulose. S1 sparsely punctured, surface wedge-like, ending in a rounded longitudinal carina, equally high throughout. S2 densely foveolate-punctate, punctures slightly sparser posterad; anteromedial crest-fold vestigial. S3-6 densely and coarsely foveolate-punctate with sparse micropunctures at S3-4; sculpture denser on S6.

Male (hitherto unknown)

Body length. 10-12 mm.

Head (Fig. 6A). Transversely subrectangular with posterolateral angles rounded and continuous with outline of eyes in dorsal view. Vertex width $0.8 \times$ pronotal width. Eye almost circular. Ocelli small; OOD $5.0 \times$ DLO, IOD slightly longer than DLO. Occipital carina distinct. Head surface densely and coarsely foveolate-punctate with dense interspersed micropunctures on gena, malar space, and posterior half of vertex. Gena ecarinate. Antennal scrobe concave to eye margin, with prominent transverse dorsal scrobal carina. Clypeus concave laterally immediately below antennal insertion, conspicuously convex medially; predominantly obscured by dense setation, coarsely and densely punctate to micropunctate where visible; apical/ventral margin with a pair of closely spaced short blunt inconspicuous tooth-like projections medially. Scape bicarinate ventrally. Flagellomere 1: $1.6 \times$ pedicel length; flagellomere 2: $2.0 \times$ pedicel length. Mandible obliquely tridentate apically, inner and middle teeth almost equal, greatly reduced; lacking dorsal or ventral projections.

Mesosoma (Fig. 6A). Epaulets well defined, slightly projected from anterior margin of pronotum, subangulate, broadly

separated from humeral carina, anterolateral angles of pronotum subrounded. Anterior face of pronotum sparsely punctate to micropunctate throughout along dorsal margin, almost unsculptured, smooth, and shining elsewhere; almost flat throughout. Tegula convex, mostly glabrous and impunctate except for dense coarse punctures on anterior and inner margin. Mesoscutum densely and coarsely foveolate-punctate, notaulus and parapsis present, reduced to posterior third of mesoscutum; with medial longitudinal carina on posterior half. Scutellum convex, subglobose, with somewhat definable dorsal and posterior faces; densely and coarsely areolate-punctate to foveolate-punctate; with longitudinal carina medially formed by aligned intervals on dorsal face. Axilla produced posterolaterally as acute projections, with conspicuous flat coarsely and densely foveolate-punctate dorsal surface, except unsculptured apically and along outer margin. Metanotum almost equally wide throughout, its surface obscured by dense setation. Propodeal dorsum convex, predominantly concealed by dense setation, densely areolate where visible; lateral face densely areolate on posterior half, vestigially areolate on anterior half; dorsal face rounded into and poorly distinguished from posterior face. Lateral face of pronotum sparsely and coarsely foveolate-punctate with interspersed dense micropunctures; mesopleuron slightly swollen on dorsal half, without any projections; sculpture densely and coarsely foveolate-punctate with interspersed micropunctures; foveolae sparser anterad and posterad. Metapleuron predominantly micropunctured to unsculptured, smooth and shining, except for vestigial foveolae and rugosities on dorsal and ventral fifths.

Wings (Fig. 6A). Fore wing with elongate sclerotized pterostigma; marginal cell elongated, truncate apically; three submarginal cells; membrane dark brown, slightly but conspicuously lighter on basal third.

Legs (Fig. 6A). Simply setose, no strong spines discernible dorsally; spurs finely serrate on margins.

Metasoma (Fig. 6A). Ratios of width of T1, width of T2 and length of T2 45:76:58. Dorsal metasomal sculpture partially concealed by dense setation, sparsely and coarsely punctate with interspersed micropunctures where visible; pygidial plate somewhat concave, posterior margin conspicuously curved upward; surface predominantly smooth, shining, with vestigial undefined sculpture along apical margin; weakly defined by parallel carinae apicolaterally. S1 longitudinally elevated medially, ending in blunt, low, concave carina. S2 sparsely and finely foveolate-punctate to punctate; foveolae conspicuously sparser posterad; anteromedial crest-fold almost absent; sternal pit absent. S3 sparsely and finely punctate with sparse interspersed micropunctures; S4–7 sparsely foveolate-punctate. S7 longer than broad, with conspicuous medial longitudinal unsculptured area; posterior margin projected apicolaterally and medially; medial projection blunt, longer than lateral projections.

Genitalia (Fig. 6B–F). Parapenial lobe not at all pronounced apically, simply rounded. Ratios of free length of paramere, cuspis and digitus, 56:28:13; paramere slightly sinuous in dorsal view, upcurved apically in lateral view; with dense setae ventrally at basal half; cuspis short, stout, slightly swollen medially and narrower apicad in lateral view; narrower apicad and almost straight in dorsal view; abruptly curved dorsally in wide angle at basal third; with dense conspicuous, strongly sinuous setae on ventral surface, except at basal third with simple short setae; dorsal surface with overall inconspicuous simple short setae; paracuspis well-developed, not sessile, slightly elongate vertically, subrounded at apical margin, densely setose along posterior margin, setae predominantly shorter than or as short as paracuspis; digitus short, slightly curved inward in dorsal view and slightly upcurved in lateral view, inconspicuously setose basodorsally; penis valve strongly concave on inner surface, with closely spaced pair of short teeth posteroventrally; posterior tooth acute, subposterior tooth rounded, with lateral pocket present on outer surface; apical distance between teeth $0.1 \times$ length of valve; dense setae present along posterior margin and inconspicuous short setae present at base of subposterior tooth on outer surface.

Coloration and variations

Female (Fig. 5A, C). Integument black to brownish-black except for mandibles and antennal flagella partially reddish-brown, and T2 with a pair of large subcircular orange integumental spots. Body setae predominantly silvery-white except for the following areas with black setae varying in density: pronotal dorsum, anterior half of mesonotum, posterior half of mesonotum medially, propodeal dorsum medially, femora apicodorsally, T1 posteromedially, disc of T2 (except over integumental spots), fringe of T2–3 medially (except inconspicuous patch of silvery-white medially), T4 sublaterally, T5–6 (except pygidial plate) laterally, fringe of S5, and S6. Some specimens may have the head completely covered with black setae (except gena and malar space), and the silvery-white setae of the mesosomal dorsum restricted to narrow inconspicuous lateral stripes on propodeum. Such specimens have the remaining silvery-white setae areas conspicuously less defined and the integumental spots of T2 have a more reddish tone rather than the usual orange. **MALE (Fig. 6A)** Integument black. Body setae predominantly silvery-white varying in density except for the following areas with black setae varying in density: mesoscutum, tegula, axillar projections, mesoscutellum, disc of T2 (except anterior third), fringe of T2–4 medially, T5–7, fringe of S5–6, and S7.

REMARKS

Traumatomutilla chuza is apparently the typical representative of the *T. gemella* species-group in the Amazon. Two other species of this group are known in the Amazon, *T. diophthalma* in transition areas between Amazon Forest and Cerrado in the south and northeast, and *T. peismatara* Bartholomay & Cambra n. sp. in the western Amazon near the border between Brazil and Peru, but they are not as commonly encountered in the Amazon as *T. chuza*. While there are records of

T. diophthalma occurring in the same area as *T. chuza* (Pará, Brazil), there are no specimens of *T. chuza* known from West or South of Leticia (Amazonas, Colombia). Apart from the characters mentioned in the diagnosis, the females of *T. chuza* are easily recognizable by their more robust and stout body in comparison to the rather slender and elongate body of the other species within the *T. gemella* species-group. The specimen recently collected in Rondônia by KAW (DZUP-299000), is undoubtedly from the *T. gemella* species-group and was identified as *T. chuza* by its overall body structure, proportions, and its occurrence on the Brazilian Amazon. The coloration of this specimen, however, is remarkably different from most *T. chuza* since the head and mesosoma are almost devoid of silvery-white setae dorsally, except for a pair of lateral longitudinal stripes on the propodeal dorsum. This color variation may be a result of a local Müllerian mimicry pattern which includes *T. barathra* Bartholomay & Williams, 2018 and *T. luscoides* André, 1908, species that were collected in the same area as this particular specimen.

Traumatomutilla diophthalma (Klug, 1821)
(Figs 7; 8)

Mutilla diophthalma Klug, 1821: 318.

Ephuta (*Traumatomutilla*) *diophthalma* – André 1902: 55.

Traumatomutilla diophthalma – André 1904: 40.

Traumatomutilla diophthalma [sic] – Williams *et al.* 2017: 8.

TYPE MATERIAL. — **Holotype**. Brazil [Brasilien] • ♀; Bahia; Freireyss S. leg.; ZMB 141/6; ZMB (examined).

