

INSECTA MUNDI

A Journal of World Insect Systematics

0533

Species groups of *Traumatotutilla* André (Hymenoptera: Mutillidae)

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Date of Issue: March 31, 2017

ZooBank Registered: urn:lsid:zoobank.org:pub:EA5F3966-87E7-4844-98CB-A896BC341DB5

Published in 2017 by

Center for Systematic Entomology, Inc.
P. O. Box 141874
Gainesville, FL 32614-1874 USA
<http://centerforsystematicentomology.org/>

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Layout Editor for this article: Eugenio H. Nearn

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Abstract. Females of *Traumatomutilla* André (Hymenoptera: Mutillidae) are organized into 14 species groups; 136 of the 138 *Traumatomutilla* taxa known from females were studied. Of these species groups, only the inermis species group was adequately established and diagnosed in the literature (Casal 1969). The remaining newly established species groups are as follows: americana, auriculata, bellica, bifurca, diabolica, gemella, indica, integella, juvenilis, quadrinotata, tabapua, trochanterata, and vitelligera. Diagnoses and lists of included species are provided for each species group. Eighty-three new country records are provided for 49 species.

Key Words. Sphaerophthalminae, Sphaerophthalmini, Sphaerophthalmina, *Dasymutilla*, velvet ants, Neotropical.

Introduction

Traumatomutilla André is a Neotropical genus that includes 183 species and subspecies, more than half of which occur in Brazil (Nonveiller 1990). No monographs have been published for the genus and it has been over 45 years since the most recent treatment of *Traumatomutilla* taxonomy (Casal 1969). Species group nomenclature has been widely used in mutillid taxonomy (e.g. Mickel 1928, 1952; Casal 1969; Pitts et al. 2004; Pitts 2005; Pilgrim et al. 2009; Williams et al. 2011b, 2012), and is especially important for species rich genera like *Traumatomutilla*.

So far, five species groups have been discussed as such in the literature: unimarginata species group (Suárez 1960); and inermis, parallela, preta, and quadripustulata species groups (Casal 1969). The unimarginata species group is diagnosed by coloration only; the included species have the posterior spots of the second tergum united into a transverse yellow band (Suárez 1960). Diagnostic features of the parallela, preta, and quadripustulata species groups were not discussed by Casal (1969). Rather, members of the groups were patchily mentioned among the remarks of various new species. The inermis species group, with its 13 taxa, is the only species group of *Traumatomutilla* that is diagnosed on the basis of a shared combination of structural characters. This leaves 125 *Traumatomutilla* taxa known from females that lack any functional subgeneric classification. In this study we formally establish 14 species groups, including the inermis species group of Casal, based on unique combinations of characters. We hypothesize that these are natural groups, but anticipate that future phylogenetic reconstructions will compel authors to refine this subgeneric classification. Given the immense diversity of this genus, coupled with the paucity of published research on *Traumatomutilla*, we hope this contribution will encourage and facilitate needed future studies.

Materials and Methods

The following codens are used for institutions housing the material discussed in the current study:
AEIC American Entomological Institute, Gainesville, Florida, USA.
AMNH American Museum of Natural History, New York, New York, USA.
ANSP Academy of Natural Sciences, Philadelphia, Pennsylvania, USA.

