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Williams (Hymenoptera: Mutillidae: Sphaerophthalminae: Dasymutillini)

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Traumatomutilla André miscellanea: Revision of the *bellica*, *bifurca*, *diabolica*, and *vitelligera* species groups, and a new group for the new species *T. pilkingtoni* Bartholomay and Williams (Hymenoptera: Mutillidae: Sphaerophthalminae: Dasymutillini)

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Abstract. Five small species groups of *Traumatomutilla* André, 1901 are revised. A new species, *T. pilkingtoni* Bartholomay and Williams **sp. nov.** (Argentina) is described and placed within its own species group. All known species of the *bellica*, *diabolica*, *vitelligera*, and *bifurca* species groups are redescribed. New synonymies are proposed for *T. vitelligera* (Gerstaecker, 1874) = *Mutilla fascinata* Smith, 1879, **syn. nov.**; = *Traumatomutilla comata* André, 1906, **syn. nov.** and for *T. bifurca* (Klug, 1821) = *T. ira* Casal, 1969, **syn. nov.** The lectotypes of *Mutilla bifurca* Klug, 1821 and *Mutilla comata* André, 1906 are designated. The hitherto unknown males of *T. vitelligera* and *T. bifurca* are diagnosed and described.

Key words. Velvet ants, Neotropics, South America.

Introduction

Traumatomutilla André, 1901 is a Neotropical genus of tribe Dasymutillini (Brothers and Lelej 2017), that includes over 180 described species and subspecies, with species ranging from Costa Rica to Argentina (Nonveiller 1990; Cambra 1997). Although Nonveiller (1990) mentioned *Traumatomutilla spegea* (Fabricius, 1804) from Mexico, this undoubtedly was based on a mislabeled specimen. Due to the extreme sexual dimorphism observed in Mutillidae, *Traumatomutilla* has many species described based only on females (140) or males (46) and sexual associations are notoriously rare and difficult to discover (Williams et al. 2017). Additionally, for most of its taxonomic history, *Traumatomutilla* species have been diagnosed almost exclusively using highly variable color and setal patterns, instead of more reliable structural characters (Gerstaecker 1874; Cresson 1902; Casal 1969). Recent works with the closely related *Dasymutilla* Ashmead, 1899 indicated that such characters alone may not be reliable for

species delimitation due to the existence of Müllerian mimicry complexes (Williams et al. 2011; Williams 2012; Wilson et al. 2012, 2013, 2018). As an effort to facilitate taxonomic revision of this species-rich genus, Williams et al. (2017) organized 135 species of *Traumatotutilla* based on females into 14 species groups supported by shared structural characters or shared combinations of structural characters. In this study we review four of the smallest groups: *bellica*, *bifurca*, *diabolica*, and *vitelligera*. We provide six redescriptions, two sex associations, and three synonymies for various species in these four groups and propose one additional species group for *T. pilkingtoni* Bartholomay and Williams, **sp. nov.**

Materials and Methods

The following codens are used for institutions housing the material discussed in the current study:

AMNH	American Museum of Natural History, New York, New York, USA.
ANSP	Academy of Natural Sciences, Philadelphia, Pennsylvania, USA
BMNH	The Natural History Museum, London, United Kingdom.
CASC	California Academy of Sciences, San Francisco, California, USA.
CEUFT	Coleção Entomológica da Universidade Federal do Tocantins, Palmas, Tocantins, Brazil.
CESC	Coleção Entomológica da Universidade de Santa Cruz do Sul, Santa Cruz do Sul, Rio Grande do Sul, Brazil.
CMNH	Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA.
CSCA	California State Collection of Arthropods, Sacramento, California, USA.
CUIC	Cornell University Insect Collection, Department of Entomology, Cornell University, Ithaca, New York, USA.
CZMA	Coleção Zoológica do Maranhão, Caxias, Maranhão, Brazil.
DGMC	Donald G. Manley Collection, Florence, South Carolina, USA
DZUP	Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.
EMUS	Department of Biology Insect Collection, Utah State University, Logan, Utah, USA.
FSCA	Florida State Collection of Arthropods, Gainesville, Florida, USA.
INHS	Illinois Natural History Survey, Prairie Research Institute, Champaign, Illinois, USA.
INPA	Coleção de Invertebrados do Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil.
MIUP	Museo de Invertebrados G.B. Fairchild, Universidad de Panama, Panama City, Panama.
MLUH	Martin Luther Universität Halle-Wittenberg, Halle, Germany.
MNCN	Museo Nacional de Ciencias Naturales, Madrid, Spain.
MNHN	Museum Nationale d'Histoire Naturelle, Paris, France
MPEG	Museu Paraense Emílio Goeldi, Belém, Pará, Brazil
MZUSP	Museu de Zoologia da Universidade de São Paulo, São Paulo, São Paulo, Brazil
UEFS	Universidade Estadual de Feira de Santana, Feira de Santana, Bahia, Brazil.
UFES	Universidade Federal do Espírito Santo, Vitória, Espírito Santo, Brazil.
UFMT	Universidade Federal do Mato Grosso, Cuiabá, Mato Grosso, Brazil.
UFRN	Universidade Federal do Rio Grande do Norte, Natal, Rio Grande do Norte, Brazil.
UMSP	University of Minnesota Insect Collection, St. Paul, Minnesota, USA.
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington D.C., USA.
ZMUC	University of Copenhagen Zoological Museum, Copenhagen, Denmark.

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

In the description and redescription sections we refrain from mentioning coloration and setae patterns due to the highly variable nature of these characters in *Traumatotutilla*. Instead, we provide a separate section titled **Coloration and variations**, in which we provide an overall description of the known color and setae patterns for a particular 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 the material examined section.

Taxonomic Results

vitelligera species group

Diagnosis. Females of this species group are identified by a unique combination of characters: head unarmed posterolaterally; mesonotum rounded laterally, lacking longitudinal medial carina; scutellar scale distinct, connected to anterior transverse carina; apex of middle and hind femora truncate; T2 having four integumental spots; gena carinate; pygidium broadly ovate. Males can be diagnosed by having the parameres conspicuously sinuous, with an isolated medial tuft of long setae ventrally; cuspis virtually straight and overall asetose, except for a small tuft of short setae apically. External characters include white meso- and metatibial spurs, truncate axilla, mesopleuron with blunt tubercle; hypopygium trapezoidal and T3–5 entirely clothed with white setae.

Included taxon. *Traumatomutilla vitelligera* (Gerstaecker, 1874).

Distribution. *Traumatomutilla vitelligera* has been recorded from six South American countries, but we have seen specimens only from semiarid regions of Ecuador, Peru and Chile.

Remarks. The vitelligera group is one of the three species groups of *Traumatomutilla* with only one species, *T. vitelligera* (Gerstaecker, 1874). As in *T. diabolica* (Gerstaecker, 1874), the mesosomal sculpture of *T. vitelligera* differs from other large-bodied *Traumatomutilla* by lacking the distinctive structures of the more diverse, large-bodied species groups [medial longitudinal mesonotal carina (indica), bilobate anterior transverse carina separated from scutellar scale (juvenilis), and lateral mesonotal tubercles (quadrinotata)]. The lectotype of *T. vitelligera*, however, has a conspicuous scutellar scale connected laterally with its anterolateral carinae, as in many species of the indica group. Additionally, aside from a few species found in northwestern Colombia, this is the only species in *Traumatomutilla* known west of the Andes.

Traumatomutilla vitelligera (Gerstaecker, 1874)

(Fig. 1–25)

Mutilla vitelligera Gerstaecker 1874: 71. Holotype (by monotypy) female, Peru (ZMB), examined.

Mutilla diligens Smith 1879: 214. Holotype female, Venezuela (BMNH). Synonymized by Mickel 1964: 171.

Mutilla fascinata Smith 1879: 217. Holotype (by monotypy) male, Peru (BMNH), examined, **syn. nov.**

Ephuta (Traumatomutilla) vitelligera André 1902: 57, taxonomic position.

Mutilla fascinata André 1902: 73, *incertae sedis*.

Ephuta (Traumatomutilla) comata André 1906: 67. Lectotype (designated here) male, Ecuador, Guayaquil (MNHN), examined, **syn. nov.**

Sphaerophthalma salaverensis Rohwer 1913: 449 (holotype female, coast of Peru, Desert of Salaverry, 15 vi 1911 (USNM 15115), examined. Synonymized by Mickel 1964: 171.

Traumatomutilla fascinata: Mickel 1964: 169, new combination

Traumatomutilla vitelligera: Mickel 1964: 171, new combination.

Diagnosis. Female. In addition to structural characters referenced in the species groups diagnosis, *T. vitelligera* can be diagnosed by the following: head mostly clothed with silvery-white setae, mesosomal setae almost entirely black. Sculptured area on mesopleural ridge broad, densely and coarsely areolate-punctate. **Male.** Males of *T. vitelligera* can be diagnosed by their unique color pattern: having entirely black integument with head mostly and T3–5 completely clothed with dense silvery-white setae as well as blunt tubercles on dorsal half of mesopleuron, truncate axillar projections, and elongate hypopygium.

Description. Female. Body length 15–18 mm. *Head.* Posterior margin straight, occipital carina slightly swollen apicolaterally. Head width $0.75 \times$ pronotal width. Eye almost circular; its length in frontal view

0.9 × distance between its lower margin and mandibular condyle. Frons and gena densely and coarsely areolate-punctate; vertex sculpture concealed by dense setae. Genal carina present, short, uneven, poorly defined. Mandible with small subapical tooth, unarmed dorsally and ventrally. Antennal scrobe dorsal carina present, well-defined, narrowly separated from antennal tubercles and reduced lateral scrobal. Antennal tubercle vestigially rugose. Flagellomere 1 2.7 × pedicel length; flagellomere 2 1.6 × pedicel length. *Mesosoma*. Mesosomal length 0.85 × width; pronotum as wide as mesothorax. Mesosomal dorsum densely and finely areolate-punctate. Anterior face of pronotum well-defined, vestigially longitudinally striate basally and sparse coarse punctate apically. Humeral carina well developed, terminating well before epaulet; projected apically; anterolateral corners of pronotum angulate in dorsal view. Pronotal spiracle virtually flat against lateral margin of pronotum. Lateral face of pronotum finely, shallowly foveate-punctate with interspersed micropunctures and inconspicuous impunctate swelling antero-ventral to pronotal spiracle. Mesopleuron micropunctate throughout, except along mesopleural ridge dense coarse areolate punctate. Metapleuron sculpture mostly concealed by dense setae, except basal fourth coarsely and densely reticulate and apical fourth impunctate. Lateral face of propodeum sparsely, coarsely and shallowly foveate-punctate, more densely, coarsely and deeply so posterad. Ratios of width of humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum posterior to propodeal spiracles, 50:58:57:45:40. Lateral margin of mesothorax slightly constricted anterior to propodeal spiracle. Scutellar scale well-defined; anterolateral carinae connected to each other forming a single transverse carina narrowly reaching propodeal spiracles laterally and wider than scutellar scale; anterolateral carinae and narrowly connected to scutellar scale sublaterally; scabrous intervals absent. Propodeal spiracles moderately projected from lateral margin of mesosoma. Propodeum convex in lateral view, posterior face longer than dorsal face; post-spiracular area undefined. *Legs*. Mid and hind femora truncate apico-externally, truncation slightly sulcate. *Metasoma*. Ratios of width of T1, width of T2 and length of T2, 33:69:68. T2 with maximum width posterior to mid length. Disc of T2 densely and coarsely foveolate-punctate throughout, more densely, coarsely and confusedly so medially; sculpture shallower and sparser on integumental spots. T3–5 densely foveolate-punctate with interspersed fine punctures. S1 with pronounced longitudinal carina equally high throughout. S2 coarsely and densely foveolate-punctate, more sparsely and finely so postero-medially; S3–5 densely foveolate-punctate; anteromedial crest-fold present on S2; subapical slope on S2 reduced, nearly absent medially. Pygidium broad, sub-ovate, defined by lateral carinae, except at basal third; with fine dense irregular rugosities; interstice coarsely granulose.

Male. Body length 11.0–16.0 mm. *Head*. Lateral margins not parallel behind eyes, posterolateral angles rounded. Head width 0.7 × pronotal width. Eye almost circular. Ocelli small; OOD 3.8 × DLO, IOD virtually equal to DLO. Vertex and gena densely, finely and partially confusedly foveate-punctate; frons sculpture concealed by dense setae. Gena ecarinate. Dorsal carina of antennal scrobe prominent, transverse, starting at eye margin and ending before antennal tubercle. Clypeus weakly convex medially, concave laterally immediately below antennal insertion; finely and densely punctate; with a pair of small tooth-like projections medially on apical margin. Scape bicarinate, inner carina less prominent. Flagellomere 1 1.7 × pedicel length; flagellomere 2 2 × pedicel length. Mandible obliquely tridentate apically, inner tooth slightly larger than middle tooth; lacking dorsal or ventral projections. *Mesosoma*. Epaulets inconspicuous, poorly defined, reduced to a narrow micropunctate area starting at anterior face of pronotum and ending on small rounded area on anterior margin of dorsal face of pronotum, disconnected from humeral carina. Sculpture of anterior face of pronotum finely and densely punctate, less densely so medially and micropunctate anterior to epaulets; lateral and dorsal faces coarsely and confusedly areolate-punctate to foveolate-punctate. Tegula convex, mostly glabrous and impunctate, except densely punctate anterior third. Mesoscutum densely, coarsely and confusedly areolate-punctate to foveolate-punctate, notaulus and parapsis absent. Scutellum convex, densely, coarsely and confusedly areolate-punctate. Axilla produced posterolaterally as truncate projection, coarsely, densely and confusedly foveolate-punctate, except impunctate posterior margin. Metanotum narrower medially, with lateral oblique micropunctate areas immediately posterior to hindwing insertion; sculpture densely and coarsely reticulate medially. Propodeum convex, densely and coarsely areolate; sculpture less defined along anterior margin of lateral face; dorsal face of propodeum slightly depressed sublaterally and with longitudinal irregular carina medially; posterolateral corners of dorsal face slightly pronounced, slightly