ADDITIONAL MATERIAL EXAMINED. — **Panama** • 2 ♀; Panama Prov. [Province], Chorrera, corregimiento Playa Leona, orilla río Perequete; 19–20.III.1991; R. Cambra leg.; MIUP • 2 ♀; Panama Prov. [Province], Chorrera, Llano largo; 26–29.III.1990; A. Mena leg.; INPA, MIUP • 1 ♀; Panama Prov. [Province], Parque Nacional Soberania, Camino de Cruces; 17.II.1998; R. Cambra & A. Santos leg.; MIUP • 1 ♂, reared in laboratory; MIUP • 1 ♂; Chica; 1–25.X.2013; Malaise trap; Y. Cheng leg.; INPA • 1 ♀; Cocle Prov. [Province], Valle de Anton; 6.VII.1991; R. Contreras leg.; MIUP • 1 ♀; Cocle Prov. [Province], Valle de Anton; 13.VII.1991; J. Coronado leg.; MIUP • 1 ♀; Cocle Prov. [Province], Valle de Anton; 9–10.I.1991; J. Coronado leg.; INPA • 1 ♂; Colon Prov. [Province], Gamboa; 16–30.IV.2016; Malaise trap; Lezcano & Estrada leg.; INPA.

Colombia • 1 ♂; Magdalena, P.N.N. [Parque Nacional Natural] Tayron, Neguanje; 11°20'N, 74°02'W; 10m [sic]; 28.VII.2001; R. Henriquez leg.; IAvH.

Venezuela • 1 ♀; Falcon, Yaracal; 19.VII.1986; L. Joly leg.; MIUP • 1 ♀, Cojedes, Hato Piñero, cr. [circa] El Baul; 3–10.IX.1994; J. Lattke leg.; INPA.

Brazil • 1 ♀; BMNH.

Pará • 1 ♀; BMNH • 1 ♀; Pará, Ponta de Pedras; 27.X.1982; M. F. Torres leg.; MPEG • 1 ♀; Pará, Santarém; IV.1919, S. M. Klages leg.; (Label: *Traumatomutilla diophthalma* (Cresson, nec Klug, det. Mickel 1953); MIUP • 1 ♂; Pará, E. [east of] Araguaia; 19–31.I.1983; J. A. Rafael leg.; MIUP • 1 ♂; Pará, Serra Norte, Manganês; 06–09.IX.1985; Márcio Zanuto leg.; MPEG • 1 ♀; Mato Grosso do Sul, Cotriguaçu, -9.84°31.39'S, -58.26°26.29'W, 245 [sic]; 20.IX.206; G. Araújo leg.; UFMT • 1 ♀; Goiás, Serranópolis, S-21 J0799057 TEC1 [sic]; 10–15.I.2007; INPA.

Paraguay • 1 ♀; Caaguazu, Ypau Señorita; 13.XII.2001; U. Dreschel leg.; FSCA • 1 ♀; Caaguazu, Zudañez; XII.1948; UMMZ • 1 ♀; Concepción, Parque Nacional Paso Bravo, Santa Sofia; 22°19'20"S, 57°10'12"W; 28.X.2002; B. Garcete leg.; MIUP • 1 ♀; Paraguari, Parque Nacional Ybycui; 151 m [above sea level]; 26°04' S, 56°50' W; 4–16.X.2004; B. Garcete leg.; MIUP • 1 ♀; Canindeyu, R.N.B. [Reserva Nacional Bosque] Mbaracayu, Jejui-mi; 10–14.I.1997; B. Garcete leg.; MIUP.

DIAGNOSIS. — **Female**. T2 with subcircular pair of integumental spots; lateral face of propodeum usually with sculpture sparse anterodorsad, lacking micropunctures; dorsal face of propodeum sloping posterad, conspicuously elevated posteromedially, sharply angulate into posterior face.

Male. Pronotum clothed with sparse setae, integument visible; body setae with overall silvery-white tone; dorsum of propodeum with dense areas of appressed silvery-white setae at least anterolaterally.

DISTRIBUTION. Panama (Panama, Cocle, and Colon), Colombia (Magdalena), Venezuela (Falcon and Cojedes), Brazil (Pará, Bahia, Mato Grosso do Sul, and Goiás), and Paraguay (Caaguazu, Concepción, Paraguari, and Canindeyu).

DESCRIPTION

Female

Body length. 13 mm.

Head (Fig. 7A, B). Posterior margin almost straight. Occipital carina evenly wide throughout. Vertex width $0.85 \times$ pronotal width. Eye almost circular, its height in frontal view $1.6 \times$ the distance from its ventral margin to mandibular condyle. Head densely coarsely and confusedly, areolate-punctate to foveolate-punctate; with conspicuous broad smooth intervals on front; sculpture denser and coarser on vertex. Genal carina present. Mandible oblique, tapering slightly apicad, conspicuously bidentate, unarmed ventrally. Dorsal scrobal carina well defined, not reaching antennal tubercles; lateral scrobal carinae present, connected to dorsal carina. Antennal tubercles irregularly rugose. Flagellomere 1: $2.0 \times$ pedicel length; flagellomere 2: $1.55 \times$ pedicel length.

Mesosoma (Fig. 7A, B). Dorsal thoracic length almost as long as mesosomal width. Mesosomal dorsum densely and coarsely areolate-punctate with smooth rounded intervals; sculpture overall slightly larger laterally on pronotum. Humeral carina present, narrowly disconnected from slightly produced subangulate epaulet; anterolateral corners of pronotum angulate in dorsal view. Anterior face of pronotum defined, short, shorter than pronotal collar, vestigially and coarsely striated longitudinally basad, with coarse dense punctures dorsad; dorsal face roundly angulate into anterior face in lateral view. Pronotal spiracle almost flat against lateral margin of pronotum. Lateral face of pronotum sparsely foveolate-punctate with interspersed micropunctures; mesopleuron sculpture, micropunctate anteriorly, sparsely and vestigially foveolate-punctate along mesopleural ridge; metapleuron sculpture almost completely concealed by dense setation, except dorsal fourth smooth, unsculptured; with dense coarse longitudinal rugosities on dorsal margin anterior to propodeal spiracle. Lateral face of propodeum sparsely foveolate-punctate, intervals smooth and shining predominantly as wide as surrounding sculpture. Ratios of widths of mesosoma at humeral angles,



FIG. 7. — *Traumatomutilla diophthalma* (Klug, 1821), female, Brazil, Bahia, ZMB: **A**, dorsal habitus; **B**, lateral habitus; **C**, type labels. Scale bars: 2 mm. Photos: P. R. Bartholomay.

pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum immediately posterior to propodeal spiracles. Lateral margin of mesonotum marginally constricted anterior to propodeal spiracle, slightly diverging anterad. Propodeal spiracle inconspicuously pro-

nounced from lateral margin of mesosoma; post-spiracular area present. Scutellar scale and anterolateral carinae absent; scabrous intervals absent on scutellar area. Propodeum conspicuously elongate, dorsal face much longer than and well differentiated from posterior face.