- ASUT Frank M. Hasbrouck Insect Collection, Arizona State University, Tempe, Arizona, USA.
- BMNH British Museum (Natural History), London, England, United Kingdom.
- CASC Department of Entomology, California Academy of Sciences, San Francisco, California, USA.
- CESC Coleção Entomológica da Universidade de Santa Cruz do Sul, Santa Cruz do Sul, Rio Grande do Sul, Brazil.
- CISC Essig Museum of Entomology, Department of Entomological Sciences, University of California, Berkeley, California, USA.
- CMNH Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA.
- CNCI Canadian National Collection, Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada.
- CPDC Centro de Pesquisas do Cacau, CEPEC, CEPLAC, Divisão de Zoologia Agrícola, Itabuna, Bahia, Brazil.
- CUIC Cornell University Insect Collection, Department of Entomology, Ithaca, New York, USA.
- CZMA Universidade Estadual do Maranhão – Coleção Zoológica do Maranhão, Caxias, Maranhão, Brazil.
- DEI Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany.
- DGMC Donald G. Manley Collection, Florence, South Carolina, USA.
- DZUP Coleção Entomológica Padre Jesus Santiago Moure, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.
- EMUS Department of Biology Insect Collection, Utah State University, Logan, Utah, USA.
- FMNH Field Museum of Natural History, Chicago, Illinois, USA.
- FSCA Florida State Collection of Arthropods, Gainesville, Florida, USA.
- IAVH Instituto Alexander von Humboldt, Villa de Leyva, Boyaca, Colombia.
- ICN Instituto de Ciencias Naturales de la Universidad Nacional, Universidad Nacional de Colombia, Bogotá, Colombia.
- IEPA Instituto de Pesquisas Científicas de Tecnológicas do Estado do Amapá, Macapá, Amapá, Brazil.
- INPA Instituto Nacional de Pesquisas na Amazônia, Manaus, Amazonas, Brazil.
- MCZC Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA.
- MNCN Museo Nacional de Ciencias Naturales, Madrid, Spain.
- MNHN Muséum National d'Histoire Naturelle, Paris, France
- MNRJ Museu Nacional, Universidade Federal do Rio de Janeiro, São Cristóvão, Rio de Janeiro, Brazil.
- MPEG Museu Paraense Emílio Goeldi, Belém, Pará, Brazil
- MZSP Museu de Zoologia da Universidade de São Paulo, São Paulo, São Paulo, Brazil.
- PMNH Peabody Museum of Natural History, Yale University, New Haven, Connecticut, USA.
- PURC Purdue University Insect Collection, West Lafayette, Indiana, USA.
- RPSP Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, São Paulo, Brazil.
- SEMC Snow Entomological Museum, University of Kansas, Lawrence, Kansas, USA.
- TAMU Texas A&M University Insect Collection, College Station, Texas, USA.
- UCDC The Bohart Museum of Entomology, University of California, Davis, California, USA.
- UCRC UCR Entomological Teaching and Research Collection, University of California, Riverside, California, USA.
- UEFS Museu de Zoologia da Universidade Estadual de Feira de Santana, Feira de Santana, Bahia, Brazil.
- UFES Coleção Entomologica, Universidade Federal do Espírito Santo, Vitória, Espírito Santo, Brazil.
- UFMT Universidade Federal do Mato Grosso, Cuiabá, Mato Grosso, Brazil.
- UFRR Univerisdade Federal de Roraima, Boa Vista, Roraima, Brazil.
- UFT Universidade Federal do Tocantins, Palmas, Tocantins, Brazil.
- UMMZ University of Michigan Museum of Zoology, Ann Arbor, Michigan, USA.
- UMRM W.R. Enns Entomology Museum, University of Missouri, Columbia, Missouri, USA.
- UMSP University of Minnesota Insect Collection, St. Paul, Minnesota, USA.
- UNAL Univerisdad Nacional de Colombia, Bogotá, Colombia.
- UNIR Universidade Federal de Rondônia, Porto Velho, Rondônia, Brazil.
- UNSM Univeristy of Nebraska State Museum, Lincoln, Nebraska, USA.

USNM United States National Museum of Natural History, Smithsonian Institution, Washington D.C., USA.

ZMUC University of Copenhagen Zoological Museum, Department of Entomology, Copenhagen, Denmark.

Many species have the head armed with posterolateral tubercles. These tubercles are connected to the occipital carina and extend forward onto the vertex. Many species in the juvenilis group have the occipital carina swollen and expanded, forming what appears to be a broadly transverse tubercle; these swellings are not considered posterolateral tubercles. To quantify mesosomal shape, the relative height and length of the lateral propodeal face are compared. Species with the mesosoma elongate have the height (measured on a vertical plane from just above the metacoxa to the ventral surface of the propodeal spiracle) subequal to the length (measured from the posterior margin of the propodeal spiracle to the posterior vertical propodeal face). Species with the mesosoma moderate in length have the lateral propodeal face height slightly greater than its length. Species with the mesosoma compact have the lateral propodeal face height nearly double its length. The scutellar scale is a tubercle or transverse carina that separates thoracic from propodeal tissue dorsomedially. Anterior transverse carina (or carinae) refers to a single carina or group of carinae situated anterior or anterolateral to the scutellar scale, between the propodeal spiracles on the dorsal mesosomal surface. We use the abbreviations T2, T3, etc., to denote the second, third, etc., metasomal terga, while S2, S3, etc., denote the second, third, etc., metasomal sterna.

Traumatomutilla André

Fourteen species groups are recognized for 136 of the 138 described females of *Traumatomutilla* (Table 1); one (inermis species group) was established by Casal (1969) and the remaining species groups are newly established here. Although many of the species groups have one or more autapomorphies, most are characterized by unique combinations of characters.