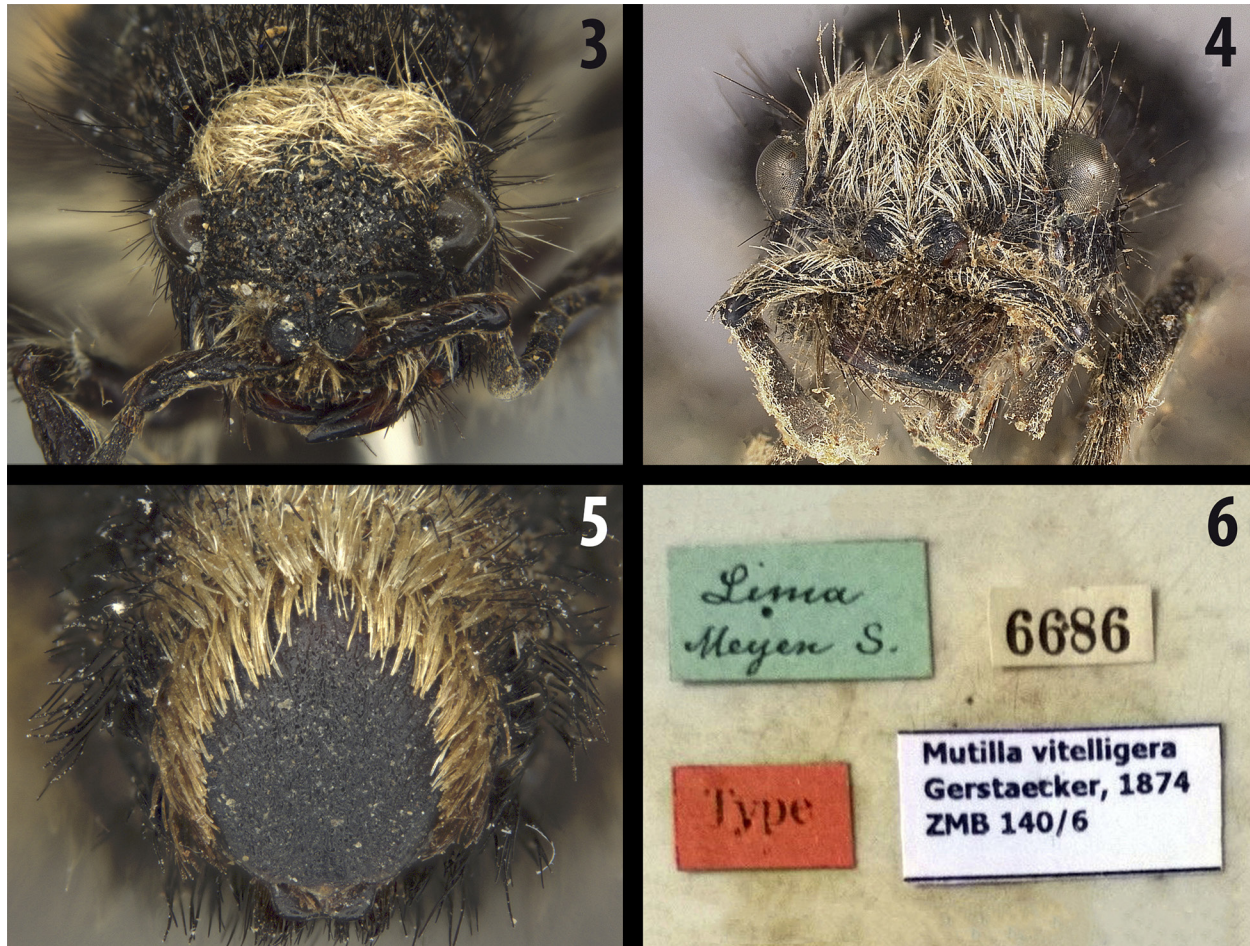
angulate; dorsal and posterior face subequal in length. Mesopleuron densely and coarsely areolate-punctate to foveolate-punctate, with conspicuous blunt medial projection on dorsal half. Metapleuron virtually smooth, with sparse inconspicuous micropunctures, except ventral fourth, immediately above hind coxa, dense and coarse areolate-punctate. *Wings*. Forewing with moderate elongate sclerotized pterostigma; marginal cell elongated, truncate apically; three submarginal cells, apical veins of third cell weak. *Metasoma*. T1 0.4 × as wide as T2. T2 length 0.9 × its width. T1–2 densely, finely and confusedly foveolate-punctate, more sparsely so anterad on T1; sculpture of T3–6 concealed by dense setae, T7 with pygidial area irregularly rugose and weakly defined by carinae apicolaterally. S1 densely, coarsely and confusedly areolate-punctate to foveolate-punctate; with longitudinal uneven and medially pronounced carina. S2 sparsely and irregularly foveolate-punctate with interspersed micropunctures along lateral margins, weakly swollen longitudinally at base, with small posteromedian pit densely filled with setae. S3–6 densely and coarsely foveolate-punctate to punctate, less densely so on S7. S7 trapezoidal, longer than broad, with a pair of closely spaced tooth-like projections on apical margin. *Genitalia*. Parapenial lobe inconspicuously pronounced apically. Ratios of free length of paramere, cuspis and digitus, 73:62:20. Paramere conspicuously sinuous throughout in dorsal view, slightly upcurved apically in lateral view; ventrally with dense medial tuft of long setae in addition to scattered, inconspicuous, short and thin setae throughout. Cuspis slightly sinuous in dorsal view and virtually straight in lateral view; slightly expanded apically in dorsal and lateral views; with small apical tuft of setae. Digitus short, weakly curved inward in dorsal view and upcurved in lateral view; with short setae dorsally, setae more numerous at base. Penis valve strongly concave on internal surface, with two sharp apical teeth on ventral margin apical distance between teeth 0.1 × length of valve; few strong short setae along apical margin and subapically on external surface.

Coloration and variations. Female. Integumental coloration is predominantly black with mandibles and antennal flagellomeres partially reddish-brown; T2 with four yellow to orange integumental spots. Head setae predominantly black with the vertex clothed with silvery-white setae. Mesosomal setae predominantly black, except most of mesopleuron, most of metapleuron, lateral face of propodeum, ventral half of posterior face of propodeum with silvery-white setae varying in density. Legs setae silvery-white, tibial spurs yellowish-white. Metasomal setae predominantly black except for part of T1, lateral felt line and lateral setae of T2, fringe of T2–4, most of T5–6 and most of S1–6 with silvery-white setae varying in density. Some females differ by having more extensive silvery-white setae on the head or on the size of the integumental spots of T2 which can be conspicuously larger and much more closely spaced. The extent of white setae areas on the metasoma may also vary, especially on S2–4 on which it may be greatly reduced to the point of lacking on the fringes of S2–3 in some cases. **Male.** Body integument color entirely black, Forewing always dark fuscous with basal third and small medial spots brownish-hyaline, veins brown; hindwing overall lighter than forewing with basal third hyaline. Head setae predominantly silvery-white, with gena, malar space and posterior margin of vertex having black setae. Mesosomal setae predominantly black with silvery-white setae varying in density medially on metanotum, posterior and lateral face of propodeum, and basal third of mesosomal pleurae. Legs setae predominantly black except few silvery-white setae on femora and dense silvery-white setae on internal surface of hind tibia. Metasomal setae predominantly black except with most of T1, T2 basolaterally, felt lines, fringe of T3–5 and S3–5, posteromedian pit of S2 and disc of S2 partially, with silvery-white setae varying in density.

Material examined. 57♀, 19♂ **Type material.** Holotype of *Traumatomutilla vitelligera*, ♀, PERU, (ZMB). Holotype of *Traumatomutilla fascinata*, ♂, PERU, (BMNH). Holotype of *Traumatomutilla salaverensis*, ♀, Peru. Lectotype of *Traumatomutilla comata*, ♂, ECUADOR, Guayaquil, 1901, Buchwald (MNHN). Paralectotype of *Traumatomutilla comata*, ♂, same label data as lectotype (MNHN). **Other material.** **CHILE: Tacna,** Tacna, 1♀, D.S. Bullock (USNM). **ECUADOR: Esmeraldas,** San Mateo, 1♀, 143202, (MNCN); South America, 1♀, ii–vii.1911, S.N. Roads (ANSP); 1♀, (ZMUC); **Manabi,** Portoviejo, 1♂, 22.xii.1971, M. Cooper (BMNH); Jama, 100 m., 2♀, 13.vi.2001, D. Curoe (MIUP); **[Guayas],** Guayaquil, 1♂, Buchwald (MNHN); **El Oro,** 2 miles north of Santa Rosa, 1♂, 24.i.1955 (AMNH); **Guayas,** Daule, 1♀, x.1981, G. Onore (MIUP). **PERU:** 3♀, (EMUS); 1♂, 1919, J. De Gaulle (USNM); 2♂, (EMUS); Toznamela [sic!], 1♀ (USNM); **Piura:** Amotopa Mts. [Cerro de Amotape], 1♀, 28.ix.1941,



Figures 1–2. *Traumatotutilla vitelligera* (Gerstaecker, 1874), holotype, line 2mm. **1)** Dorsal habitus. **2)** Lateral habitus.



Figures 3–6. *Traumatomutilla vitelligera* (Gerstaecker, 1874), ♀. **3)** Head, frontal view, holotype. **4)** Head, frontal view, Lambayeque, Peru. **5)** T6 (pygidium), posterior view, holotype. **6)** Holotype labels.

H.E.F. (AMNH); Sullana, 2♀, 02.ix.1944, P.A. Berry (USNM); 2♀, 15.viii.1943, P.A. Berry (USNM); **Lambayeque:** Lambayeque, 1♀, 03.iii.1981, M.E. Irwin (INHS); Pampa northwest of Oyotun [Pampa de Chumbenique], 1♀, 15.i.1985, J.M. Carpenter (USNM); Chiklaya [Chiclayo], 2♂, 06.ii.1931, H.A. Jaynes (USNM); 10 km south of Olmos, 1♂, 27.iii.2005, M.E. Irwin (EMUS); 10km S Olmos, km52 Olmos road marker, malaise in deciduous dry forest, 06°01.55'S 79°40.82'W, 265m, 1♀, 27–31.iii.2005, M.E. Irwin & F.D. Parker (EMUS); **Amazonas,** [Utcubamba], 8 km west of Bagua Grande, 1♂, 08.iii.2005, M.E. Irwin (EMUS); 8km W Bagua Grande, 05°43'.02'S 78°31.68'W, km216 on Bagua rd, malaise across damp wash, 530m, 1♀, 08–31.iii.2005, M.E. Irwin & F.D. Parker (EMUS); **Cajamarca:** [San Miguel], Nanchoc Quebrada, 1♀, 1–17.i.1985, J.M. Carpenter (USNM); 6 km north of Chamaya, 1#, 14.xi.2007, Irwin & Parker (EMUS); 6km N Chamaya, 2km W Mochenta on rd to Valillo, 850m, 05°47.95'S 78°47'84"W, 1♂, 14–17.xi.2007, M.E. Irwin & F.D. Parker (EMUS); **San Martin:** 23 km south of Picota, 1♂, 09.xi.2007, M.E. Irwin (EMUS); [La Libertad], Trujillo, 1♀, 17.xi.1936, H.A. Jaynes (DGMC); [Ancash], Casma, San Rafael, 2♀, 01.iv.1912, C.J. Townsend (USNM); **Pasco,** Pozizo [Pozuzo], 1♀, P. Vaquero (CMNH); **Lima:** Cartavio, 9♀, 17.iii.1935, E.G. Smyth (EMUS); 1♀, 21.iii.1935, E.G. Smyth (EMUS); 1♀, 15.iii.1937, E.G. Smyth (EMUS); 1♀, 15.i.1937, E.G. Smyth (EMUS); 1♀, 08.iii.1937, E.G. Smyth (EMUS); 3♂, 03.iii.1935, E.G. Smyth (EMUS); 4♀, 03.iii.1935, E.G. Smyth (EMUS); 1♀, 03.iv.1935, E.G. Smyth (EMUS); 3♀, 13.iii.1935, E.G. Smyth (EMUS); 1♀, 03.iii.1937, E.G. Smyth (EMUS); Lima, 1♀, 01.i.1939, Weyrauch (CMNH); 1♀, 02.ii.1939, C.J. Drake (USNM); Verrugas, 1♀, 07.iv.1928, R.C. Shannon (USNM); Chosica [railstation east of Lima], 1♂, P. Vaquero (UMSP); North Central coast, 1♀, 01.iv.1951 (AMNH); ; San Miguel, 1♀, 08.iii.1955, W. Markl (MNCN); **Ica:** Huacachina, 2♀, E. Escomal (AMNH).



Figures 7–8. *Traumatotutilla comata* André, 1906, ♂, lectotype, line 2mm. 7) Dorsal habitus. 8) Lateral habitus.



Figures 9–13. *Traumatomutilla comata*, lectotype; 9) Head, frontal view. 10) T6 (pygidium), posterior view. 11) Mesosoma, dorsal view. 12) Metasoma, dorsal view. 13) Lectotype labels.



Figures 14–15. *Traumatotutilla fascinata* (Smith, 1879), ♂, holotype, line 5mm. **14)** Dorsal habitus. **15)** Lateral habitus.



Figures 16–17. *Traumatomutilla fascinator*, ♂, holotype. 16) Head, frontal view. 17) Holotype labels, *T. fascinator*.