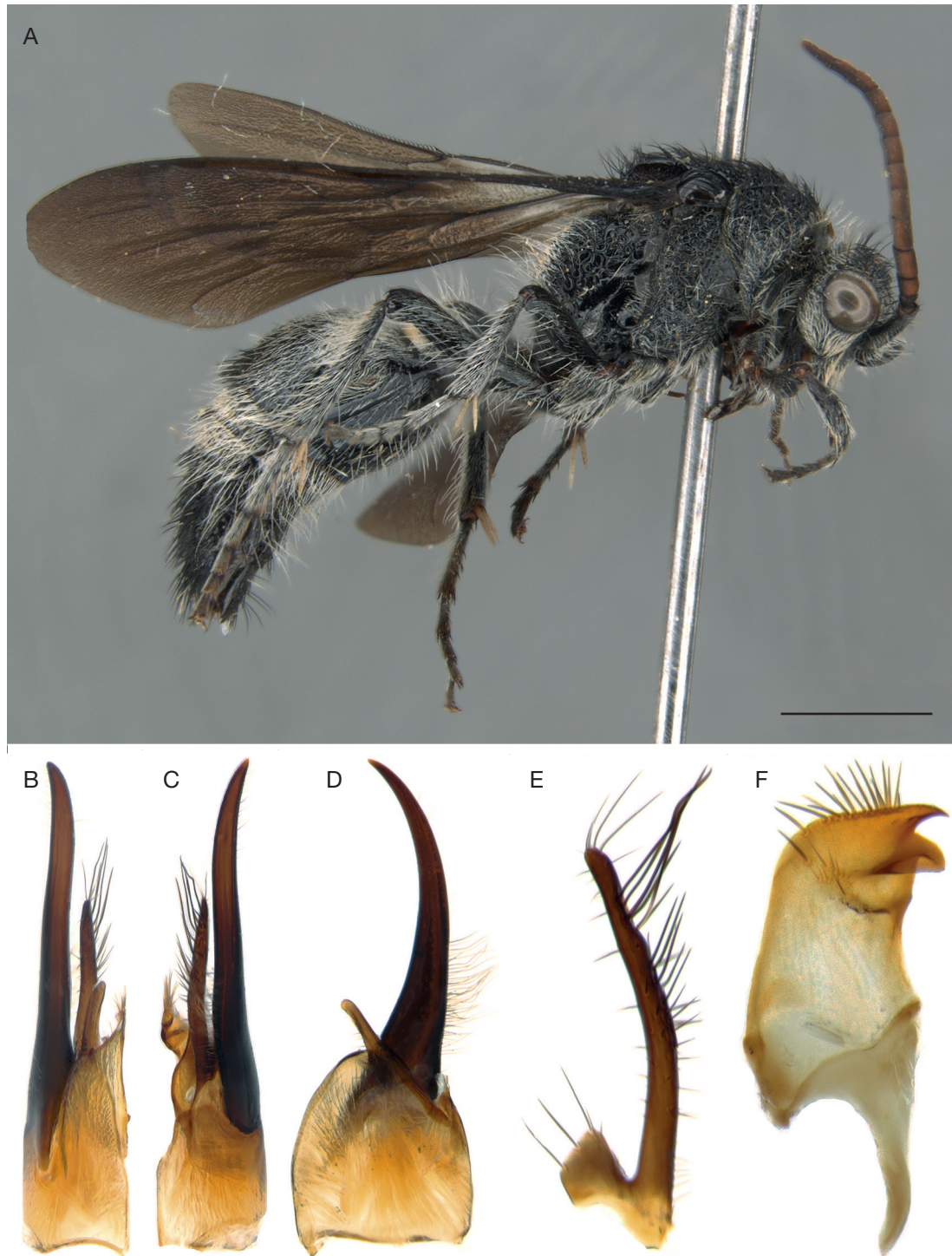


FIG. 8. — *Traumatotutilla diophthalma* (Klug, 1821), male, Pará, Serra Norte, MPEG: **A**, lateral habitus; **B–F**, genitalia: **B**, dorsal view (halved); **C**, ventral view (halved); **D**, lateral/inner view (penis valve removed); **E**, cuspis, lateral/inner view (removed not to scale); **F**, penis valve, lateral/outer view (removed, not to scale). Scale bar: 2 mm. Photos: P. R. Bartholomay.

Metasoma (Fig. 7A, B). Ratios of width of T1, width of T2 and length of T2, 30:68:67. Disc of T2 densely and coarsely foveolate-punctate to punctate with dense interspersed micropunctures; foveolae sparser and micropunctures absent laterally and over integumental spots. T3–6 sculpture, except pygidial plate, predominantly concealed by dense setation,

sparsely and coarsely foveolate-punctate to simply punctate with dense interspersed micropunctures where visible; micropunctures sparser on T5, absent on T6; pygidial plate subpyriform, defined by strong, projected, flange-like lateral carinae at apical fourth of plate; surface predominantly with irregular longitudinal rugosities; interstice apparently granulose. S1

sparsely punctured, surface wedge-like, ending in a rounded longitudinal slightly concave carina. S2 sparsely foveolate-punctate, sculpture sparser posterad; anteromedial crest-fold almost absent. S3–6 densely and coarsely foveolate-punctate with sparse micropunctures at S3–4; sculpture denser and micropunctures absent on S6.

Male (hitherto unknown).

Body length. 12–12.5 mm.

Head (Fig. 8A). Transversely subrectangular with posterolateral angles rounded in dorsal view. Width $0.88 \times$ pronotal width. Eye almost circular. Ocelli small; OOD $3.4 \times$ DLO, IOD $1.5 \times$ DLO. Occipital carina distinct. Head surface densely and coarsely punctate. Gena ecarinate. Antennal scrobe concave to eye margin, with prominent transverse dorsal scrobal carina. Clypeus concave laterally immediately below antennal insertion, conspicuously convex medially; coarsely and densely punctate to micropunctate; apical medial margin slightly concave, with a small denticle on each side of the concavity. Scape bicarinate. Flagellomere 1: $2.05 \times$ pedicel length; flagellomere 2: $2.3 \times$ pedicel length. Mandible obliquely tridentate apically, inner tooth slightly larger than middle tooth; lacking dorsal or ventral projections.

Mesosoma (Fig. 8A). Epaulets well defined, slightly projected from anterior margin of pronotum, broadly separated from humeral carina, anterolateral angles of pronotum rounded. Anterior face of pronotum sparsely punctate with interspersed micropunctations laterally, with a conspicuous smooth unsculptured area. Tegula convex, mostly glabrous and impunctate except for dense coarse punctures on anterior third and along inner margin. Mesoscutum densely and coarsely foveolate-punctate, notaulus absent, parapsis vestigial, reduced to posterior half of mesoscutum. Scutellum convex, densely and coarsely areolate-punctate to foveolate-punctate; with longitudinal irregular carina medially formed by aligned intervals. Axilla produced posterolaterally as acute projections in dorsal view, with conspicuous flat coarsely and densely foveolate-punctate dorsal surface. Metanotum slightly wider laterally, its surface obscured by dense setation. Propodeal dorsum convex, partially concealed by dense setation, densely areolate where visible; lateral face densely and coarsely areolate, areolations less defined anterad; dorsal face rounded into and poorly distinguished from posterior face. Lateral face of pronotum densely coarsely and confusedly punctate to micropunctate; mesopleura slightly swollen on dorsal half, without any or projections; mesopleural sculpture densely and coarsely areolate-punctate to foveolate-punctate with interspersed micropunctures anteriorly. Metapleuron foveolate-punctate ventrally, micropunctate to smooth dorsally.

Wings (Fig. 8A). Fore wing with elongate sclerotized pterostigma; marginal cell elongated and with Rs convex, not truncate apically; three submarginal cells; dark brown, slightly but conspicuously lighter on basal third.

Legs (Fig. 8A). Simply setose, no strong spines discernible dorsally; spurs finely serrate on margins.

Metasoma (Fig. 8A). T1 $0.48 \times$ as wide as T2. T2 length $0.72 \times$ its width. Dorsal metasomal sculpture partially concealed by dense setation, densely and coarsely punctate with interspersed micropunctures where visible; pygidial plate irregularly and vestigially rugose, weakly defined by parallel carinae apicolaterally. S1 longitudinally elevated medially, slightly pronounced carina lower medially. S2 sparsely foveolate-punctate to punctate, interspersed micropunctations present anterolaterally, foveolae conspicuously sparser and larger posterad; with vestigial longitudinal anteromedial crest-fold; sternal pit absent. S3–5 sparsely and coarsely foveolate-punctate with interspersed micropunctures; S6–7 sparsely foveolate-punctate. S7 longer than broad, posterior margin projected laterally and medially, medial projection terminating in a pair of very small subacute closely spaced tooth-like on posterior margin.

Genitalia (Fig. 8B–F). Parapenial lobe not at all pronounced posteriorly, simply rounded. Ratios of free length of paramere, cuspis and digitus, 53:31:14; paramere slightly sinuous in dorsal view, upcurved posteriorly in lateral view; with dense setae ventrally at anterior half; cuspis short, stout, slightly swollen medially and narrower posterad in lateral view; narrower posterad and almost straight in dorsal view; abruptly curved dorsally in wide angle at anterior third; with dense conspicuous, strongly sinuous setae on ventral surface, except at anterior third with simple short setae; dorsal surface with overall inconspicuous simple short setae; paracuspis well-developed, not sessile, slightly elongate vertically, subrounded at posterior margin, densely setose along posterodorsal margin, setae predominantly shorter than or as short as paracuspis; digitus short, slightly curved inward in dorsal view and slightly upcurved in lateral view, inconspicuously setose basodorsally; penis valve strongly concave on inner surface, with closely spaced pair of short teeth posteroventrally; posterior tooth acute, subposterior tooth rounded, with lateral pocket present on outer surface; apical distance between teeth $0.1 \times$ length of valve; dense setae present along posterior margin and inconspicuous short setae present at base of subposterior tooth on outer surface.

Coloration and variations

Female (Fig. 7A, B). Integument black, except mandibles and antennal flagella partially reddish-brown and T2 with a pair of orange subcircular integumental spots which vary slightly in size. Body setae predominantly silvery-white varying in density, except the following areas with black setae varying in density: front, genae; pronotal dorsum, mesonotum medially, scutellar area, propodeal dorsum medially; T1 medially, disc of T2 (except integumental spots), fringe of T2–5 sublaterally, T6 laterally, and S6.

Male (Fig. 8A). Integument black, with mandibles and flagella partially reddish-brown. Head mostly with dense white setae except sparse, erect and large, black setae on postero-lateral

areas of vertex and near inner eye margins; pronotum dorsum, mesoscutum, axillar projections, scutellum and tegula with black setae; dorsum of propodeum with sparse white setae, dense and decumbent antero-laterally; pronotum lateral face with white setae; mesopleura with sparse black setae near tegula other area with sparse white setae; propodeum lateral face with sparse white setae; legs with white setae except apex of meso and metafemora dorsally with black setae, T1 with white setae, dense and decumbent on dorsal face; T2 to T7 with black setae except anterior third and narrow lateral area of T2, narrow apical fringe of T2, narrow lateral areas of T3–4 with white setae; S1 to S4 with white setae; S5–S6 with white and black setae, S7 with black setae.