Primary types were observed for only 70 of the species studied herein (Table 1). Sixty-one of the remaining identifications are based on specimens that were identified by authors who presumably (or explicitly, in the case of homotypes) studied the type material, including E. André, C.E. Mickel, O.H. Casal, and F.J. Suárez. Five additional species were identified using original descriptions from the literature (see Table 1). Two remaining species could not be recognized and are not placed into a species group: *T. hemicycla* (Gerstaecker) and *T. puella* (Gerstaecker).

Although *Traumatomutilla* includes 48 species known from males (Nonveiller 1990), the species group construct presented here is based exclusively on females for three reasons. First, there are many more taxa known from females (138) than from males (48), suggesting that the majority of male diversity has not yet been discovered. Second, genitalic characters are often necessary for male identification, but historical descriptions focus almost entirely on color and many species have not had the type specimens dissected; this limits the viability of identifications based on literature and casts doubt on historical identifications. Finally, only two species (*T. dubia* (Fabricius) and *T. bispiculata* André) are recognized from both sexes (Nonveiller 1990), making it impossible to diagnose groups with characters from both sexes.

Based on morphology, *Traumatomutilla* forms an apparently natural group with seven other New World genera: *Cephalomutilla* André, *Dasymutilla* Ashmead, *Frigitilla* Williams, *Leucospilomutilla* Ashmead, *Reedomutilla* Mickel, *Suáreztilla* Casal, and *Tobantilla* Casal (Williams 2012). These genera are linked by the following features: the first metasomal segment is narrow and usually petiolate, the pygidium in both sexes is usually defined by lateral carinae, the males have dentate or truncate projections on the axillae, both sexes lack definite bands of plumose setae on the metasomal fringes. These genera can be readily separated by the key to genera in Brothers (2006) and the diagnostic features in Williams et al. (2011a), Bartholomay et al. (2015), and Cambra et al. (2016).

The predominantly North American genus *Dasymutilla* Ashmead, 1899 is notoriously difficult to separate from the predominantly South American *Traumatomutilla* (Brothers 2006). Both genera are diverse (over 150 species; Nonveiller 1990, Manley and Pitts 2007) and morphologically variable. The Neotropical *Dasymutilla* have not been organized into species groups, but only three apparent lineages

have members in South America. These are referenced in the key below as the blattoserica species group, which includes *D. bellatrix* Manley and Pitts; *D. blattoserica* (Kohl), and *D. homochroma* Suárez; the paradoxa species group, which includes *D. fasciventris* Mickel, *D. guanacaste* Manley and Pitts, *D. naranjo* Manley and Pitts, *D. paradoxa* (Gerstaecker), *D. paraparadoxa* (Luz and Williams), *D. phya* (Cameron), *D. relata* (Cameron), and *D. sliepniri* Manley and Pitts; and the pulchra species group, which includes only *D. pulchra* (Smith).

We have seen only three *Traumatotutilla* species in Central America: *T. dictynna* (Cameron) of the *inermis* species group, and two apparently undescribed species from the gemella and trochanterata species groups, respectively. In the key to female Neotropical *Dasymutilla* (Manley and Pitts 2007), *T. dictynna* keys to couplet 98 and can be recognized by having two pairs of yellow integumental spots on the second tergum. The apparent new species from the gemella species group keys to *D. parkerorum* Manley and Pitts in couplet 87; this apparent new species can be recognized by its elongate mesosoma that has the dorsal propodeal face longer than the posterior face. The apparent new species from the trochanterata species group keys to couplet 45 in Manley and Pitts (2007) and can be recognized by having the mesosoma reddish.

Species groups are preferred over subgenera because they are not governed by the code and are, therefore, more flexible and functional for a preliminary study like this. With three exceptions, these species groups are named for the oldest included species. Because of subsequent taxonomic studies, many of Mickel's species groups (e.g. *sparsa*, *obscura*) are based on synonymous names, leading to some confusion. We hope to avoid this by using the oldest names. For the *bellica*, *gemella*, and *trochanterata* species groups, however, we chose these over older names because they belong to species that are more reliably identified, more representative of the species group construct, more common in collections, and reliably distinct from older named forms.