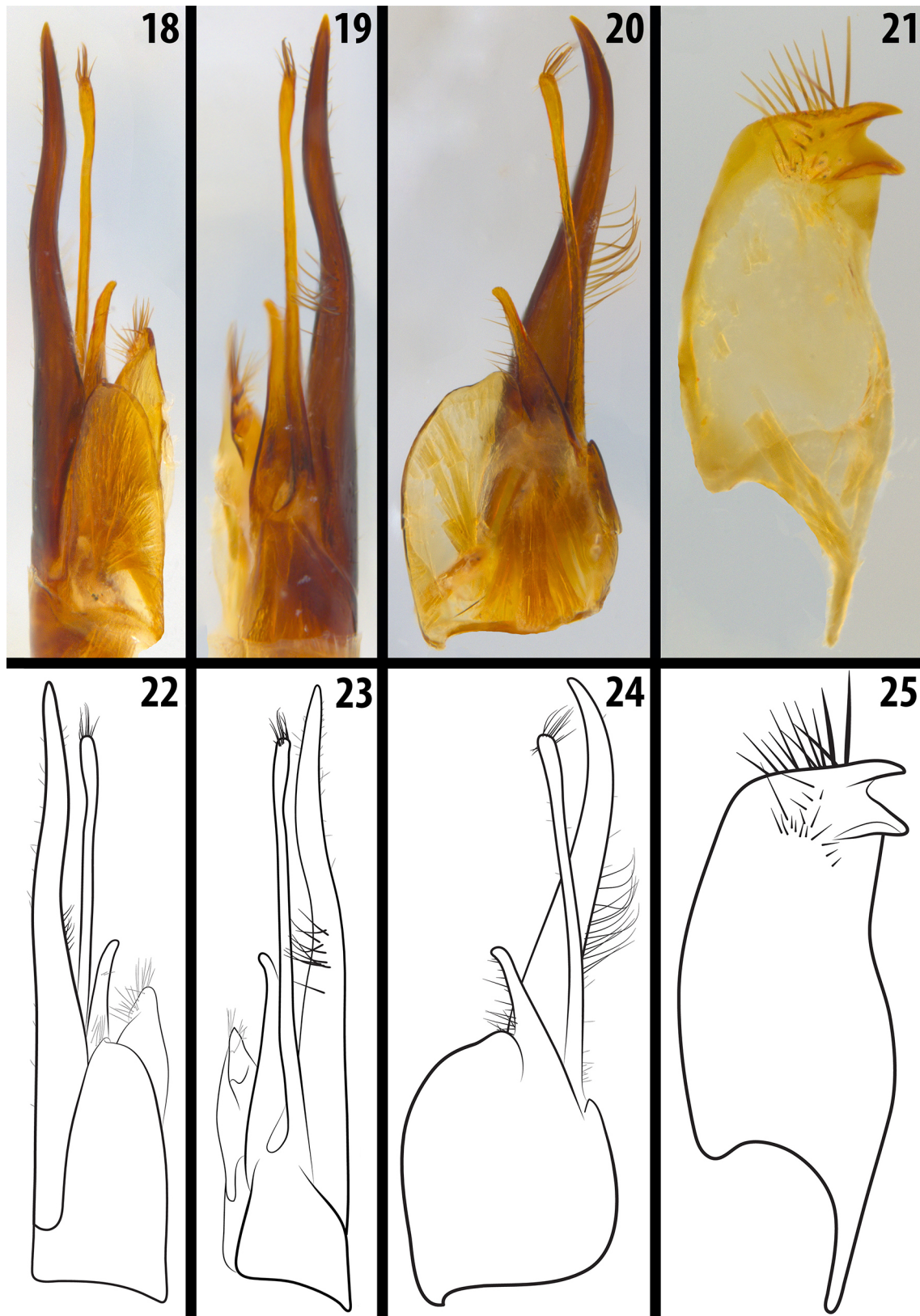
Distribution. Ecuador, Peru, Chile.

Host. Unknown.

Remarks. The distinctive setae pattern in *T. vitelligera* can be approximated by other species that have their bright mesosomal setae patches lost or obscured due to specimen wear or condition. According to Nonveiller (1990), this species has been recorded from Peru, Venezuela, Ecuador, Brazil, Paraguay and Chile. However, we have only seen valid records of *T. vitelligera* from Ecuador, Peru and Chile and hypothesize the historical records from other countries are based on misidentified or mislabeled specimens. Examination of the types of *T. fascinator* and *T. comata*, as well as dissection of the genitalia of both species, indicate that they are virtually identical, except that the silvery-white setae areas on *T. comata* are less extensive and conspicuous than on *T. fascinator*. Additionally, both the lectotype and paralectotype of *T. comata* have an incomplete vein arising from the *rs* vein at the first submarginal cell ending halfway towards the base of the pterostigma. Given that the remaining characteristics of these specimens are virtually identical to specimens of *T. fascinator*, this abnormal vein is possibly some sort of malformation or teratoma, or a case of intraspecific variation. Additionally, variations in the venation of the right and left forewing of a mutillid may occur in the same specimen (Quintero and Cambra 2005). With the exception of a few species from the inermis and indica species groups in northwestern Colombia, *T. vitelligera*, *T. fascinator* and *T. comata* are the only species of *Traumatomutilla* to occur west of the Andes. Therefore, we associate *T. vitelligera* with *T. fascinator* **syn. nov.** and *T. comata* **syn. nov.** based on their overlapping geographical distribution and congruence of taxonomically important characters.

bifurca species group

Diagnosis. Females can be diagnosed by lacking integumental markings on T2, the presence of contrasting patterns of black and white setae, head unarmed posterolaterally, genal carina absent or



Figures 18–25. *Traumatotutilla fascinata*, ♂, holotype. 18, 22) Genitalia, ♂, dorsal view. 19, 23) Genitalia, ♂, ventral view. 20, 24) Genitalia, ♂, internal view (penial valve removed). 21, 25) Penial valve, ♂, external view.

weakly defined, mesosoma compact, scutellar scale and anterior transverse carina present, mid and hind femora rounded apically, and pygidium broadly ovate. Males can be diagnosed by having the pygidium with a raised medial plate surrounded by lateral carinae and the head having a pair of blunt tooth-like projections on the front.

Included taxa. *T. bifurca* (Klug, 1821) and *T. oxira* Casal, 1969.

Distribution. Brazil.

Remarks. Species of the *bifurca* species group are marked by a contrasting pattern of black and white setae, making them some of the most easily recognizable within the genus. Additionally, they are among the few species of *Traumatotutilla* that show almost no variation in color or setae patterns. Although the two included species are separated by multiple structural features, as noted in their diagnoses below, they are most readily and easily differentiated by color pattern, particularly in the mesosomal stripes and T2 markings (Fig. 26, 46).

***Traumatotutilla bifurca* (Klug, 1821)**

(Fig. 26–45)

Mutilla bifurca Klug 1821: 313. Lectotype female (designated here), Brazil, Pará, Cameté (ZMB)

Ephuta (Ephuta) bifurca André 1902: 58 (new combination)

Mutilla bifurca Bradley 1916: 192 (*incertae sedis*)

Traumatotutilla ira Casal 1969: 297 Holotype female, Brazil, Paraíba, Soledade, Juazeirinho (AMNH), examined, **syn. nov.**

Traumatotutilla bifurca Nonveiller 1990: 75 (new combination)

Diagnosis. Female. This species is separated from other members of the *bifurca* species group by lacking genal carina and overall setae pattern with the head completely clothed in silvery-white, dorsum of pronotum and mesonotum completely black and two sublateral oblique longitudinal patches of appressed silvery-white setae on T2. **Male.** Males can be diagnosed by their conspicuously striated and raised medial plate of pygidium, one pair of tooth-like projections below mid-ocellus, genital cuspis which is conspicuously slender and broadened, dorsoventrally flattened and subacute apically. Additionally, the cuspis is virtually devoid of setae with the exception of a single oblique row of short setae subapically on ventral surface.

Description. Female. Body length 8.0–12.0 mm. *Head.* Posterior margin flat, occipital carina conspicuously swollen apicolaterally. Head width $0.75 \times$ pronotal width. Eye almost circular; its length in frontal view $0.9 \times$ the distance between its lower margin and mandibular condyle. Sculpture of frons and vertex concealed by dense setae; gena sparsely, coarsely and shallowly foveate-punctate; genal carina absent. Mandible unidentate apically, unarmed ventrally and dorsally. Antennal scrobe with dorsal horizontal carina conspicuously projected into a small lamella narrowly before antennal tubercle; lateral scrobal carina absent. Antennal tubercle irregularly and coarsely rugose. Flagellomere 1 $2.2 \times$ pedicel length; flagellomere 2 $1.5 \times$ pedicel length. *Mesosoma.* Mesosomal length $0.85 \times$ width; pronotum as wide as mesothorax. Anterior face of propodeum well-defined, densely and finely punctate in dorsal half with longitudinal striae on ventral half. Mesosomal dorsal sculpture mostly concealed by dense setae, coarsely and densely areolate-punctate where observable. Humeral carina well developed, slightly projected apically, terminating just before low and rounded epaulet; anterolateral corners of pronotum angulate in dorsal view. Pronotal spiracles virtually flat against lateral margin of pronotum. Lateral face of pronotum sparsely and superficially punctate. Sculpture of mesopleuron and lateral face of propodeum concealed by dense setae, except at smooth impunctate dorsal fourth of metapleuron. Post spiracular area apparently undefined, concealed by dense setae. Ratios of width of humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum posterior to propodeal spiracles, 53:62:60:48:45. Lateral margin of mesothorax slightly constricted anterior to propodeal spiracle. Scutellar scale well-defined, very narrower than anterolateral carinae; anterolateral carinae unequal, disconnected from each other and scutellar scale; scabrous intervals on scutellar area apparently indistinct, concealed by dense setae if present. Posterior face of propodeum

longer than dorsal face. *Metasoma*. Ratios of width of T1, width of T2 and length of T2, 45:97:104. T2 with maximum width posterior to midlength. Sculpture of T1–6, except pygidium, mostly concealed by dense setae, except laterally on T2 sparsely and coarsely foveate-punctate. S1 with longitudinal sharp carina, higher posteriorly; S2–5 densely and coarsely foveate-punctate, more finely and densely so in S3–5; anteromedial crest-fold vestigially present on S2; subapical slope on S2 vestigial, observable only laterally. Pygidium ovate, defined by carinae along its entire length, with well defined longitudinal wavy costae; interstice apparently smooth; apical margin with minute transverse striae.

Male. (Hitherto undescribed) Body length 8.0–12.0 mm. *Head*. posterolateral angles rounded, vertex conspicuously swollen posteromedially; head width $0.9 \times$ pronotal width. Eyes almost rounded, slightly longitudinally ovate; ocelli small; OOD $4.8 \times$ DLO, IOD $1.5 \times$ DLO. Occipital carina distinct, strongly convex. Front, vertex and gena sculpture concealed by setae; front with a pair of tooth-like projections below median ocellus. Gena ecarinate. Antennal scrobe broadly concave, with prominent transverse dorsal carina extending from internal margin of eye to antennal tubercle, $2/3$ of antennal tubercle height in lateral view. Clypeus weakly convex, densely setose, setae concealing sculpture, apical margin straight. Scape bicarinate. Flagellomere 1 $1.8 \times$ pedicel length; flagellomere 2 $1.3 \times$ pedicel length. Mandible obliquely tridentate apically, inner tooth larger than middle tooth; lacking dorsal or ventral projections; maxilla and labium elongate; maxillary palp 6-segmented, third and fourth segments slightly flattened and apically expanded, other segments almost cylindrical. Labial palp 4-segmented, second and third segments slightly flattened and apically expanded, other segments almost cylindrical. *Mesosoma*. Epaulets evident, slightly prominent, rounded, distad from humeral carina by more than its own length. Anterior face of pronotum densely micropunctate laterally and with a distinct, impunctate, shining and slightly concave area medially; lateral face of pronotum finely and densely punctate; dorsal face of pronotum densely setose, sculpture concealed. Meso and metapleuron sculpture concealed by setae; mesopleuron with acute tubercle on dorsal half; Tegula convex, glabrous except with long appressed setae anterolaterally. Mesonotum and scutellum densely punctured; notaulus absent, parapsis indistinguishable; scutellum slightly convex; axilla produced posterolaterally as truncate tooth, contiguously punctate but smooth posteriorly. Metanotum sculpture concealed by dense appressed setae. Propodeum strongly convex, entirely densely reticulate, except lateral face near metapleuron smooth. *Metasoma*. T1 sub-petiolate, $0.5 \times$ as wide as T2, sculpture concealed by dense silvery-white setae. S1 with weakly pronounced ridge-like carina. T2 $0.75 \times$ as long as wide, observable sculpture with dense coarse punctures, sculpture concealed by dense silvery-white setae elsewhere. S2 sparsely and coarsely punctate, more sparsely so medially; with posteromedial, longitudinal, acutely sub-ovate pit filled with dense silvery-white setae. T3–5 with sculpture concealed by dense silvery-white setae. T6 densely and coarsely punctate. S3–4 sculpture concealed by dense silvery-white setae. S5–7 densely and coarsely punctate, except apical third of S7 impunctate and asetose; apical margin of S7 with weakly acute medial projection. Pygidium with raised striated medial plate surrounded by lateral carinae. *Wings*. Forewing with elongate sclerotized pterostigma, stigma length $2x$ its height; marginal cell broadly truncate apically; three submarginal cells, 3r-m ending before M. Legs. Mid and hind tibiae each without strong spines dorsally, distinct apical secretory pore on inner surface near base of inner spur; spurs straight on margins, not serrate. *Genitalia*. Parapenial lobe weakly digit-like apically. Paramere free length $1.15 \times$ the free length of cuspis and $3.5 \times$ the free length of digitus; virtually straight in dorsal view and weakly and gradually upcurved in lateral view, virtually asetose. Cuspis free length $3 \times$ the free length of digitus, slightly sinuose throughout and slightly expanded apically in dorsal view, virtually straight throughout and sharp apically in lateral view; with a single subapical row of short setae ventrally. Digitus with numerous short setae basally on dorsal surface. Penis valve with strongly concave on internal surface, closely bidentate apically, apical distance between teeth $0.05 \times$ length of valve; with few short setae on apical margin and subapically on external surface.

Coloration and variations. Female. Body and appendages black except mandibles partially reddish-brown. Tibial spurs pale-yellow. Head setae predominantly silvery-white with dorsal half of gena and posterior margin of vertex having black setae. Mesosomal setae predominantly silvery-white except dorsum of pronotum, mesonotum, and dorsum of propodeum medially, with black setae. Legs setae predominantly silvery-white except tarsi setae partially black to reddish-black. Metasomal setae predominantly white,

except T1 medially, T2 medially and sublaterally, T3 medially, and T4–5 sublaterally with black setae varying in density. No significant color variations were found in the females examined. **Male.** Body and appendages black. Tibial spurs yellowish-white. Wings hyaline brown, apical third infuscated brown on forewing; veins brown, hindwing completely hyaline. Head setae silvery-white. Mesosomal setae predominantly silvery-white, except mesonotum, tegulae, and scutellum with black setae. Legs setae silvery-white; tibial spurs white. Metasomal setae predominantly silvery-white, except posterior half of T2, T5 medially, T6–7, and S7 with brownish-black to black setae varying in density. No significant color variations were observed for any of the males examined.