HOSTS

Hymenoptera: Apoidea Latreille, 1802: Sphecidae Latreille, 1802: *Podium* sp. (in laboratory); Hymenoptera: Apoidea: Crabronidae Latreille, 1802: *Trypoxylon* sp. (*in situ*). Host association: wooden trap nests were placed in a forested area in Panama by RAC for two weeks (17–31.II.1998), after which one of the nests was found to be occupied and the entrance closed with resin. The occupied trap was taken to the lab at MIUP and both halves of the nest were separated revealing a *Podium* Fabricius, 1804 larva. The nest was once again closed so the larvae could pupate. Once the larvae reached the pupa stage, a female of *T. diophthalma* was placed inside the nest using forceps and the entrance was once again closed leaving the mutillid locked inside the nest for 24 hours, after which the female was removed. Approximately 30 days later a male of *T. diophthalma* emerged. Additionally, one female of *T. diophthalma* emerged from a species of *Trypoxylon* Latreille, 1797 in trap-nests placed at Amazonian forest areas in Cotriguaçu, Mato Grosso state, Brazil from August to July of 2017 by Gustavo Júnior de Araújo as part of his PhD fieldwork.

REMARKS

This species is, to the best of our knowledge, the most widely distributed in the genus, being found from Paraguay and Mid-western Brazil to Panama. Its distribution, however, is remarkably “patchy” in between these extremes. It is not clear whether this is due to lack of sampling or its range being indeed disjunct, interrupted near the Amazon and resumed further South. The latter would be a novel distribution for *Traumatomutilla*, since most species seem to be widespread and common across large areas – e.g. *T. ocellaris* (Klug, 1821) which is found from Argentina to the southern edges of the Amazonian Forest – or restricted to certain types of environments like *T. bifurca* (Klug, 1821) in the Caatinga and *T. guarata* Casal, 1969 in the Atlantic Forest.

Traumatomutilla gemella (André, 1906)
(Figs 9–11)

Ephuta (*Traumatomutilla*) *gemella* André, 1906: 42.

Traumatomutilla gemella – Casal 1969: 285.

TYPE MATERIAL. — **Syntypes**. Brazil [Brasília] • ♀; S. [São] Paulo; id 153108, Hym. [Hymenoptera] coll. [collection]; HNHM (examined) • ♀, Brésil [Brazil], S. [São] Paulo; Schrottky leg.; MNHN (examined).

ADDITIONAL MATERIAL EXAMINED. — **Brazil** • 1 ♀; Espírito Santo, Atilio Vivacqua; 13.II.2003; UFES • 1 ♀; Espírito Santo, Parque Sooretama; XI.1967; F. M. Oliveira leg.; DZUP • 1 ♀; Espírito Santo, Santa Teresa; 07.XII.1964; C. Elias leg.; DZUP • 1 ♀; Espírito Santo, Guarapari; 15.XI.1969; Alvarenga leg.; DZUP • 1 ♀; Conceição da Barra; 15.XI.1969; C. Elias leg.; DZUP • 1 ♀; Espírito Santo, Corrego do Ita [Itá]; XII.1956; MNRJ • 1 ♀; Minas Gerais, Viçosa; 1931; AMNH • 1 ♀; Minas Gerais, Nanuque, Zona Rural; 24–29.VII.2007; F. B. Fraga leg.; UFES • 4 ♀; São Paulo; MZSP • 1 ♀; São Paulo, Ilha de Busios [Búzios]; 16.X-04.XI.1963; Exp. Depto. Zool. [Expedição do Departamento de Zoologia] leg.; MZSP • 1 ♀; São Paulo, Ilha de Busios; 23–28.III.1964; Exp. Depto. Zool. [Expedição do Departamento de Zoologia] leg.; MZSP • 1 ♂; São Paulo, Teodoro Sampaio; XII.1985; F. M. Oliveira leg.; EMUS • 4 ♀; Rio de Janeiro; MZSP • 1 ♀; Rio de Janeiro, Itatiaia; 700m [a.s.l.]; 04.XII.1940; J. F. Zikán leg.; MZSP • 1 ♀; Paraná, Antonina, Reserva Morro da Mina; 11.XII.2006; C. Maia leg.; DZUP • 1 ♀; Paraná, Reserva Rio Cachoeira; 01.II.2007; A. J. C. Aguiar leg.; DZUP • 1 ♀; Santa Catarina, Corupá; III.1947; A. Maller leg.; AMNH • 1 ♀; Santa Catarina, Corupá; XI.1946; A. Maller leg.; AMNH • 2 ♀; Santa Catarina, Corupá; XII.1944; A. Maller leg.; AMNH • 1 ♀; Santa Catarina, Corupá; II.1946; A. Maller leg.; AMNH • 1 ♀; Santa Catarina, Corupá; IV.1952; MNRJ • 1 ♀; Santa Catarina, Corupá; I.1955; MNRJ • 1 ♀; Santa Catarina, Corupá; XII.1953; MNRJ • 1 ♀; Santa Catarina; Rio Vermelho; XII.1945; A. Maller leg.; AMNH.

DIAGNOSIS. — **Female**. Dense setae covering most of lateral face of propodeum; micropunctures present on lateral face of propodeum; body setae predominantly silvery-golden; T2 integumental spots orange.

Male. Body setae predominantly silvery-golden; dense appressed setae partially present on lateral face of propodeum and concealing most of metapleuron surface; micropunctures present anterolaterally on S2.

DISTRIBUTION. Brazil (Espírito Santo, Minas Gerais, São Paulo, Paraná, and Santa Catarina)

DESCRIPTION

Female

Body length. 9–13 mm.

Head (Figs 9A, C; 10A, B). Posterior margin almost slightly sinuous, somewhat concave sublaterally and slightly convex medially. Occipital carina conspicuously equally wide throughout. Vertex width $0.9 \times$ pronotal width. Eye almost circular, its height in frontal view almost equal to the distance from its ventral margin to mandibular condyle. Head densely and coarsely foveolate-punctate to areolate-punctate. Mandible with conspicuous subapical tooth. Dorsal scrobal carina present, irregular, separated from antennal tubercles; lateral scrobal carina almost absent. Antennal tubercle finely and irregularly rugose. Flagellomere 1: $2.1 \times$ pedicel length; flagellomere 2: $1.5 \times$ pedicel length.

Mesosoma (Figs 9A, C; 10A, B). Dorsal thoracic length slightly smaller than mesosomal width. Mesosomal dorsum densely and coarsely areolate-punctate to foveolate-punctate, with conspicuous medial longitudinal carinae extending from anterior margin of mesonotum to posterior margin of dorsal



FIG. 9. — *Traumatomutilla gemella* (André, 1906), female, syntype, Brazil, Sao Paulo, HNHM: **A**, dorsal habitus; **B**, type labels; **C**, lateral habitus. Scale bars: 2 mm. Photos: T. Németh.

face of propodeum; carina less defined on propodeum, sinuous, irregular. Anterior face of pronotum defined, short, shorter than pronotal collar, vestigially and coarsely striated longitudinally with interspersed scattered punctures; dorsal face roundly sub-angular with anterior face in lateral view. Humeral carina well-defined, broadly separated from well-defined low sharp epaulet, anterolateral corners of pronotum angulate in dorsal

view. Pronotal spiracle slightly projected from lateral margin of pronotum, rounded. Lateral face of pronotum sparsely punctate with sparse interspersed micropunctures; mesopleuron sculpture mostly concealed by dense setation, micropunctate anteriorly and foveolat-punctate along mesopleural ridge where visible; metapleuron sculpture almost completely concealed by dense setation, dorsal fourth with sparser setae and medial asetose

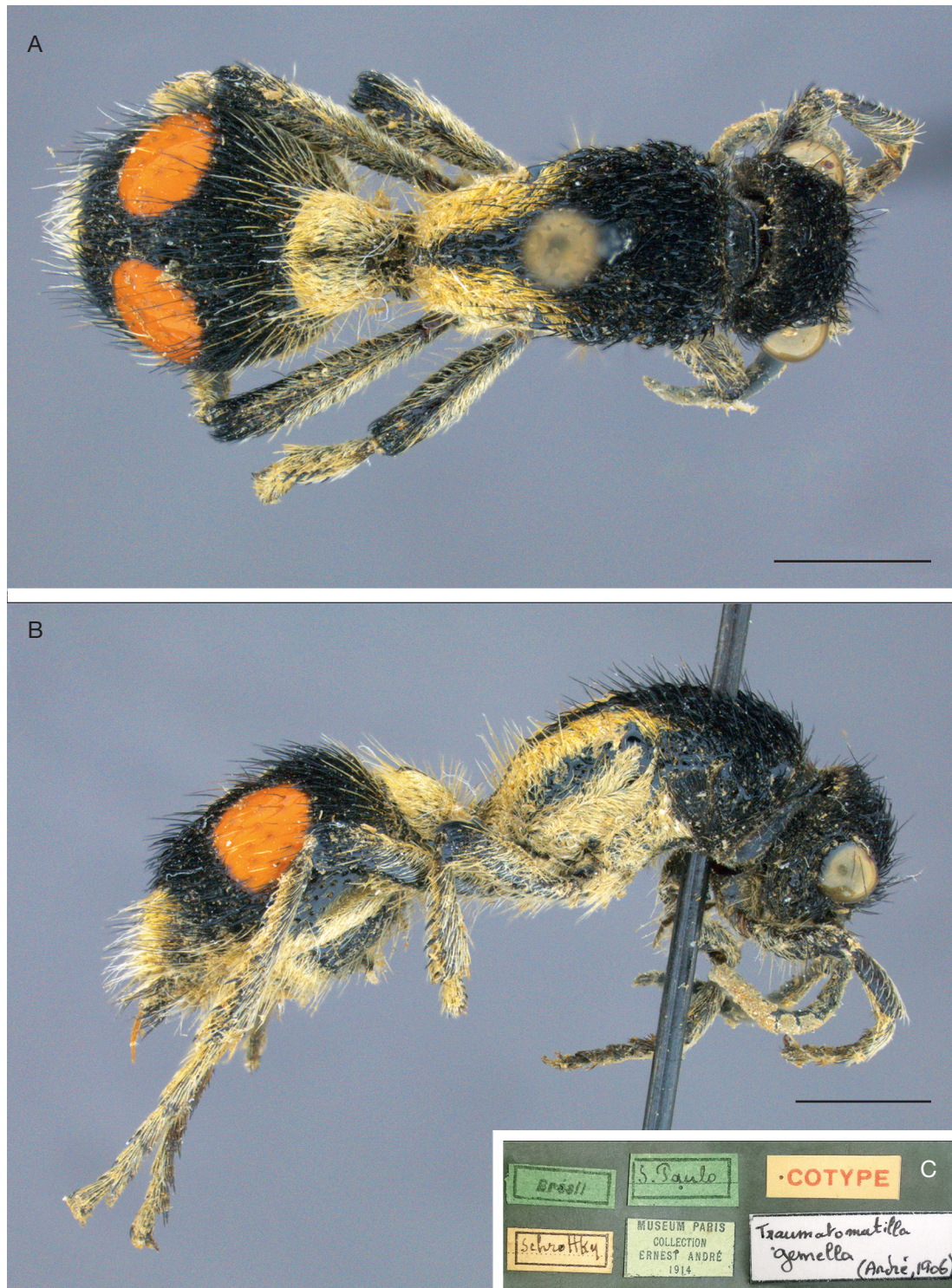


FIG. 10. — *Traumatotutilla gemella* (André, 1906), female, syntype, Brazil, Sao Paulo, MNHN: **A**, dorsal habitus; **B**, lateral habitus; **C**, type labels. Scale bars: 2 mm. Photos: P. R. Bartholomay.

smooth area. Lateral face of propodeum with sculpture partially concealed by dense setation, foveolate-punctate where visible. Ratios of widths of mesosoma at humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum immediately posterior to propodeal spiracles. Lateral margin of mesonotum simply divergent ante-

rior to propodeal spiracle, slightly diverging anterad. Propodeal spiracle almost flat against lateral margin of mesosoma; post-spiracular area absent. Scutellar scale and anterolateral carinae absent; scabrous intervals absent on scutellar area. Propodeum conspicuously elongate, dorsal face much longer than and well differentiated from posterior face.

Metasoma (Figs 9A, C; 10A, B). Ratios of width of T1, width of T2 and length of T2, 31:70:69. Disc of T2 densely and coarsely foveolate-punctate to punctate with dense interspersed micropunctures; foveolae sparser and micropunctures absent laterally and over integumental spots; sculpture less defined in general over integumental spots. T3–6 sculpture, except pygidial plate, predominantly concealed by dense setation, densely and coarsely foveolate-punctate to simply punctate with interspersed micropunctures where visible; pygidial plate broadly subpyriform, defined by strong, projected, flange-like lateral carinae at apical fourth of plate; surface mostly irregularly longitudinally rugose; interstice apparently granulose. S1 sparsely punctured, surface wedge-like, ending in a rounded longitudinal carina, slightly lower medially. S2 sparsely foveolate-punctate, punctures conspicuously smaller anteriorly; anteromedial crest-fold vestigial. S3–6 densely and coarsely foveolate-punctate with sparse micropunctures at S3–4; sculpture denser on S6.

Male

Body length. 10–12 mm.

Head (Fig. 11A). Transversely subrectangular with posterolateral angles rounded in dorsal view. Width $0.8 \times$ pronotal width. Eye almost circular. Ocelli small; OOD $3.1 \times$ DLO, IOD $1.2 \times$ DLO. Occipital carina distinct. Head surface densely and coarsely punctate. Gena ecarinate. Antennal scrobe concave to eye margin, with prominent transverse dorsal scrobal carina. Clypeus concave laterally immediately below antennal insertion, conspicuously convex medially; coarsely and densely punctate to micropunctate; apical/ventral margin completely concealed by dense setation. Scape bicarinate. Flagellomere 1: $2.4 \times$ pedicel length; flagellomere 2: $3.8 \times$ pedicel length. Mandible obliquely tridentate apically, inner tooth slightly larger than middle tooth; lacking dorsal or ventral projections.

Mesosoma (Fig. 11A). Epaulets well defined, slightly projected from anterior margin of pronotum, broadly separated from humeral carina, anterolateral angles of pronotum rounded. Anterior face of pronotum sparsely punctate with interspersed micropunctures laterally, with a conspicuous smooth unsculptured area. Tegula convex, mostly glabrous and impunctate except for dense coarse punctures on anterior third and along inner margin. Mesoscutum densely and coarsely foveolate-punctate, notaulus absent, parapsis vestigial, reduced to posterior half of mesoscutum. Scutellum convex, densely and coarsely areolate-punctate to foveolate-punctate; with longitudinal irregular carina medially formed by aligned intervals. Axilla produced posterolaterally as acute projections, with conspicuous flat coarsely and densely foveolate-punctate dorsal surface. Metanotum slightly wider laterally, its surface obscured by dense setation. Propodeal dorsum convex, partially concealed by dense setation, densely areolate where visible; lateral face densely and coarsely areolate, areolations less defined anterad; dorsal face rounded into and poorly distinguished from posterior face. Lateral face of pronotum densely coarsely and confusedly punctate to micropunctate;

mesopleura slightly swollen on dorsal half, without any or projections; mesopleural sculpture densely and coarsely areolate-punctate to foveolate-punctate with interspersed micropunctures anteriorly. Metapleuron sculpture almost concealed by dense setation.

Wings (Fig. 11A). Fore wing with elongate sclerotized pterostigma; marginal cell elongated, truncate apically; three submarginal cells; dark brown, slightly but conspicuously lighter on basal third.

Legs (Fig. 11A). Simply setose, no strong spines discernible dorsally; spurs finely serrate on margins.

Metasoma (Fig. 11A). T1 $0.5 \times$ as wide as T2. T2 length $0.85 \times$ its width. Dorsal metasomal sculpture partially concealed by dense setation, densely and coarsely punctate with interspersed micropunctures where visible; pygidial plate irregularly and vestigially rugose, weakly defined by parallel carinae apicolaterally. S1 longitudinally elevated medially, slightly pronounced carina lower medially. S2 coarsely and sparsely foveolate-punctate to punctate, interspersed micropunctures present anterolaterally, foveolae conspicuously sparser and larger posterad; with vestigial longitudinal anteromedial crest-fold; sternal pit absent. S3–5 sparsely and coarsely foveolate-punctate with interspersed micropunctures; S6–7 sparsely foveolate-punctate. S7 longer than broad, posterior margin projected laterally and medially, medial projection terminating in a pair of very small subacute closely spaced tooth-like process on posterior margin.

Genitalia (Fig. 11B–F). Parapenial lobe not at all pronounced posteriorly, simply rounded. Ratios of free length of paramere, cuspis and digitus, 63:33:19; paramere slightly sinuous in dorsal view, upcurved posteriorly in lateral view; with dense setae ventrally at anterior half; cuspis short, stout, slightly swollen sub-basally, narrower posterad, and almost straight in dorsal view; abruptly curved in wide angle at anterior third and narrower posterad in lateral view; with dense conspicuous, strongly sinuous setae on ventral surface, except at anterior third with simple short setae; dorsal surface with simple short setae; paracuspis well-developed, not sessile, slightly elongate vertically, subrounded at posterior margin, densely setose along posterodorsal margin, setae predominantly shorter than or as short as paracuspis; digitus short, slightly curved inward in dorsal view and slightly upcurved in lateral view, sparsely setose dorsally at base; penis valve strongly concave on internal surface, with closely spaced pair of short teeth posteroventrally; posterior tooth acute, subposterior tooth rounded, lateral pocket present on outer margin; distance between apex of teeth $0.1 \times$ length of valve; dense setae present along posterior margin and inconspicuous short setae present at base of subposterior tooth on outer surface.