Material examined. 1733♀, 71♂. **Type material.** Lectotype of *Traumatomutilla bifurca*, ♀, **BRAZIL, Bahia**, Sieber & Gomes (ZMB). Holotype of *Traumatomutilla ira*, ♀, **BRAZIL, Paraíba**, Soledade, Juazeirinho, vi.1956, A.G.A. Silva (AMNH). **Other material.** **BRAZIL: Pará:** Algodual, Praia da Princesa, 1♀, 22.viii.1981, Edmar L. Oliveira (MPEG); Cachimbo, 1♀, 19.viii.1978, M.J.G. Hopkins & H.C. Hopkins (MPEG); Conceição do Araguaia, 1♀, vii.1959, M. Alvarenga (MPEG); Mangabeira, Mocajuba, 3♀, vii.1953, O. Rego (AMNH); **Maranhão:** Barreirinha, Parque Nacional Lençóis Maranhenses, 02°39'80"S 42°49'88"W, 1♀, 07.v.2016, J.A. Rafael & F.L. Oliveira (INPA); Barra do Corda, 1♀, 07.ii.1955, Expedição do Departamento de Zoologia (MPEG); Imperatriz, 1♀, 13.vi.1978, M.F. Torres (MPEG); Mirador, Parque Estadual do Mirador, Base da Geraldina, 12♀, 28.viii–03.ix.2008, F. Limeira-de-Oliveira (CZMA); Riachão, Fazenda Altos, 9♀, 18–22.viii.2009, F. Limeira-de-Oliveira (CZMA); Caxias, Reserva Ecológica do Inhamum, 5♀, 02–11.ix.2005, M.M.B.G.J. Júnior (CZMA); Mirador, Parque Estadual do Mirador, Base da Geraldina, 5♀, 22–26.viii.2006, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Base da Geraldina, 5♀, 26.viii.2006, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Base dos Cágados, 06°46'37"S 45°06'34"W, 3♀, 26.xi–03.xii.2011, F. Limeira-de-Oliveira (CZMA); Caxias, Reserva Ecológica do Inhamum, 2♀, 17.ix.2005, F. Limeira-de-Oliveira (CZMA); Caxias, Ecológica do Inhamum, 2♀, 30.viii.2005, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Base dos Cágados, 06°46'37"S 45°06'34"W, 1♀, 06.viii.2011, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Base dos Cágados, 06°46'37"S 45°06'34"W, 1♀, 27.ix–02.x.2011, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Base dos Cágados, 06°46'37"S 45°06'34"W, 1♀, 01–05.vi.2011, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Base da Geraldina, 1♀, 22.viii–03.ix.2008, F. Limeira-de-Oliveira (CZMA); Caxias, Reserva Ecológica do Inhamum, 1♀, 25.viii.2005, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Base da Geraldina, 1♀, 21–25.vi.2008, F. Limeira-de-Oliveira, J.A. Rafael e P.A.M. Moraes (CZMA); Mirador, Parque Estadual do Mirador, Base da Geraldina, 06°37'25"S 45°52'08"W, 4♂, 30.vii–06.viii.2011, F. Limeira-de-Oliveira & D.W.A. Marques (CZMA); Mirador, Parque Estadual do Mirador, Base da Geraldina, 1♂, 21–26.viii.2006, F. Limeira-de-Oliveira (CZMA); Mirador, Parque Estadual do Mirador, Povoado Pindaíba (Mel), 06°39'44"S 45°01'37"W, 1♂, 01–05.vi.2007, F. Limeira-de-Oliveira, M.M. Abreu & J.S. Pinto-Júnio (CZMA); Mirador, Parque Estadual do Mirador, Posto Avançado do Mel, 06°43'48"S 45°00'22"W, 1♀, 18–25.iii.2012, F. Limeira-de-Oliveira & D.W.A. Marques (CZMA); Mirador, Parque Estadual do Mirador, Base dos Cágados, 06°46'37"S 45°06'34"W, 1♂, 26.xi–03.xii.2011, F. Limeira-de-Oliveira & D.W.A. Marques (CZMA); São Luis, Vila Maranhão, 1♀, 29.ix.1992, R. Cambra (MIUP); São Luis, Vinhais, 1♀, 23.ix.1992, D. Quintero (MIUP); **Piauí:** Parque Nacional de Sete Cidades, 2♀, 08.ii.2013, M.L. Oliveira (INPA); 1♀, 10.ii.2013, P.C. Grossi (INPA); BR135, 35km south of Bom Jesus, 2♀, 01.ii.2001, J.P. Pitts (EMUS); Parque Nacional de Sete Cidades, 2♂, 07–13.ii.2013, A. Somavilla (INPA); Teresina, 2♀m, 19.vii.1993, A. Casimiro (MIUP); **Ceará,** M. Calmon [Miguel Calmon], 1♂, 18.4.1909, Ducke (MNHN); **Rio Grande do Norte:** Natal, Lagoa Nova, 1♀, 24.iv.2011, S.M.N.T. Melo (UFRN); Natal, Campus CB UFRN, 1♀, 03.iii.2008, I.V. Almeida (UFRN); Natal, Campus CB UFRN, 1♀, 25.xi.2008, M.A. Silveira (UFRN); Natal, Parque das Dunas, 1♀, 22.v.2008, M.G.C. Bezerra (UFRN); Nísia Floresta, Praia de Barreta, 1♀, 04.ii.2011, R.M.B. Silva (UFRN); Nísia Floresta, Estrada de acesso à FLONA, 1♀, 15.x.2005, I. Moreno (UFRN); Baixa Verde, 1♀, Mann (USNM); **Goiás,** Parque Nacional Chapada dos Veadeiros, 9♂, 2005 (UFES); nr. Araguaína, 1♀ 10–12.ix.1963 (BMNH); **Paraíba,** Juazeirinho, Soledade, 4♀, ix.1956, C.R. Gonçalves (DGMC); Juazeirinho, Soledade, 4♀, ix.1956, A.G.A. Silva (FSCA); Juazeirinho, Soledade, 2♀, vi.1956, C.R. Gonçalves (EMUS); Souza, 1♀, 29.xi.1938, A. Silva (FSCA); 1240♀, vi.1956, A.G.A. Silva (DZUP) Santa Luzia, 1♀, vi.1956, A.G.A. Silva (FSCA); Santa Luzia, 1♀, vii.1956, A.G.A. Silva (EMUS); **Tocantins:** Itaguatins, Ilha São Domingos,

1♀, 20.vii.1989, F.F. Ramos (MPEG); Jalapão, 1♀, 30.x.2005, C.A. Nogueira (CEUFT); Lagoa da Confusão, Campo dos Ipês, 1♀, 24.ix.2005, C.A. Nogueira (CEUFT); Dianópolis, 1♀, 16.i.1962, J. Bechyne (MIUP); **Mato Grosso:** Utiariti, Rio Papagaios, 1♀, 27.x.1966, Lenko & Pereira (MZUSP); 1♀, 29.x.1966, Lenko & Pereira (MZUSP); 1♀, x.1966, Lenko & Pereira (MZUSP); 1♀, 22–31.x.1966, Lenko & Pereira (MZUSP); 1♀, 01–12.xi.1966, Lenko & Pereira (MZUSP); Chapada, 2♀, x. (CMNH), 1♀, iv. (CMNH), 1♀, v. (CMNH); 1♀, vi. (CMNH); Alto Xingú, P. Leonardo [Posto Indígena Leonardo Villas-Bôas, 12°11'50"S 53°22'46"W], 7♀, 1963, R. Arlé (MPEG); Cuiabá, Coxipó, 2♀, 10.x.1988, Ulisses M. Bezerra (UFMT); Cuiabá, Salgadeira, 1♀, 28.v.1990, Luzia (UFMT); Cuiabá, 2♀, 05.x.1988, Laura M. Rodrigues (UFMT); Chapada dos Guimarães, Água Fria, 1♀, 10.v.1984, Sebastião Marcolino (UFMT); Nova Mutum, 1♀, 21.viii.1991, Humberto Fonseca (UFMT); Paranatinga, Fazenda Agrochapada, Córrego Santiago, 3♀, 18.viii.1990, Wellington Péche (UFMT); Santa Teresinha, near Barra do Tapirapé, 2♀, 14.i.1963, B. Malkin (CASC); Santa Teresinha, near Barra do Tapirapé, 2♀, 26.viii.1957, B. Malkin (CASC); Capitão Vasconcelos, Rio Tuatuari, Xingú Basin, 1♀, 31.vii.1957, B. Malkin (CASC); Barra do Tapirapé, 1♀, 11.xii.1962, B. Malkin (CASC); Barra do Corda, 2♀, 11.vii.1955, Exp. Dep. Zool. (CASC); **Mato Grosso do Sul,** Chapada [dos Guimarães], 1♀, i.1960, Canuto Amann. (MZUSP); **Bahia:** [Chapada Diamantina], Vila do Ventura, Morro do Chapéu, 1♀, 26.i.2011, T. Mahlmann (INPA); Camaçari, Barra do Jacuípe, 3♀, 21.ii.2010, A. Köhler (CESC); 4 km northwest of Lençóis, 1♂, 22.x.1999, Freddy (UEFS); Lençóis, 1♂, 29.iv.1999, Freddy (UEFS); Guarajuba, Camacari, 4♀, 4.i.1992, J. Delabie (MIUP), 2♀, 24.vi.1993 (MIUP); Sambaiba, 1♀, 20.x.1994, Nascimento (MIUP); **Minas Gerais:** Rosário Oeste, 1♀, xi.1970, Dirings (MZUSP); 1♀, xi.1971, Dirings (MZUSP); 2♀, Dirings (MZUSP). An additional 50♂ and 352♀ from various localities in Brazil and different collections were also examined.

Distribution. Brazil.

Host. Unknown.

Remarks. The lectotype of *Mutilla bifurca* is herein officially designated because, although the specimen was labelled as a lectotype by Mickel (Fig. 31), the taxonomic act was never published. The taxonomic history of *T. bifurca* is uncertain regarding at what moment it was moved to *Traumatomutilla*. André (1902) moved the species from *Mutilla* Linnaeus to *Ephuta* Say s.l. which contained most species that would eventually be included in *Dasymutilla* Ashmead. Bradley (1916) revised *Ephuta* s.s. and provided a list of species north of Mexico whilst Mickel (1928) published the first comprehensive treatment of *Dasymutilla*. Unfortunately, neither author provided information on the status of the remaining species that once comprised *Ephuta* s.l. Casal (1969) was actually the first author to mention the combination *Traumatomutilla bifurca* without, however, providing any remarks about the species or stating that it was a new combination. Several specimens in different collections have identification labels from Mickel as *Traumatomutilla bifurca* (pers. com.) which is why we hypothesize that Casal assumed the species had already been moved into *Traumatomutilla* by Mickel even without any official publishing of the taxonomic act. Casal (1969) originally separated *T. ira* from *T. bifurca* by subtle, subjective and not easily observable characteristics, namely the sculpture of T2 above the lateral felt line and relative size of the setal patterns of T2, the limits of which are subjected to the interpretation of the observer. Neither difference was evident or even observable in any of the specimens analyzed, including reference material identified by Casal himself after 1969. Sparser setae laterally on T2 is common in several species of every species group of *Traumatomutilla* (e.g. *T. latevittata* (Cresson, 1902), *T. angustata* André, 1906). Regarding the setal patterns of T2, we observed that specimens from more southern regions (Mato Grosso do Sul and Tocantins cerrado areas) have the oblique stripes much shorter and wider, ending before the midline of T2 in some cases. This contrasts with specimens from north and northeastern cerrado or Caatinga areas which have long and slender setal stripes on T2. The lectotype falls between these two forms, with the setal stripes on T2 evidently longer than southern specimens and wider than northeastern specimens. Most specimens identified by Casal as *T. ira* are from Caatinga regions in northeastern Brazil, whilst specimens from Cerrado were usually identified as *T. bifurca*. We observed no structural or color characters to support separation between Caatinga and Cerrado specimens into distinct species. We have seen more than 120 specimens from Cerrado, Caatinga and Amazon areas that cannot be differentiated based on the characteristics proposed by Casal (1969). Consequently, we propose *T. ira* Casal, 1969 as a junior synonym of *T. bifurca*. The males herein associated with *T. bifurca*

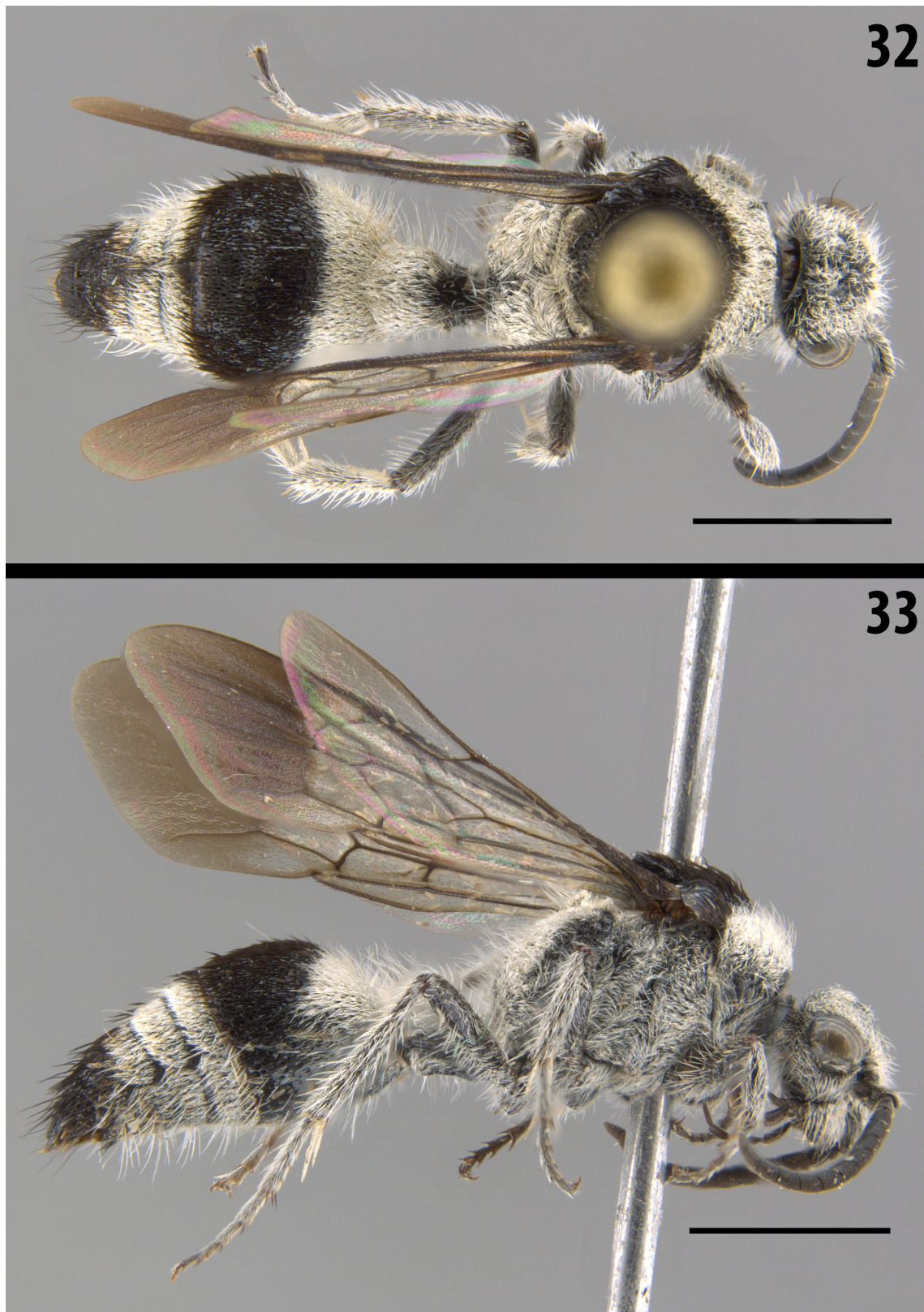


Figures 26–27. *Traumatomutilla bifurca* (Klug, 1821), ♀, lectotype, line 2mm. 26) Dorsal habitus. 27) Lateral habitus.