Coloration and variations

Female (Figs 9A, C; 10A, B). Head, mesosoma and metasoma integument always black, at most brownish-black, with



FIG. 11. — *Traumatotutilla gemella* (André, 1906), male, Brazil, Sao Paulo, EMUS: **A**, lateral habitus; **B–F**: genitalia: **B**, dorsal view (halved); **C**, ventral view (halved); **D**, lateral/inner view (penis valve removed); **E**, cuspis, lateral/inner view (removed not to scale); **F**, Penis valve, lateral/outer view (removed, not to scale). Scale bar: 2 mm. Photos: K. A. Williams.

mandibles and antennal flagella partially reddish-brown and T2 with a pair of subrounded orange integumental spots varying in size; seta varying in density and predominantly silvery-golden except the following areas with black setae: head (except antennae), dorsum of pronotum, mesonotum, dorsum of propodeum medially, lateral face of pronotum, anterior half of mesopleuron, apex of meso and metafemora

dorsally, most of disc of T2 (except integumental spots), most of fringe of T2–3 (except medially and laterally), narrow sub-lateral areas on fringe of T4, and S6.

Male (Fig. 11A). Integument black, at most brownish-black, with mandibles and flagella partially reddish-brown. Body setae predominantly silvery-golden varying in density except

for the following areas with black setae varying in density: head (except apical/ventral margin of clypeus), pronotum, mesonotum, axillar projections, scutellum, apex of meso and metafemora dorsally, posterior two thirds of T2, fringe of T2–3 (except narrow lateral areas), T4–7, most of S4–5, and S6–7.

REMARKS

The sex association was based on distribution and matching color pattern, since both sexes of *Traumatomutilla gemella* are part of a well-defined mimicry syndrome occurring in the Atlantic Forest, which has been observed and used as a basis for sex associations in multiple species such as *Pappognatha patruelis* (André, 1898), *Hoplocrates cephalotes* (Swederus, 1787), *Hoplomutilla spinosa* (Swederus, 1787), *Atlantilla auriculata* (Gerstaecker, 1874), and *T. guarata* Casal, 1969 (KAW and PRB pers. obs.). To the best of our knowledge, the only way to differentiate the males of *T. gemella* from the remaining males of the species-group are the setal characters previously mentioned in the diagnosis and identification key. Setae and color characters are also the most easily observable character to differentiate females of *T. gemella* especially since it appears that there are no variations whatsoever in the specimens examined. In the case of the females, however, there are reliable structural characters that can be used, namely the presence of micropunctures on the lateral propodeal face.

Traumatomutilla peismatara

Bartholomay & Cambra n. sp.

(Figs 12; 13)

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Traumatomutilla peismatara – Bartholomay & Cambra in Bartholomay 2019: 101.

ETYMOLOGY. — From the Greek *peismatára*, meaning “stubborn, headstrong”, in reference to PRB’s initial stubborn denial of RAC’s conclusion that this was indeed a new species with the males from Acre state as their corresponding opposite sex. Treat as an adjective in the nominative singular.

TYPE MATERIAL. — **Holotype.** Peru • 1 ♀; Loreto, Pucallpa; 02.X.1953; J. M. Schunke leg.; BMNH.

Paratypes. Peru • 1 ♀; MNHN-EY-EY26102 • 1 ♀; Loreto, 80 km NE [kilometers northeast of] Iquitos, Yanamono River, Explorama Lodge; 7.XI.1990; R. Cambra & D. Quintero leg.; MIUP • 1 ♀; Madre de Dios, Reserva Manu, Estacion Pakitza; 1-2.VII.1993; R. Cambra leg.; MIUP • 1 ♀; Manu N. P. [National Park], Colapa, nr. [near] Cocha Cashu; 1992; MIUP.

Brazil • 4 ♂; Amazonas, Rio Javari, Estirão do Equador; M. Alvarenga leg.; AMNH • 1 ♂; Acre, Senador Guiomard, F. E. [Fazenda Experimental] Catuaba; 06-26.IX.2016; J. A. Rafael & E. F. Morato leg.; INPA.

DIAGNOSIS. — **Female.** Lateral face of propodeum sparsely sculptured, with large smooth and shining areas, dorsal face of propodeum almost flat with mesonotum, sharply angled in relation to posterior face, with conspicuous elevation on posterior margin of dorsal face, head setae entirely silvery-white.

Male. Pronotal dorsum not concealed by dense appressed setation and without micropunctures, lateral face of propodeum without conspicuous areas of dense appressed setae, posterior margin of

hypopygium projected medially and laterally, medial projection shorter than lateral ones.

DISTRIBUTION. — Peru (Loreto, Ucayali, Madre de Dios).

DESCRIPTION

Female

Body length. 12 mm.

Head (Fig. 12A, B). Posterior margin almost straight. Occipital carina evenly wide throughout and smoothly curved dorsolaterally. Vertex width $0.9 \times$ pronotal width. Eye almost circular, its height in frontal view $1.4 \times$ the distance from its ventral margin to mandibular condyle. Head densely and coarsely foveolate-punctate to areolate-punctate, with broad longitudinal carina extending medially from posterior margin of vertex to middle of front. Mandible with conspicuous subapical tooth. Dorsal scrobal carina well-defined, irregular, separated from antennal tubercles and irregular lateral scrobal carina. Antennal tubercle finely and irregularly rugose. Flagellomere 1: $1.75 \times$ pedicel length; flagellomere 2: $1.5 \times$ pedicel length.

Mesosoma (Fig. 12A, B). Dorsal thoracic length slightly smaller than mesosomal width. Mesosomal dorsum densely and coarsely areolate-punctate to foveolate-punctate. Anterior face of pronotum defined, short, its height equal to pronotal collar length, vestigially and coarsely striated longitudinally; laterobasally with interspersed scattered punctures; unsculptured, smooth, shining mediobasally; dorsal face roundly angulate into anterior face in lateral view. Humeral carina well-defined, slightly projected dorsally, broadly separated from well-defined raised subangulate epaulet; anterolateral corners of pronotum sharply angulate in dorsal view. Pronotal spiracle almost flat against lateral margin of pronotum. Sculpture of lateral face of pronotum almost concealed by dense setation; mesopleuron and metapleuron sculpture concealed by dense setation, except dorsal fourth of metapleuron unsculptured, smooth, shining. Lateral face of propodeum sparsely and shallowly areolate-punctate throughout; sculpture larger and denser posterad, smaller anterad, with large and conspicuous unsculptured, smooth and shining areas. Ratios of widths of mesosoma at humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum immediately posterior to propodeal spiracles. Lateral margin of mesonotum simply divergent anterior to propodeal spiracle, slightly diverging anterad. Propodeal spiracle almost flat against lateral margin of mesosoma; post-spiracular area absent. Scutellar scale and anterolateral carinae absent; scabrous intervals absent on scutellar area. Propodeum conspicuously elongate, dorsal face much longer than and well differentiated from posterior face; dorsal face with conspicuous tubercle-like medial elevation at posterior margin, thus sharply differentiated from posterior margin in lateral view.

Metasoma (Fig. 12A, B). Ratios of width of T1, width of T2 and length of T2, 33:72:66. Disc of T2 sparsely and coarsely foveolate-punctate with dense interspersed micropunctures; foveolae sparser and micropunctures absent laterally and over



FIG. 12. — *Traumatotutilla peismatara* Bartholomay & Cambra n. sp., female, holotype, Peru, Loreto, Pucallpa, BMNH: **A**, dorsal habitus; **B**, lateral habitus. Scale bars: 2 mm. Photos: P. R. Bartholomay.

integumental spots. T3–5 sculpture predominantly concealed by dense setation, densely and coarsely foveolate-punctate to simply punctate with dense interspersed micropunctures where visible; T6, except pygidial plate, densely and coarsely foveolate-punctate; pygidial plate broadly subpyriform, defined by strong, projected, flange-like lateral carinae at apical fourth of plate; surface with predominant longitudinal, coarse

and confused rugosities, interstice granulose.. S1 sparsely punctured, surface wedge-like, ending in a rounded longitudinal carina, conspicuously higher anteriorly. S2 sparsely foveolate-punctate, foveolae sparser and smaller anterad; anteromedial crest-fold vestigial. S3–4 densely and coarsely foveolate-punctate with dense micropunctures; S5–6 densely and coarsely foveolate-punctate.