Figures 28–31. *Traumatotutilla bifurca*, ♀, lectotype. 28) Head, frontal view. 29) T6 (pygidium), posterior view. 30) T2, lateral view. 31) Lectotype labels.

were repeatedly and consistently collected in large numbers and in multiple areas where females of *T. bifurca* were commonly collected. Although *T. bifurca* overlaps in distribution with *T. oxira* in Paraíba state, these males can't be considered as candidates for association with *T. oxira* because this species is apparently restricted to the locality of Juazeirinho and males and females of *T. bifurca* have been collected together in multiple other localities.



Figures 32–33. *Traumatomutilla bifurca*, ♂, line 2mm. 32) Dorsal habitus. 33) Lateral habitus.



Figures 34–37. *Traumatomotilla bifurca*, ♂. **34**) Head, frontal view. **35**) Head, dorsolateral view (frontal tubercles in detail). **36**) T6 (pygidium), posterior view. **37**) T6 (pygidium), posterolateral view.

In addition to the peculiar color characteristics of the *bifurca* species group, the ecarinate gena on the females, frontal tubercles and raised pygidium on the males set this group apart from most *Traumatomotilla*. Although male characteristics of *T. bifurca* are apparently unique and exclusive within the Dasymutillini, a large number of *Dasymutilla* females also have ecarinate gena and many species of *Dasymutilla* do not have integumental markings on T2, something that only occurs in the *bifurca* group within *Traumatomotilla*. This, however, does not indicate that *T. bifurca* could be transferred to *Dasymutilla* in the near future. This conclusion is supported by the fact that the phylogeny of Williams (2012) found evidence that *Traumatomotilla* and *Dasymutilla* are reciprocally monophyletic and that species of the latter are predominantly North or Central American (Williams and Pitts 2013; Cambra et al. 2018).

***Traumatomotilla oxira* Casal, 1969**

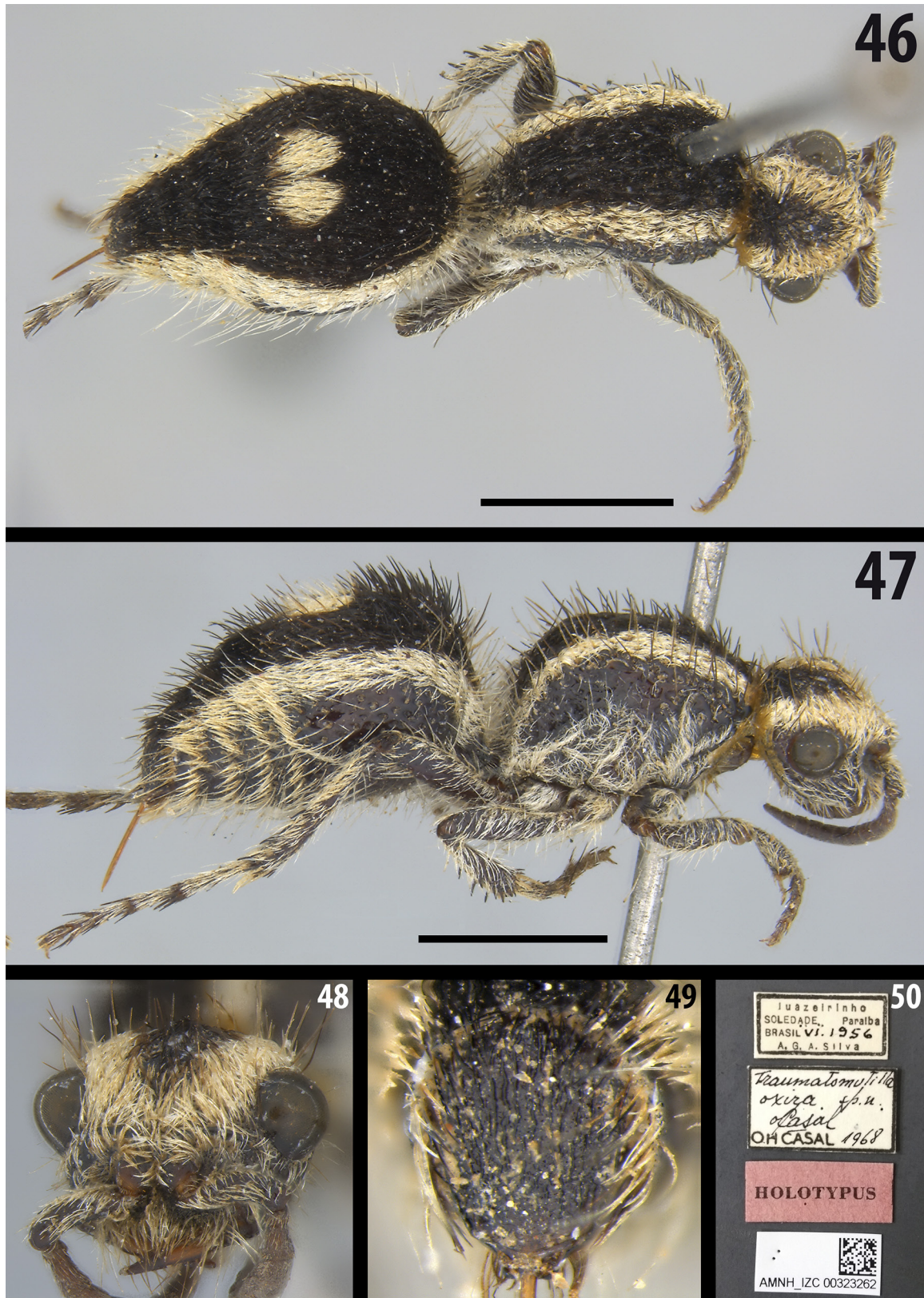
(Fig. 46–50)

Traumatomotilla oxira Casal 1969: 294. Holotype female, Brazil, Paraíba, Soledade, Juazeirinho (AMNH), examined.

Diagnosis. Female. This species is separated from other members of the *bifurca* species group by having a genal carina, lacking a scutellar scale and, by the overall setal pattern with the head having black setae medially on the frons and vertex, mesosoma with silvery-white lateral stripes throughout and



Figures 38–45. *Traumatomutilla bifurca*, ♂. 38, 42) Genitalia, dorsal view. 39, 43) Genitalia, ventral view. 40, 44) Genitalia, internal view (penial valve removed). 41, 45) Penial valve, external view.



Figures 46–50. *Traumatomytila oxira* Casal, 1969, ♀, holotype. 46) Dorsal habitus, line 2mm. 47) Lateral habitus, line 2mm. 48) Head, frontal view. 49) T6 (pygidium), posterior view. 50) Holotype labels.

metasoma with a pair of closely spaced submedial spots of silvery-white setae. Additionally, the fringes of T2–5 have silvery-white setae only laterally and T2 is virtually devoid of dense and short setae laterally.

Description Female. Body length 08 mm. *Head.* Posterior margin virtually straight. Head width $0.9 \times$ pronotal width. Eye length in frontal view $0.9 \times$ distance from its ventral margin to mandibular condyle. Head sculpture completely concealed by dense setae, except ventral surface, irregularly coarsely and shallowly punctate. Mandible with small subapical tooth. Dorsal scrobal carina present, well-defined, reaching antennal tubercles and vestigial lateral scrobal carina; lateral scrobal carina reduced to longitudinal, interrupted, impunctate area. Antennal tubercle coarsely and irregularly rugose. Flagellomere 1 $1.8 \times$ pedicel length; flagellomere 2 $1.3 \times$ pedicel length. Genal carina present, broadly separated from gular carina and hypostomal carina. Occipital carina equally wide throughout, tubercles of vertex absent. *Mesosoma.* Mesosoma $0.8 \times$ as long as wide. Mesosoma densely and coarsely areolate-punctate, areolations denser and smaller mediad. Anterior face of propodeum well-defined, vestigially striated longitudinally; micropunctate at dorsal third. Humeral carina present, narrowly connected to poorly defined low epaulet, anterolateral corners of pronotum rounded in dorsal view. Pronotal spiracle slightly projected from lateral margin of pronotum. Sculpture of lateral face of pronotum and mesosomal pleurae obscured by dense setae, except dorsal fourth of metapleuron aetose and impunctate. Lateral face of propodeum coarsely and confusedly sculptured. Ratios of width of humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum posterior to propodeal spiracles, 53:62:59:51:44. Lateral margin of mesosoma not emarginated anterior to propodeal spiracle, smoothly and slightly diverging anterad, converging slightly posterior to pronotal spiracles. Propodeal spiracle virtually flat against lateral margin of mesosoma; post-spiracular absent. Scutellar scale and anterolateral carinae absent. Scabrous intervals absent. Posterior face of propodeum longer than dorsal face. *Metasoma.* Ratios of width of T1, width of T2 and length of T2, 36:78:72. T2 virtually as wide as long, with maximum width posterior to midlength. Dorsal sculpture of metasoma mostly concealed by dense setae except laterally of T2 sparsely foveolate-punctate. S1 with coarse blunt longitudinal carina, equally high throughout. S2 dense coarse foveolate-punctate; subapical transverse slope absent; antero-medial longitudinal crest-fold absent. S3–6 dense coarse foveolate-punctate. Pygidium sub-ovate, defined by lateral carinae, except at basal fifth; surface with longitudinal interrupted subparallel costae; interstice rugose.

Coloration and variations. Body and appendages reddish-brown to black. Body setae predominantly silvery-white, except for reddish-black to black setae on the following: medially on vertex and front, medially on mesosomal dorsum, medially on dorsal face of T1, most of T2 disc, and medially on T3–5. No significant color or setae variations have been observed in the specimens examined.

Male. Unknown.

Material examined. (10♀) **Type material.** Holotype of *Traumatmutilla oxira*, ♀, BRAZIL, Paraíba, Soledade, Juazeirinho, VI.1956, A.G.A. Silva (AMNH). Paratypes of *Traumatmutilla oxira*, 2♀, same label data as holotype (AMNH). **Other material.** 5♀ same label data as type series (DZUP); Pernambuco, Petrolina, 09°19'44.2"S 40°33'30.1"W, 1♀, 24–26.iii.2018, Martins H.O.J. (CSCA); 1♀, 14–16.v.2018, Martins H.O.J. (CSCA).

Distribution. Brazil.

Host. Unknown.

Remarks. Williams et al. (2017) noted that *T. oxira* was structurally different from *T. bifurca*. The genal carina, though reduced, is distinct in this species and there is no trace of any scutellar scale or anterolateral carinae in the scutellar area except for a slight change in the sculpture intervals, which are wider in relation to the remainder of the mesosomal dorsum. Additionally, *T. oxira* is apparently a more slender species in comparison with *T. bifurca*. This species is known only from a single locality in northeastern Brazil, no putative males for this species have yet been found. For that reason, we refrain from transferring this species into another species group or erecting a new group for the species.

bellica species group

Diagnosis. Females of this species group can be defined by a unique combination of characters: vertex unarmed, apex of middle and hind femora truncate, scutellar scale lacking, and T2 with only two integumental spots. Additionally, the genal carina is weak, the mesosoma is not elongate, and the pygidium is broadly ovate.

Included taxon. *Traumatomutilla virginalis* (Gerstaecker, 1874) and *T. bellica* (Cresson, 1902).

Distribution. Species of the bellica group have been found so far in Chaco areas of Paraguay and Cerrado areas of Brazil.

Remarks. The two species of this group can be differentiated most readily by coloration and distribution; *T. bellica* has the head and mesosomal dorsum setae entirely black (Fig. 51) and is known only from the Brazilian Cerrado, while *T. virginalis* has whitish setae on the propodeum and vertex dorsum (Fig. 56) and its distribution extends into the Paraguayan Chaco.

Apart from the characters mentioned in the species group diagnosis, both species from the bellica group have two apparently exclusive characters: the metafemur is strongly and subacutely projected posterodistally, in contrast to having a truncate metafemur and the intervals of the dorsal mesosomal sculpture form longitudinal sinuous carinae. Some species of the inermis group appear to approximate the first character whilst some species of the trochanterata group appear to approximate the latter. In both of these groups, however, the posterior margin of the head is armed with tubercles, which are lacking in the bellica group.

Traumatomutilla bellica (Cresson, 1902)

(Fig. 51–55)

Mutilla bellica Cresson 1902: 40. Holotype (designated by Cresson (1916: 80)) female, Brazil, [Mato Grosso do Sul], Chapada [dos Guimarães] (CMNH), examined.

Ephuta (*Traumatomutilla*) *bellica* André 1902: 54 (new combination).

Traumatomutilla bellica André 1904: 40 (new combination).

Diagnosis. Female. In addition to the structural characters referenced in the species groups diagnosis, *T. bellica* can be defined by its entirely black head and dorsum of mesosoma, and its longitudinal yellow integumental spots on T2.

Description. Female. Body length 8–10 mm. *Head.* Posterior margin nearly straight. Occipital carina uniformly wide throughout; tubercles of vertex absent. Head width $0.8 \times$ pronotal width. Eye almost circular, its length in frontal virtually $1.4 \times$ the distance from its ventral margin to mandibular condyle. Front, vertex, and gena densely and coarsely foveolate-punctate, more finely so on gena and malar space; intervals slightly scabrous on front. Genal carina present, well defined, short, broadly separated from gular carina. Mandibles with small subapical tooth, unarmed ventrally and dorsally. Dorsal scrobal carina present, narrowly separated from antennal tubercles and broadly separated from lateral scrobal carina; lateral scrobal carina reduced to longitudinal impunctate smooth area. Antennal tubercles sculpture indistinct, apparently irregularly smooth. Flagellomere 1 $2.5 \times$ pedicel length; flagellomere 2 $1.75 \times$ pedicel length. *Mesosoma.* Mesosoma $0.8 \times$ as long as wide. Pronotum slightly wider than mesothorax. Anterior face of propodeum distinct from dorsal face, short, vestigially longitudinally striate ventrally and coarsely foveolate-punctate dorsally. Mesosomal dorsum densely, sharply and finely areolate-punctate throughout; intervals aligned appearing to form sinuous longitudinal carinae. Humeral carina present, well developed, slightly produced apically, disconnected from slightly pronounced epaulet; antero-lateral corners of pronotum angulate in dorsal view. Pronotal spiracle virtually flat against lateral margin of pronotum. Sculpture of lateral face of pronotum predominantly micropunctate, except dorsal third sharply areolate-punctate and anterior margin sparsely foveolate-punctate. Mesopleuron sculpture predominantly micropunctate, except along mesopleural ridge sparsely foveolate-punctate. Metapleuron predominantly micropunctate, except ventral fourth coarsely foveolate-punctate and dorsal third unsculptured, smooth. Lateral face of propodeum micropunctate, for few scattered punctures along posterior and anterior margin. Post-spiracular area defined, with few sparse punctures. Ratios

of width of humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum posterior to propodeal spiracles, 79:79:77:65:57. Lateral margin of mesosoma not constricted, simply diverging anterad and converging slightly posterior to pronotal spiracles. Scutellar, anterolateral carinae and scabrous intervals of scutellar area absent. Propodeal spiracle virtually flat against lateral margin of mesosoma. Posterior face of propodeum as long as dorsal face. *Legs*. Meso and metafemora strongly truncate apicolaterally; truncation deeply sulcate; apex of metafemora strongly and sub-acutely projected posteriorly. *Metasoma*. Ratios of width of T1, width of T2 and length of T2, 41:91:91. T2 maximum width posterior to midlength. Disc of T2 dense and coarse foveolate-punctate to coarse punctate; foveolations sparser and larger laterad and over integumental spots. T3–6, except pygidium, densely and coarsely foveolate-punctate. S1 anteriorly with vestigial longitudinal blunt crest. S2 sparsely foveolate-punctate; antero-medial crest-fold and subapical slope absent; sculpture smaller and sparser posteromedial. S3–6 dense coarse foveolate-punctate. Pygidium broad, sub-ovate, defined by lateral carinae except at basal third; surface with well-defined, slightly sinuous, longitudinal, uninterrupted, subparallel costae; interstice granulose.

Coloration and variations. No significant color or setae variations were observed. Body and appendages color predominantly reddish-brown to black, except for mandibles and antennal flagellomers partially orange-brown, and T2 with a pair of longitudinally elliptical yellow spots. Body setae predominantly brownish-black to black, except for silvery-white to silvery-golden setae varying in density on the following: lateral face of pronotum; mesosomal pleurae; lateral face of propodeum; lateral felt lines, lateral margins and lateral spots on fringe of T2; lateral and medial spots on fringe of T3–4; medial spot on fringe of T5; T6 except pygidium; and S1–4.

Distribution. Brazil.

Material examined. (14♀) **Type material.** Holotype of *Traumatomutilla bellica*, ♀, BRAZIL, [Mato Grosso], Chapada [dos Guimarães], [H.H. Smith] (CMNH). **Other material.** BRAZIL, Mato Grosso, Chapada dos Guimarães, 4♀, 15.xi.2013, Melo, G.A.R., Luz, D.R., Williams, K.A. (DZUP); 2♀, 16.xi.2013, Melo, G.A.R., Luz, D.R., Williams, K.A. (DZUP); 2♀, 13.xi.2013, Melo, G.A.R., Luz, D.R., Williams, K.A. (DZUP); 1♀, 12.xi.2013, Melo, G.A.R., Luz, D.R., Williams, K.A. (DZUP); Mato Grosso, Chapada [dos Guimarães], [H.H. Smith]: 1♀, v, (CMNH); 2#, x, (CMNH); 1♀, v, (MNHN).

Remarks. Five of the examined specimens were collected by H. H. Smith in Chapada dos Guimarães and formed the type series in Cresson's (1902) paper. Over 100 years after these specimens were collected, nine additional females were collected by KAW and DRL in the same area. This strange species has apparently never been documented from any other locality. The color pattern for *T. bellica* approximates several other species from Chapada dos Guimarães, such as *T. rectilineata* André, *T. andrei* (Cresson), and *T. ipanema* (Cresson), appearing to be in an intermediate stage between circular spots on T2 (as *T. virginalis*) and longitudinal spots as in the previously mentioned species.

***Traumatomutilla virginalis* (Gerstaecker, 1874)**

(Fig. 56–60)

Mutilla virginalis Gerstaecker 1874: 67. Holotype (by monotypy) female, Brazil, (ZMB), examined.

Ephuta (Traumatomutilla) virginalis André 1902: 56 (new combination).

Traumatomutilla virginalis André 1904: 40 (new combination).

Diagnosis. Female. In addition to the structural characters referenced in the species groups diagnosis, *T. virginalis* can be defined by its mostly black head and dorsum of mesosoma, except for medial silvery-white to silvery-golden setae spot medially on vertex and longitudinal silvery-white to silvery-golden setae stripe medially on mesosomal dorsum.

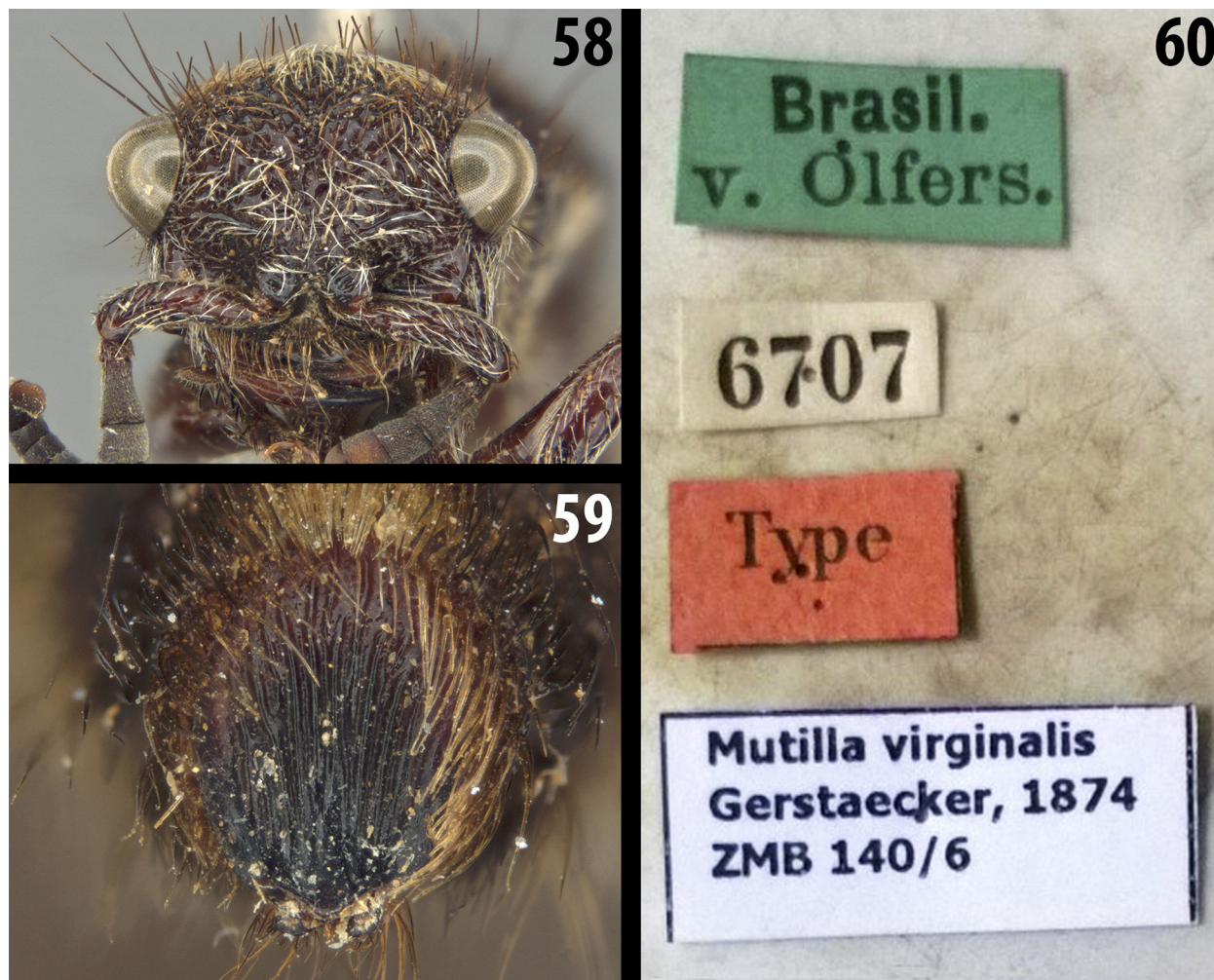
Description. Female. Body length 8–12 mm. *Head*. Posterior margin virtually straight. Occipital carina equally wide throughout. Head width $0.9 \times$ pronotal width. Eye almost circular, its length in frontal view $1.65 \times$ the distance from its ventral margin to mandibular condyle. Front, vertex, and gena densely and coarsely foveolate-punctate. Genal carina well-defined, short. Mandibles slender, evenly arcuate



Figures 51–55. *Traumatotutilla bellica* (Cresson, 1902), ♀, holotype. 51) Dorsal habitus, line 3mm. 52) Lateral habitus, line 3mm. 53) Head, frontal view. 54) T6 (pygidium), posterior view. 55) Holotype labels.



Figures 56–57. *Traumatomutilla virginialis* (Gerstaecker, 1874), ♀, holotype, line 2mm. 56) Dorsal habitus. 57) Lateral habitus.



Figures 58–60. *Traumatomutilla virginalis* (Gerstaecker, 1874), ♀, holotype. **58)** Head, frontal view. **59)** T6 (pygidium), posterior view. **60)** Holotype labels.

inwards apicad, with small subapical tooth, unarmed ventrally and dorsally. Dorsal scrobal carina well defined, broadly separated from antennal tubercles and virtually absent lateral scrobal carina. Antennal tubercle irregularly and vestigially rugose. Flagellomere 1 $2.9 \times$ pedicel length; flagellomere 2 $2.0 \times$ pedicel length. *Mesosoma*. Mesosomal length $0.8 \times$ width. Pronotum virtually as wide as mesothorax. Anterior face of propodeum distinct from dorsal face, short, vestigially longitudinally striate ventrally and coarsely foveolate-punctate dorsally. Mesosomal dorsum densely, sharply and finely areolate-punctate throughout; intervals aligned appearing to form sinuous longitudinal carinae. Humeral carina present, well developed, slightly produced apically, disconnected from slightly pronounced epaulet; antero-lateral corners of pronotum angulate in dorsal view. Pronotal spiracle virtually flat against lateral margin of pronotum. Sculpture of lateral face of pronotum, mesosomal pleurae and lateral face of propodeum predominantly micropunctate, except for dorsal third and anterior margin of lateral face of pronotum sharply foveolate-punctate, mesopleural ridge densely foveolate-punctate; anterior and posterior margins of lateral face of propodeum sparsely foveolate-punctate. Post-spiracular area defined, virtually impunctate. Ratios of width of humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum posterior to propodeal spiracles, 80:86:84:68:63. Lateral margin of mesosoma not constricted, simply diverging anterad and converging slightly posterior to pronotal spiracles. Scutellar, anterolateral carinae and scabrous intervals of scutellar area absent. Propodeal spiracle virtually flat against lateral margin of mesosoma. Posterior face of propodeum as long as dorsal

face. *Legs.* Meso and metafemora strongly truncate apicolaterally; truncation deeply sulcate; apex of metafemora strongly and sub-acutely projected posteriorly. *Metasoma.* Ratios of width of T1, width of T2 and length of T2, 34:75:68. T2 maximum width posterior to midlength. Disc of T2 densely and finely foveate-punctate; sculpture overall larger and sparser laterad and on integumental spots. T3–6, except pygidial plate, densely and finely foveate-punctate. S1 anteriorly with vestigial longitudinal blunt crest. S2 sparsely foveolate-punctate; antero-medial crest-fold and subapical slope absent; sculpture smaller and sparser posteromedial. S3–6 dense coarse foveolate-punctate. Pygidium broad, sub-ovate, defined by lateral carinae except at basal third; surface with well-defined, slightly sinuous, longitudinal, uninterrupted, subparallel costae; interstice granulose.

Coloration and variations. Body and appendages predominantly brownish-black to black, except mandibles and antennal flagellomeres partially orange-brown. Body setae predominantly brownish-black to black, with silvery-white to silvery-golden on the vertex, frons, gena, malar space, ventral surface of head; medial longitudinal stripe on propodeal dorsum; mesosomal pleurae; lateral felt line, lateral areas, lateral margins, and integumental spots of T2; T3–4 medially and laterally; T5 medially; and S1–4. Some specimens may have the medial longitudinal silvery-white setal stripe on the mesosomal dorsum restricted to the propodeum whilst others may have remnants of silvery-white setae reaching the anterior margin of pronotum.

Distribution. Brazil and Paraguay.

Material examined. (18♀) **Type material.** Holotype of *Traumatomutilla virginalis*, ♀, BRAZIL, v. Olfers (ZMB); **Other material.** BRAZIL: **Goiás:** 2♀, 1912, E. Gounelle, (MNCN, 163464, 163465); 2♀ (CUIC); **Minas Gerais:** 1♀, Reinhardt (ZMUC); 10km ao S de São Gonçalo do Rio Preto, 1♀, 14.i.2005, Melo G.A.R. & Costa (DZUP); **Mato Grosso do Sul:** Três Lagoas, 1♀ (MZSUP); Três Lagoas, marg. esq. Rio Sucuriu, Faz Canaã, 1♀, 10.xii.1967, Lane F. (MZSUP); **São Paulo:** Luis Antônio, Reserva de Jataí, 1♀, 16.x.1999, Melo G.A.R. (DZUP); **PARAGUAY: Concepción:** Cororo, 1♀, 25.ii.– 1.iii.1997, B. Garcete (MIUP); 1♀, 13–17.xi.1995, C. Aguilar (MIUP); **Amambay,** Parque Nacional Cerro Corá, 1♀, 17–18.v.2004, B. Garcete (MIUP); **San Pedro:** Rio Ypane, Cororo, 5♀, ii.1979, M.A. Fritz (AMNH); 1♀, xi.1983, M.A. Fritz (AMNH).