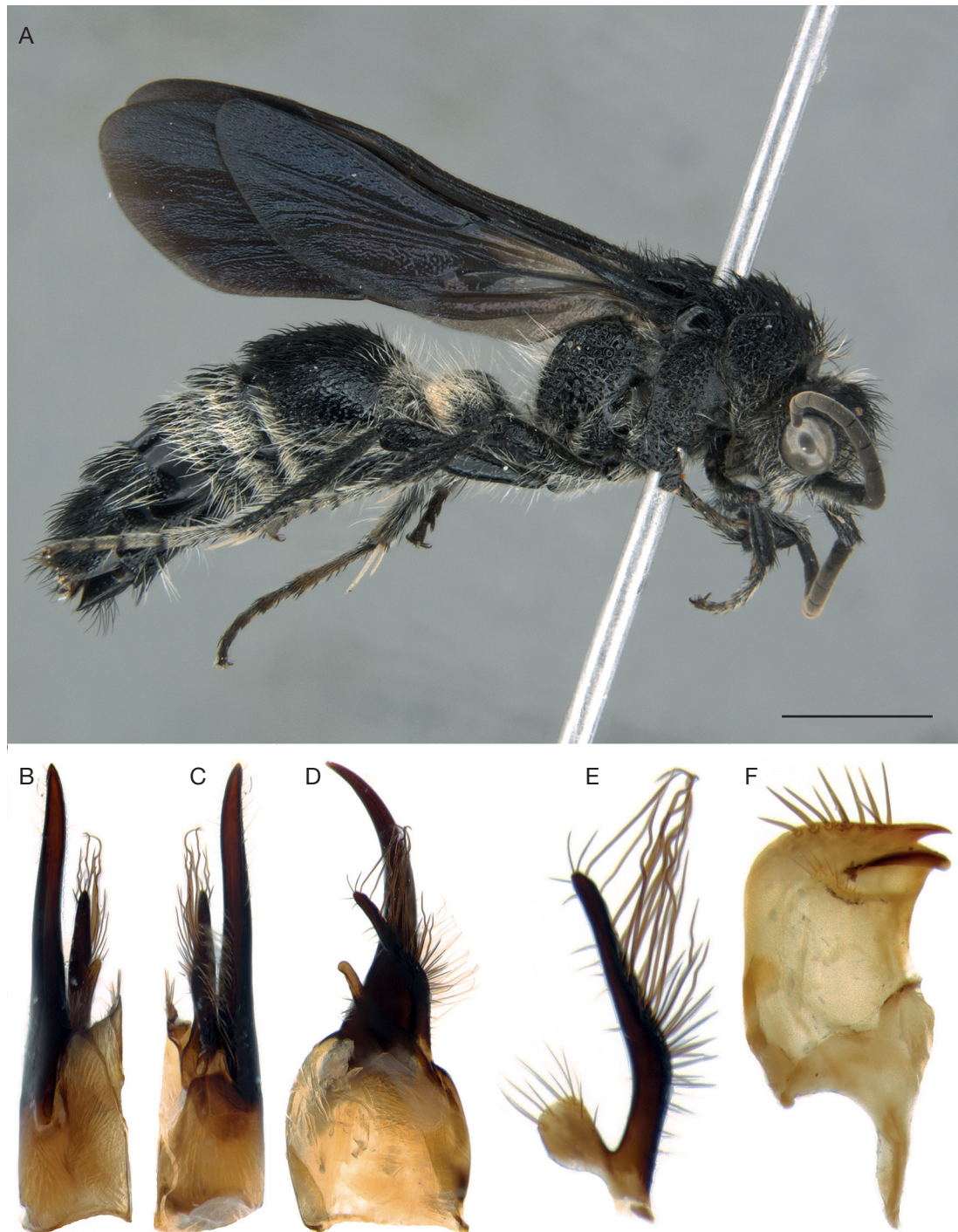


FIG. 13. — *Traumatotutilla peismatara* Bartholomay & Cambra n. sp., male, paratype, Brazil, Acre, Senador Guiomard, INPA: **B-F**, genitalia; **B**, dorsal view (halved); **C**, ventral view (halved); **D**, lateral/inner view (penis valve removed); **E**, cuspid, lateral/inner view (removed not to scale); **F**, penis valve, lateral/outer view (removed, not to scale). Scale bar: 2 mm. Photos: P. R. Bartholomay.

Male

Body length. 12 mm.

Head (Fig. 13A). Transversely subrectangular with posterolateral angles rounded in dorsal view. Vertex width $0.9 \times$ pronotal width. Eye almost circular. Ocelli small; OOD $3.4 \times$ DLO, IOD $0.8 \times$ DLO. Occipital carina distinct. Head

surface densely and coarsely foveolate-punctate; interspersed micropunctures present along posterior margin, genae, and malar space. Gena ecarinate. Antennal scrobe concave to eye margin, with prominent transverse dorsal scrobal carina. Clypeus concave laterally immediately below antennal insertion, conspicuously convex medially; predominantly obscured by dense setation, coarsely and densely punctate to

micropunctate where visible; apical/ventral margin with a pair of closely spaced short blunt tooth-like projections medially. Scape bicarinate. Flagellomere 1: $1.6 \times$ pedicel length; flagellomere 2: $2.2 \times$ pedicel length. Mandible obliquely tridentate apically, inner and middle teeth almost equal, greatly reduced; lacking dorsal or ventral projections.

Mesosoma (Fig. 13A). Epaulets well defined, slightly projected from anterior margin of pronotum, subangulate, broadly separated from humeral carina, anterolateral angles of pronotum subrounded. Anterior face of pronotum sparsely punctate with interspersed micropunctations laterally, almost unsculptured, smooth, and shining elsewhere; slightly longitudinally depressed medially. Tegula convex, mostly glabrous and impunctate except for dense coarse punctures on anterior and inner margin. Mesoscutum densely and coarsely foveolate-punctate, notaulus and parapsis present, reduced to posterior half of mesoscutum; with medial longitudinal carina on posterior half. Scutellum convex, subglobose, with somewhat definable dorsal and posterior carina; densely and coarsely areolate-punctate to foveolate-punctate; with longitudinal carina medially formed by aligned intervals on dorsal face. Axilla produced posterolaterally as acute projections, with conspicuous flat coarsely and densely foveolate-punctate dorsal surface, except apically and along outer margin unsculptured. Metanotum almost equally wide throughout, its surface obscured by dense setation. Propodeal dorsum convex, densely areolate; lateral face densely areolate posterad to foveolate anterad; dorsal face rounded into and poorly distinguished from posterior face. Lateral face of pronotum sparsely and coarsely foveolate-punctate with interspersed dense micropunctures; mesopleuron slightly swollen on dorsal half, without any or projections; sculpture densely and coarsely foveolate-punctate; foveolae sparser anterad and posterad, micropunctures present anteriorly. Metapleuron predominantly micropunctured to unsculptured, smooth and shining, except for vestigial foveolation and rugosities on dorsal and ventral fifths.

Wings (Fig. 13A). Fore wing with elongate sclerotized pterostigma; marginal cell elongated, truncate apically; three submarginal cells; dark brown, slightly but conspicuously lighter on basal third.

Legs (Fig. 13A). Simply setose, no strong spines discernible dorsally; spurs finely serrate on margins.

Metasoma (Fig. 13A). T1 $0.5 \times$ as wide as T2. T2 length $0.8 \times$ its width. Dorsal metasomal sculpture partially concealed by dense setation, sparsely and coarsely punctate with interspersed micropunctures where visible; pygidial plate concave, posterior margin conspicuously curved upward; surface predominantly smooth, shining, with vestigial undefined sculpture apically; weakly defined by parallel carinae apicolaterally. S1 longitudinally elevated medially, ending in blunt low, slightly concave carina. S2 sparsely and finely foveolate-punctate to punctate, with

interspersed micropunctations on anterior third, foveolae conspicuously sparser posterad; anteromedial crest-fold almost absent; sternal pit absent. S3–4 sparsely and finely foveolate-punctate with interspersed micropunctures; S5–7 sparsely foveolate-punctate. S7 longer than broad, with conspicuous medial longitudinal unsculptured area; posterior margin projected apicolaterally, simply convex and shorter than lateral corners medially.

Genitalia (Fig. 13B–F). Parapenial lobe not at all pronounced posteriorly, simply rounded. Ratios of free length of paramere, cuspis and digitus, 48:24:11; paramere slightly sinuous in dorsal view, upcurved posteriorly in lateral view; with dense setae ventrally at anterior half; cuspis short, stout, slightly swollen medially and narrower posterad in lateral view; narrower posterad and almost straight in dorsal view; abruptly curved dorsally in wide angle at anterior third; with dense conspicuous, strongly sinuous setae on ventral surface, except at anterior third with simple short setae; dorsal surface with overall inconspicuous simple short setae; paracuspis well-developed, not sessile, slightly elongate longitudinally, subrounded at posterior margin, densely setose along posterodorsal margin, setae predominantly shorter than or as short as paracuspis; digitus short, slightly curved inward in dorsal view and slightly upcurved in lateral view, sparsely setose dorsally at base; penis valve strongly concave on internal surface, with closely spaced pair of short teeth posteroventrally; posterior tooth acute, subposterior tooth subacute, lateral pocket present on outer margin; distance between apex of teeth $0.1 \times$ length of valve; dense setae present along truncate, flat posterior margin and inconspicuous short setae present at base of subposterior tooth on outer surface.