Remarks. This species has only been recorded for the Chaco areas of Paraguay and Cerrado areas of Brazil. Additionally, its single longitudinal setal stripe on the mesosomal dorsum is uncommon in South American Dasymutillini, and is found only in some species of *Suareztilia* Casal.

diabolica species group

Diagnosis. The females of this species group can be separated from the other groups lacking posterolateral head tubercles by their simplified mesosoma: the scutellar scale is narrow; anterior transverse carinae and the, longitudinal mesonotal carina are absent the lateral mesonotal margins are rounded; the genal carina is present; and the femoral apices rounded.

Included taxon. *Traumatomutilla diabolica* (Gerstaecker, 1874).

Distribution. Bolivia and Argentina.

Remarks. Williams et al. (2017) stated that the overall morphology of *T. diabolica* made it impossible to place this species in one of the more diverse large-bodied species groups such as the indica, juvenilis, and quadrinotata species groups. Discovery of males of this and other groups are necessary to understanding relationships within the genus.

Traumatomutilla diabolica (Gerstaecker, 1874)

(Fig. 61–65)

Mutilla diabolica Gerstaecker 1874: 76. Holotype (by monotypy) female, Argentina, Rosario (MLUH), examined.

Ephuta (Traumatomutilla) diabolica André 1902: 55 (new combination).

Ephuta (Traumatomutilla) chilena André 1906: 48. Lectotype (designated here) female, Chile [Argentina], Neuquen (MLUH), examined. Synonymized by Mickel 1964: 169.

Diagnosis. Female. Head unarmed, sculpture distinctly and coarsely foveolate-punctate; mesosoma without scutellar scale, longitudinal medial carina or mesonotal lateral projections; T2 with four large, reddish integumental spots.

Description. Female. Body length 13-15 mm. *Head.* Posterior margin slightly convex. Head width 0.9 × pronotal width. Eye length in frontal view slightly longer than distance from its ventral margin to mandibular condyle. Front, vertex and gena densely and coarsely areolate-punctate to foveolate-punctate. Mandible with small subapical tooth. Dorsal scrobal carina present, well-defined, not reaching antennal tubercles and vestigial lateral scrobal carina. Antennal tubercle finely and irregularly rugose. Flagellomere 1 2.5 × pedicel length; flagellomere 2 1.8 × pedicel length. Genal carina present, broadly separated from gular carina. Occipital carina slightly swollen apicolaterally; tubercles of vertex absent. *Mesosoma.* Mesosoma 0.8 × as long as wide. Mesosoma densely and finely areolate-punctate, areolations larger and sparser laterad. Anterior face of propodeum defined, striated longitudinally except coarsely punctate at dorsal margin. Humeral carina present, not pronounced apically, disconnected from well-defined and slightly produced epaulet, anterolateral corners of pronotum rounded in dorsal view. Pronotal spiracle virtually flat against lateral margin of pronotum. Sculpture of lateral face of pronotum and mesosomal pleurae obscured by dense setae, except dorsal fourth of metapleuron asetose and impunctate. Lateral face of propodeum virtually unsculptured, smooth, with few scattered punctures. Ratios of width of humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum posterior to propodeal spiracles, 83:96:97:72:65. Lateral margin of mesosoma emarginated anterior to propodeal spiracle, slightly projected anterad. Propodeal spiracle conspicuously projected from lateral margin of mesosoma; post-spiracular well-defined, apparently unsculptured. Scutellar scale well-defined, slightly wider and more conspicuous than anterolateral carinae; anterolateral carinae, reduced, narrowly connected to each other, disconnected from scutellar scale. Scabrous intervals absent. Posterior face of propodeum longer than dorsal face. *Metasoma.* Ratios of width of T1, width of T2 and length of T2, 25:59:67. T2 with maximum width posterior to midlength. T2 disc densely and coarsely foveolate-punctate; sculpture sparse and larger laterad. S1 with coarse uneven longitudinal carina, equally high throughout. S2 sparse coarse foveolate-punctate; subapical transverse slope present, interrupted medially; antero-medial longitudinal crest-fold vestigial. S3–6 dense coarse foveolate-punctate. Pygidium sub-ovate, defined by lateral carinae, except at basal third; surface confusedly, irregularly and finely costate; costae subparallel, mostly interrupted; interstice granulose.

Color variations. Body and appendages black, except mandibles and antennal flagellomeres partially reddish-brown; T2 with four large orange to red integumental spots. Body setae predominantly black, except for silvery-white setae varying in density on the following: most of ventral surface of head; malar space; ventral half of gena; lateral face of pronotum; mesosomal pleurae; lateral face of propodeum; propodeal dorsum laterally; T1 laterally; integumental spots, lateral areas, lateral margin and lateral felt line of T2; fringe of T2–3 medially and laterally; T4–6, except pygidium, medially; S1–4. Certain specimens may have vestigial lateral silvery-white setae stripes on the propodeal dorsum, whilst others have such lines well defined.

Distribution. Argentina.

Material examined. (10♀) **Type material.** Holotype of *Traumatomutilla chilena*, ♀, [ARGENTINA], Neuquén, [18]95 (MNHN); **Other material.** ARGENTINA, Salta, Sumalao, 2♀, iii.1991, M.A. Fritz (AMNH); Tucuman, near Las Cejas, 1♀, 20.iv.1968, C.C. Porter (USNM); 8km N Cadillal, 1♀, 25.iii.1990, J.G. Rozen & A. Roig (AMNH); Mendoza, Estancia Pedregal, 1♀, 29.iii.1903 (ZMUC); Dep. De Calamuchita, El Sauce, 1♀, iv.1938, Manuel J. Viana (AMNH); Buenos Aires, Saladillo, 1♀, 26.ii.1911 (UMSP, compared with type *Traumatomutilla chilena* (André) det. Mickel 1931; compared with type *Mutilla diabolica* (Gerstaecker) det. Mickel 1931); Srta. Ventana, m. 200, Pcla. B.As., 1♀, 14.iii.1972, Bordón (AMNH); Neuquén, Choele Choel, 1♀, i.1990, U. Fritz (AMNH).

Remarks. Mickel (1964) synonymized *Ephuta* (*Traumatomutilla*) *chilena* with *T. diabolica* without, however, providing any information on the designation of holotypes or lectotypes for either species. The type of *Ephuta* (*Traumatomutilla*) *chilena* has a 1931 label by Mickel identifying it as *T. diabolica* and a “cotype” label likely from André himself. The only specimen of *T. diabolica* from MLUH has no type



Figures 61–62. *Traumatomutilla diabolica* (Gerstaecker, 1874), ♀, holotype, line 2mm. 61) Dorsal habitus. 62) Lateral habitus.



Figures 63–65. *Traumatomutilla diabolica* (Gerstaecker, 1874), ♀, holotype. 63) Head, frontal view. 64) T6 (pygidium), posterior view. 65) Holotype labels.

labels whatsoever, simply a handwritten label identifying it as *Mutilla diabolica*, the locality label, Rozario [sic], and a control label from MLUH. Since this specimen matches the type of *Traumatomutilla diabolica*, and the type locality of the original description, a holotype labeled has been added to it. *Traumatomutilla diabolica* has been recorded from dry Chaco areas of Argentina and Bolivia, as well as Argentinian Montes. One specimen is recorded from a humid Pampas area in Buenos Aires province. Perhaps the only remarkable feature of this species is that it lacks the distinguishing characters of the typical large bodied *Traumatomutilla* of southern South America. Its color pattern is typical of the grasslands and xeric areas of Argentina. Additionally, to our knowledge this is the southernmost distribution for a species of *Traumatomutilla*.

pilkingtoni species group

Diagnosis. Females of this species group can be defined by a unique combination of characters: head unarmed posterolaterally; mesonotum simply divergent anterad, not constricted anterior to propodeal spiracle; scutellar scale and anterolateral carinae distinct; apex of middle and hind femora rounded; T2 with two integumental spots; gena feebly carinate; pygidium ovate.

Included taxon. *Traumatomutilla pilkingtoni* Bartholomay and Williams, **sp. nov.**

Distribution. *Traumatomutilla pilkingtoni* has been recorded solely from southwestern Dry Chacos areas of Argentina.

Remarks. Species groups of *Traumatomutilla* with small-bodied species tend to have the head posteriorly armed with tubercles, while larger *Traumatomutilla* lack these tubercles and have mesosomal armature. Interestingly, the small bodied *T. pilkingtoni* resembles small bodied members of the trochanterata and inermis groups but lacks head tubercles and various other traits. It does not, however, possess the diagnostic traits of any larger bodied groups either. In its lack of diagnostic features, it is somewhat similar to *T. diabolica*, which lives in similar habitats in Argentina, but these two species differ in other important *Traumatomutilla* features: head shape, T1 shape, pygidium shape and sculpture, number of spots, tergal fringes, etc. As in *T. diabolica*, eventual discovery of the male will be necessary to understand its relations to other species groups.

In the key to species groups (Williams et al. 2017), *T. pilkingtoni* keys out to the trochanterata group in couplet 16. It can be recognized by its broad pygidium (Fig. 69), while the trochanterata group has a slender pygidium (e.g. figure 16 in Williams et al. 2017).

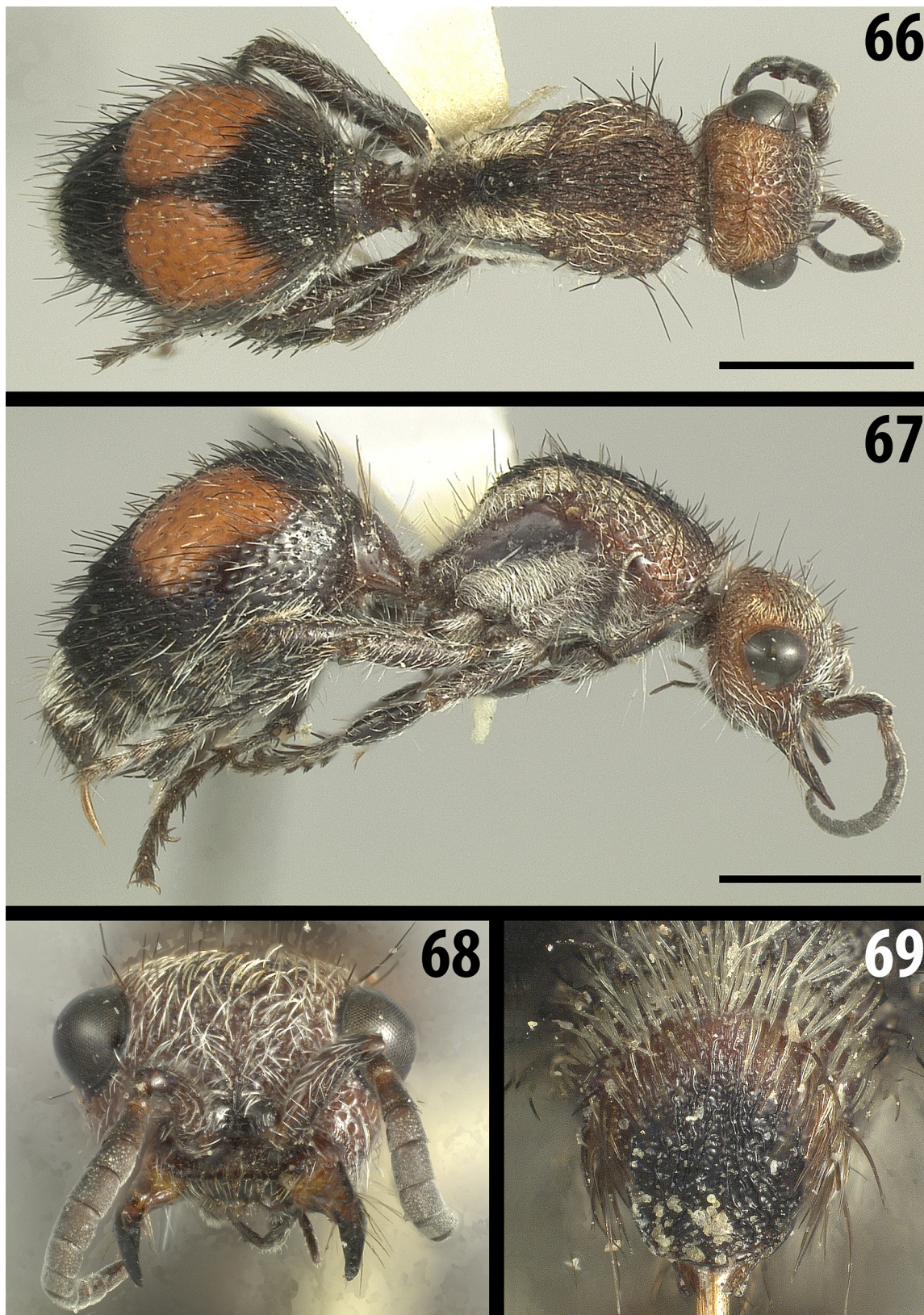
***Traumatomutilla pilkingtoni* Bartholomay and Williams, sp. nov.**

(Fig. 66–69)

Diagnosis. Female. In addition to the structural characters referenced in the species groups diagnosis, *T. pilkingtoni* can be defined by its orange-red head, T2 with a pair of longitudinally sub-ovate orange-red integumental spots, and fringes of T2–4 mostly clothed with black setae.

Description. Female. Body length 5–8 mm. *Head.* Posterior margin nearly straight. Head width nearly equal to pronotal width. Eye length in frontal view $1.3 \times$ distance from its ventral margin to mandibular condyle. Front vertex and gena densely foveolate, more sparsely so on transition area between front and vertex. Mandible unidentate. Dorsal scrobal carina well defined, narrowly separated from antennal tubercles; lateral scrobal carina virtually absent. Antennal tubercle shallowly and irregularly rugose. F1 $1.85 \times$ pedicel length; F2 virtually as long as pedicel. Genal carina present, broadly separated from gular carina and hypostomal carina. Occipital carina slightly swollen dorsolaterally. *Mesosoma.* Mesosoma $1.1 \times$ as long as wide. Pronotum slightly wider than mesothorax. Mesosomal dorsum densely areolate-punctate, slightly denser posterad. Humeral carina present, disconnected from low rounded epaulet, slightly produced apically, antero-lateral corners of pronotum slightly angulate in dorsal view. Pronotal spiracle virtually flat against lateral margin of pronotum. Sculpture of lateral face of pronotum and mesosomal pleurae obscured by dense setae, except dorsal fourth of metapleuron asetose and impunctate. Lateral face of propodeum virtually impunctate, smooth, shining with scattered small shallow punctures. Ratios of width of humeral angles, pronotal spiracles, widest point of mesonotum, narrowest point of mesonotum and propodeum posterior to propodeal spiracles, 75:78:76:66:57. Lateral margin of mesosoma not emarginated anterior to propodeal spiracle, smoothly diverging anterad. Propodeal spiracle slightly projected from lateral margin of mesosoma; post-spiracular area absent. Scutellar scale present, well-developed, arcuate in posterior view, as wide as and separated from conspicuous anterolateral carinae; anterolateral carinae connected to each other. Scabrous intervals absent on scutellar area. Posterior face of propodeum longer than dorsal face. *Metasoma.* T1 sub-nodose $0.4 \times$ as wide as T2. T2 slightly longer than wide, with maximum width posterior to midlength. Disc of T2 densely foveolate to densely punctate mediad; sculpture sparser and larger posterolaterally and over integumental spots. T3–6, except pygidium, dense foveolate-punctate to dense punctate. S1 with conspicuous blunt longitudinal carina, slightly higher anteriorly. S2 sparse foveolate, sculpture smaller anterad; subapical transverse slope present, less conspicuous medially; antero-medial crest-fold absent. S3–6 dense coarse foveolate. Pygidium sub-ovate, defined by lateral carinae throughout its extension, except basal margin; surface irregularly rugose; rugae longitudinally interrupted, wavy; interstice apparently impunctate, smooth.

Coloration and variations. Head, mesosoma, T1 and appendages orange-brown, darker on legs and antennal flagellomeres partially. Metasoma except T1 brownish-black with a pair of large longitudinally



Figures 66–69. *Traumatomutilla pilkingtoni* Bartholomay and Williams, sp. nov., ♀, holotype. 66) Dorsal habitus, line 2mm. 67) Lateral habitus, line 2mm. 68) Head, frontal view. 69) T6 (pygidium), posterior view.

sub-ovate orange integumental spots on T2, nearly confluent medially. Body setae predominantly silvery-white to silvery-golden, except for black to reddish-black setae on the following: medial spot on vertex, mesosomal dorsum medially, T2 medially (except over integumental spots), T3–4 nearly entirely, and small areas on T5 posterolaterally. No conspicuous color or setae variations were observed for any of the females examined.

Distribution. Argentina (Tucuman, Cordoba and Santiago del Estero provinces).

Material examined. (35♀) **Type material.** Holotype, ♀, **ARGENTINA, Cordova**, Balnearia, ii.1971, Fritz (AMNH). Paratypes, **ARGENTINA**, Gran Chaco, 1♀ (MNHN); **Tucumán**, 11km N Cadillal, 1♀, 03.iii.1990, J.G. Rozen & A. Roig (AMNH); 1♀, 25.iii.1990, J.G. Rozen & A. Roig; **Santiago del Estero**, 1♀, Muséum Paris, E.R. Wagner 1935 (MNHN); Añatuya. 6♀, iii.1979, Fritz (AMNH); Barrancas, Bañados de Río Dulce, 60km O D'Icaño, 3♀, 1909, E.R. Wagner (MNHN); Outskirts of Icaño, Mistol Paso, 1♀, janvier juin [i–vi?] 1912, E.R. Wagner (MNHN); 1♀, 1918, E.R. Wagner (MNHN); Banks of the Salado River, 1♀, xii.1910, E.R. Wagner (MNHN); Chaco, Río Salado, 1♀, avril [iv?] (MNHN); **Cordoba**, Balnearia, 16♀, ii.1971, Fritz (AMNH); 1♀, ii.1971, Fritz (CSCA).

Etymology: This remarkable species, is named in honor of the British philosopher, comedian, radio personality, presenter, author, and actor Karl Pilkington due to its rounded orange head.

Remarks. The reddish/orange head integument, silvery white setae patterns of the mesosoma, and integumental markings of the metasoma of *T. pilkingtoni* are remarkably similar to other species from the same area, such as *Cephalomutilla haematodes* (Gerstaecker, 1874).

Discussion

The species groups treated in this paper are generally restricted to xeric areas of South America. The bellica species group is distributed in Cerrado and Chaco regions, while the pilkingtoni and diabolica groups are concentrated in dry Cacho regions of Argentina. Out of 76 specimens of *T. vitelligera* examined, more than 50 were collected in coastal areas west of the Andes with overall xeric habitats and at low altitudes. Some specimens were collected on the eastern slope of the Andes in high altitude, xeric, savannah-like habitats. This apparent isolation of the vitelligera species group from other species of *Traumatomutilla* resulted in a fairly consistent color pattern for *T. vitelligera* when compared with more widely distributed and variable species within the genus. Additionally, most specimens of Mutillidae we have observed from xeric areas west of the Andes are nocturnal and generally exhibit duller color patterns.

The bifurca species group is also mostly restricted to xeric areas, specifically Caatinga and Cerrado habitats, but there are specimens registered from within the Amazonian forest domain (six out of 142 specimens examined). These, however, were collected either in Restinga areas in the northern coast of Brazil, or transition areas between Amazonian forest and Cerrado. Both species of the bifurca species group have similar color patterns; the integument is completely black, they lack integumental colored spots, and the setae are almost exclusively silvery-white. This color pattern is conspicuously common in Cerrado and especially Caatinga habitats, with species of *Hoplomutilla* Ashmead, *Leucospilomutilla* Ashmead, *Suareztilia* Casal, *Tallium* André, *Atillum* André and several undescribed new species and genera bearing variations of this same pattern. This is yet another observation supporting the hypothesis that Mullerian mimicry observed in North American and African velvet ants likely occurs in South America (Wilson et al. 2015, 2018).

After this treatment, three of the species groups in *Traumatomutilla* include only one species. On the surface, this is oxymoronic or contradictory; what value is there in naming a “group” of one? In reality, the species group concept as used in this genus is a flexible shorthand for sub-generic groupings that allows us and other researchers to communicate about these taxa and break up the revision of such a diverse genus into smaller manageable units. A case could be made that members of monotypic species groups should be treated as ungrouped or unplaced taxa within the genus. This, however, would confuse them with males that are unplaceable without knowing their females or taxa that could not yet be placed into a group before studying the types. Additionally, maintaining them as groups could allow any new related species to be associated with them by future authors. For example, the tabapua

species group was named to house a single species (Williams et al. 2017), but now includes four species (Bartholomay et al. 2018). For its flexibility in arranging diversity and tracking progress for revision of this large genus, we choose to maintain species group nomenclature for each *Traumatotutilla* taxon that has been studied and can be placed into a diagnostic framework based on combinations of useful traits, even when such a combination is found in a single species only.

This is the fourth recent paper treating current or former members of *Traumatotutilla* and the second to focus on certain species groups to further elucidate this complex and species rich genus (Luz et al. 2016; Williams et al. 2017; Bartholomay et al. 2018, 2019). There are still 10 species groups of *Traumatotutilla* left to be treated in detail, some of which comprise dozens of species some of which are yet to be described. In order to make this genus functional for future evolutionary and ecological studies, there is a dire need for continued revision of species groups with sexual associations and description of new species with effective diagnoses and figures.

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Literature Cited

- André, E. 1902. Fam. Mutillidae. *In*: P. Wytsman. Genera Insectorum, Fasc. 11. V. Verteneuil & L. Desmet; Brussels. 77 p.
- André, E. 1904. Examen critique d'une nouvelle classification proposée par M. le Dr. W. H. Ashmead pour la famille des Mutillidae. *Revue d'Entomologie* 23(1): 27–41.
- André, E. 1905. Nouvelles espèces de Mutillides d'Amérique. (Hym.). *Zeitschrift für Systematische Hymenopterologie und Dipterologie* 5: 361–376.
- André, E. 1906. Nouvelles espèces de Mutillides d'Amérique. (Hym.). *Zeitschrift für Systematische Hymenopterologie und Dipterologie* 6: 33–48, 65–80, 161–169.
- Bartholomay, P. R., K. A. Williams, D. R. Luz, and M. L. Oliveira. 2018. New species of *Traumatotutilla* André in the *T. tabapua* and *T. integella* species groups (Hymenoptera, Mutillidae). *Zootaxa* 4433(2): 361–385.
- Bartholomay, P. R., K. A. Williams, V. M. Lopez and M. L. Oliveira. 2019. Revision of the *Traumatotutilla americana* species group (Hymenoptera: Mutillidae). *Zootaxa* 4608(1): 1–34.
- Bradley, J. C. (1916) Contributions toward a monograph of the Mutillidae and their allies of America north of Mexico. 1. A revision of *Ephuta* Say, a genus of Mutillidae equivalent to the species group *scrupea* of Fox. *Transactions of the American Entomological Society* 42: 187–198.
- Brothers, D. J., and A. S. Lelej. 2017. Phylogeny and higher classification of Mutillidae (Hymenoptera) based on morphological reanalyses. *Journal of Hymenoptera Research* 60: 1–97.
- Cambra, R. A. 1997. Comparación de la diversidad en la Sphaerophthalminae (Hymenoptera: Mutillidae) de Costa Rica y Panamá, con notas sobre Biología. *Scientia* 12(2): 115–128.
- Cambra, R. A., K. A. Williams, D. Quintero, D. M. Windsor, J. Pickering, and D. Saavedra. 2018. *Dasymutilla* Ashmead (Hymenoptera, Mutillidae) in Panama: new species, sex associations

- and seasonal flight activity. *Insecta Mundi* 0608: 1–17.
- Casal, O. H. 1969.** Sobre *Traumatomutilla* André (Hymenoptera, Mutillidae). *Physis* 28 (77): 279–298.
- Cresson, E. T. 1902.** Descriptions of some Brazilian *Mutilla*. *Transactions of the American Entomological Society* 28: 1–82.
- Gerstaecker, A. 1874.** Mutillarum Americae meridionalis indigenarum synopsis systematica et synonymica. *Archiv für Naturgeschichte* 40(1): 41–77, 299–328.
- Harris, R. A. 1979.** A glossary of surface sculpturing. *Occasional Papers in Entomology* 28: 1–31.
- Klug, J. C. F. 1821.** Entomologiae Brasiliae specimen. *Nova Acta Academica Caesareae Leopoldino-Carolinae* 10(2): 305–324.
- Luz D. R., K. A. Williams, and P. R. Bartholomay. 2016.** The mutillid wasps of the *Dasymutilla paradoxa* species group (Hymenoptera: Mutillidae). *Zootaxa* 4193(2): 361–372.
- Mickel, C. E. 1928.** Biological and taxonomic investigations on the mutillid wasps. *United States National Museum Bulletin* 143: 1–351.
- Mickel, C. E. 1964.** Synonymical notes on Neotropical Mutillidae (Hymenoptera). *Proceedings of the Royal Entomological Society of London (B)* 33(9–10): 163–171.
- Nonveiller, G. 1990.** Catalogue of the Mutillidae, Myrmosidae and Bradynobaenidae of the Neotropical region including Mexico (Insecta, Hymenoptera). *Hymenopterorum Catalogus (Nova Editio)*, 18. SPB Academic Publishing; The Hague. 150 p.
- Quintero, D., and R. A. Cambra. 2005.** *Pappognatha* Mickel (Hymenoptera: Mutillidae: Sphaerophthalminae): new species, sex associations, hosts, and new distribution records. *Journal of Hymenoptera Research* 14(2): 191–199.
- Rohwer, S. A. 1913.** Results of the Yale Peruvian Expedition of 1911. Hymenoptera, Superfamilies Vespoidea and Sphecoidea. *Proceedings of the United States National Museum* 44: 449–450.
- Smith, F. 1879.** Descriptions of New Species of Hymenoptera in the Collection of the British Museum. Taylor and Francis; London. XXI + 240 p.
- Williams, K. A. 2012.** Systematics of Mutillidae (Hymenoptera) with species emphasis on *Dasymutilla* and their allies. All Graduate Theses and Dissertations. Paper 1200. Utah State University Press; Logan, UT, USA. 327 p.
- Williams, K. A., P. R. Bartholomay, and M. L. Oliveira. 2017.** Species groups of *Traumatomutilla* André (Hymenoptera: Mutillidae). *Insecta Mundi* 0533: 1–33.
- Williams, K. A., D. G. Manley, M. Deyrup, C. von Dohlen, and J. P. Pitts. 2012.** Systematic review of the *Dasymutilla monticola* species group (Hymenoptera: Mutillidae): using phylogenetics to address species group placement and sex associations. *Zootaxa* 3554: 1–29.
- Williams, K. A., D. G. Manley, E. K. Pilgrim, C. D. von Dohlen, and J. P. Pitts. 2011.** Multifaceted assessment of species validity in the *Dasymutilla bioculata* species group (Hymenoptera: Mutillidae). *Systematic Entomology* 36: 180–191.
- Williams, K. A., and J. P. Pitts. 2013.** Caribbean and Mexican Additions to the *Dasymutilla bioculata* Species groups (Hymenoptera: Mutillidae). *Annals of the Entomological Society of America* 106(4): 429–436.
- Wilson, J. S., S. L. Clark, K. A. Williams, and J. P. Pitts. 2012.** Historical biogeography of the arid-adapted velvet ant *Sphaerophthalma arota* (Hymenoptera: Mutillidae) reveals cryptic species. *Journal of Biogeography* 39: 336–352.
- Wilson, J. S., J. P. Jahner, K. A. Williams, and M. L. Forister. 2013.** Ecological and Evolutionary Processes Drive the Origin and Maintenance of Imperfect Mimicry. *Plos ONE* 8(4): 1–7.
- Wilson, J. S., J. P. Jahner, M. L. Forister, E. S. Sheehan, K. A. Williams, and J. P. Pitts. 2015.** North American velvet ants form one of the world's largest known Müllerian mimicry complexes. *Current Biology* 25: R693–R710.
- Wilson, J. S., A. D. Pan, E. S. Limb, and K. A. Williams. 2018.** Comparison of African and North American velvet ant mimicry complexes: Another example of Africa as the 'odd man out'. *Plos ONE* 13(1): 1–15.

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