Coloration and variations

Female (Fig. 12A, B). Integument black to brownish-black except mandibles and antennal flagella partially reddish-brown, and T2 with a pair of subcircular orange integumental spots. Body setae predominantly silvery-white varying in density except the following areas with black to brownish-black setae varying in density: pronotum medially, mesonotum anteromedially, scutellar area, propodeum medially, disc of T2 (except over integumental spots), and fringe of T2–3 sublaterally. The posterior transverse area of silvery-white setae on the mesonotum varies from broadly interrupted by black setae medially to complete.

Male (Fig. 13A). Integument black. Wings predominantly dark-brown infuscated, except basal third hyaline brown with blackish veins; with strong violaceous/blueish reflections. Body setae predominantly silvery-white varying in density except the following areas with black setae varying in density: vertex anteriorly, ocellar area, dorsal half of front, gena dorsally; pronotum predominantly, mesoscutum, axillar projections, mesoscutellum, mesopleuron anterodorsally, dorsal third of propodeal dorsum; dorsal and external surfaces of tibiae, femora apicodorsally; T2 disc (except anterior third), fringe of T2–5 medially, T6–7 (except pygidial plate asetose), S6 partially, and S7.

REMARKS

Females of *T. peismatara* Bartholomay & Cambra n. sp. are structurally similar to those of *T. diophthalma*, but differ mainly in features of the propodeum, namely the overall shape of the dorsal propodeal face and its relation with the mesonotum in lateral view. This small difference originally raised doubts about the validity of this new species and it was initially considered a variation of *T. diophthalma*. After the sex association of *T. chuza*, *T. diophthalma*, and *T. gemella*, a fourth male morphospecies remained that could not be properly placed within any of the

known species, especially because of the structural differences observed in the hypopygium. These males were all collected in Amazonian areas that are relatively close to the Peruvian distribution of *T. peismatara* Bartholomay & Cambra n. sp. and in areas where no other females of the *T. gemella* species-group were found. Based on this, morphological features, and similar distribution, we hypothesize that the females of *T. peismatara* Bartholomay & Cambra n. sp. represent a distinct species and the males collected in the far west of the Brazilian Amazon are conspecific with those females.

KEY TO FEMALES OF THE *TRAUMATOMUTILLA* GEMELLA SPECIES-GROUP

1. T2 with a pair of sublateral longitudinal yellow integumental stripes arched outward at posterior third (Fig. 1A, B); Cerrado, Caatinga, and Restinga (Brazil) species *T. andrei* (Cresson, 1902).
- T2 with a pair of subcircular yellowish to reddish integumental spots (Figs 2A; 3A; 4A; 5A; 7A; 9A; 10A; 12A) 2
2. Lateral face of propodeum with dense pale golden setae and micropunctures on anterodorsal third (Fig. 10B); head setae completely black (Figs 9A, C; 10A, B); setae on posterior half of mesosomal dorsum golden (Figs 9A; 10A); Atlantic Forest (Brazil) species *T. gemella* André, 1906.
- Lateral face of propodeum with sparse erect setae only, intervals between larger punctures smooth (Figs 2C; 3C, 4C; 5C; 7B; 12B); head setae predominantly silvery-white to silvery-golden (Figs 2A; 3A; 4A; 5A; 7A; 12A) ... 3
3. Propodeal dorsum convex throughout or evenly sloping posterad, not conspicuously elevated anywhere, dorsalface smoothly angulate into posterior face in lateral view (Figs 4C; 5C) 4
- Propodeal dorsum conspicuously elevated medially on posterior margin, dorsal face sharply angulate into posterior face in lateral view (Figs 7B; 12B) 5
4. Propodeum robust, dorsal face slightly longer than posterior face (Fig. 5C) *T. chuza* Casal, 1969.
- Propodeum slender, elongate, dorsal face much longer than posterior face (Fig. 3C, 4C) *T. angustata* (André, 1906).
5. Head setae entirely silvery-white, varying in density *T. peismatara* Bartholomay & Cambra n. sp.
- Silvery-white setae of head restricted to dense transverse band on vertex, and sparser setae on malar space and gena (Fig. 7A, B) *T. diophthalma* (Klug, 1821).

KEY TO THE KNOWN MALES OF THE *TRAUMATOMUTILLA* GEMELLA SPECIES-GROUP (UNKNOWN FOR *T. ANGUSTATA* AND *T. ANDREI*)

1. Pronotal dorsum predominantly concealed by dense setae, sculpture with conspicuous interspersed micropunctures where visible; pronotum clothed exclusively with silvery-white setae throughout (Fig. 6A) *T. chuza* Casal, 1969.
- Pronotal dorsum with mostly sparse, erect setae, sculpture without micropunctures or with inconspicuous micropunctures where visible clothed predominantly with black setae, at most with silvery-white setae medially on anterior margin (Figs 8A; 11A; 13A) 2
2. Lateral face of propodeum and metapleuron with conspicuous dense and decumbent silvery-golden setae throughout; head clothed almost exclusively with black setae; body setae with an overall silvery-golden tone (Fig. 11A) *T. gemella* (André, 1906).
- Lateral face of propodeum and metapleuron at most with sparse scattered and erect silvery-white setae; head predominantly clothed with silvery-white setae, black setae restricted to ocellar area and/or most of vertex; body setae with an overall silvery-white tone (Figs 8A; 13A) 3
3. Posterior margin of hypopygium projected medially and laterally with medial projection simply convex and shorter than lateral projections; S2 sculpture with interspersed micropunctures anterolaterally; propodeal dorsum at most with sparse scattered and erect silvery-white setae anterolaterally (Fig. 13A) *T. peismatara* Bartholomay & Cambra n. sp.
- Posterior margin of hypopygium projected medially and laterally with medial projection blunt and longer than lateral projections; S2 simply foveolate-punctate throughout, without apparent interspersed micropunctures; propodeal dorsum densely clothed with appressed silvery-white setae anterolaterally (Fig. 8A) *T. diophthalma* (Klug, 1821).

DISCUSSION

The *T. gemella* species-group is at the same time the most widely distributed in the genus and one of the rarest, with only 100 specimens found in collections and recorded from Argentina to Panama. This disparity results in paradoxical situations; for example, *T. andrei* appears to be widely distributed in Brazil but is known from three specimens only. Sex associations were particularly difficult to recognize. Therefore, apart from the *T. diophthalma* couple reared in Panama, sex associations in this species-group relied heavily on close or overlapping distribution of males and females. This situation is not ideal, but the sex association hypotheses proposed here are supported by the morphological clues provided by the reared male specimen of *T. diophthalma* in Panama. Males and females of *T. gemella* co-occur in the Atlantic Forest and both sexes have the typical color syndrome for the region. Extensive sampling over the years in the Ducke Reserve, Manaus, Amazonas, Brazil, has produced only males and females of *T. chuza*. Additionally, males of *T. chuza* have not been recorded in areas outside of the Amazon so far, while *T. diophthalma* males have been recorded as far South as Mato Grosso state in Brazil. Finally, through a process of elimination and considering the clear differences between males of *T. chuza* and *T. peismatara* Bartholomay & Cambra n. sp. and the known distribution of *T. peismatara*, the sex association for this new species became obvious.

Though there are obvious differences in the cuspis, digitus, and penis valve between all males of the *T. gemella* species-group, it is still unclear how reliable and/or variable these characters are due to the small number of specimens available. At this early stage, however, it is evident that the penis valve of *T. gemella* is conspicuously more elongate with shorter posteroventral teeth, unlike those of the other species that are stout with a more prominent narrow anterior tooth. The differences between the genitalia of *T. diophthalma* and *T. chuza* are all superficial and can only be properly delimited with larger series of specimens.

The biological data presented here are the first records of *Traumatomutilla* attacking arboreal or twig-nesting hosts, albeit in trap-nests. It is important to note that females of the *T. gemella* species-group have the most reduced pygidial plate in the genus, with the flange-like lateral carinae restricted to the apical fifth of the plate; also, the protarsal rake is almost absent. Well developed protarsal rakes and pygidial plate have been associated with velvet-ant species that attack ground-nesting hosts (Williams *et al.* 2011b; Bartholomay *et al.* 2018). The reduction of both these characters in the females of the *T. gemella* species-group, coupled with two different instances of them being reared from non-ground-nesting hosts, is strong evidence that this association is true. Finally, it is quite remarkable that a single species, *T. diophthalma*, parasitizes very distinct hosts, a cockroach-hunting sphecid (*Podium*) and a spider-hunting crabronid (*Trypoxylon*). It is important to note that the rearing of the male specimen from the *Podium* sp. nest was highly experimental and therefore done in very different conditions than those likely found by

this species in nature. This particular host/parasite relationship, however, possibly occurs naturally since both species were collected in the same area and the female was capable of opening the chitinous cocoon of the host on its own. Additionally, Morato (1994) reared Couples of *Xystromutilla asperiventris* André, 1905 (Mutillidae: Sphaerophthalminae) from species of *Podium* and *Trypoxylon* in the same area.

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