Key to the *Traumatotutilla* species groups (females)

1. Vertex armed with posterolateral tubercles (Fig. 1–2) 2
- Vertex unarmed, at most having occipital carina obscurely swollen (Fig. 3) 7
- 2(1). Hind and usually mid femora truncate apically (Fig. 9) 3
- Femora rounded apically (Fig. 8) 4
- 3(2). Pygidium narrow, with well-defined lateral carinae that converge anteriorly; Brazil (Fig. 14, 34–35) **integella species group**
- Pygidium not as above, with lateral carinae undefined in basal half or broadest in basal half with lateral carinae parallel or bowed laterally; widespread (Fig. 13, 32–33) **inermis species group**
- 4(2). Spots of T2 composed of appressed, thickened setae; Brazil (Fig. 20–21) **auriculata species group**
- T2 generally marked with integumental spots, *if* spots composed of setae only, *then* these setae simple (e.g. Fig. 22–29) 5
- 5(4). Pygidium generally broad, occupying most of T6 surface, sides parallel or bowed laterally; widespread (Fig. 15, 18–19) **americana species group**
- Pygidium narrow, with well-defined lateral carinae that converge anteriorly (Fig. 16–17); *if* sides of pygidium weakly bowed laterally, *then* T4–5 entirely clothed with silver setae *or* genal carina strong and extending near angulate posterolateral head margin 6
- 6(5). Frons with conspicuous longitudinal carina (Fig. 11); T1 and base of T2 with longitudinal tubercles; northern Brazil (Fig. 40–41) **tabapua species group**
- Frons simple (Fig. 10, 12); T1 and base of T2 without any longitudinal tubercles; widespread (Fig. 42–43) **trochanterata species group**

- 7(1). Hind and usually mid femora truncate apically (Fig. 9) 8
 — Femora rounded apically (Fig. 8) 10
- 8(7). T2 having two spots (Fig. 22–23); mesosoma lacking scutellar scale; Brazil and Paraguay (Fig. 3) **bellica species group**
 — T2 having four spots (e.g. Fig. 18, 30); mesosoma having scutellar scale (e.g. Fig. 1–2, 4–7) .. 9
- 9(8). Mesonotum rounded laterally (Fig. 4, 7); having anterior transverse carinae connected to scutellar scale; Ecuador and Peru (Fig. 4, 44–45) **vitelligera species group**
 — Mesonotum dentate laterally (Fig. 5); lacking anterior transverse carinae; widespread (Fig. 5, 38–39) **quadrinotata species group**
- 10(7). Mesosomal dorsum clothed with orange setae; T2 lacking integumental spots, having extensive patch of orange setae; Chile, Ecuador, and Peru **blattoserica species group (*Dasymutilla*)**
 — Mesosoma marked with contrasting black and generally whitish setae (Fig. 18–19, 24–25, 30–31); T2 generally having contrasting yellow to red integumental markings or contrasting black and white setae (e.g. Fig. 26–29, 34–37) 11
- 11(10). T2 lacking integumental markings, having contrasting patterns of black and white setae; Brazil (Fig. 24–25) **bifurca species group**
 — T2 having integumental spots, or rarely, entirely black without extensive white discal setal markings (e.g. Fig. 28–29, 34–37) 12
- 12(11). Mesosoma elongate, height of lateral propodeal face subequal to length; scutellar scale absent (Fig. 3, 28–29) 13
 — Mesosoma compact to moderate, lateral propodeal face significantly higher than long; scutellar scale usually present (e.g. Fig. 19, 39, 41) 14
- 13(12). T2 marked with four integumental spots; tibial spurs black; Central America and Colombia .. **paradoxa species group (*Dasymutilla*)**
 — T2 having only two integumental spots; tibial spurs white; widespread in South America (Fig. 28–29) **gemella species group**
- 14(12). Mesonotum dentate laterally; scutellar scale narrow (Fig. 5, 38–39) 15
 — Mesonotum rounded laterally; scutellar scale variable (Fig. 1–2, 4, 6–7) 16
- 15(14). Punctuation and setae of T2 greatly reduced on integumental spots; widespread in South America (Fig. 38–39) **quadrinotata species group**
 — Punctuation and setae of T2 similar on disc and integumental markings; Central America and Colombia **pulchra species group (*Dasymutilla*)**
- 16(14). Apical terga clothed either entirely with pale setae or black setae medially, no terga having medial spot of white setae; widespread **trochanterata species group**
 — Fringes of T3–5 (sometimes T2–5) each having medial white spot (e.g. Fig. 18, 22, 30) 17
- 17(16). Scutellar scale narrow, transverse carinae anterior to scale absent; mesosoma lacking medial carina; lateral margin of mesonotum emarginate anterior to propodeal spiracle; Argentina and Chile (Fig. 26–27) **diabolica species group**
 — Scutellar scale having transverse carinae anteriorly *or* mesonotum having medial carina (Fig. 4, 6–7) 18
- 18(17). Scutellar scale broad, separated from transverse carina anterior to scale; transverse carina anterior to scutellar scale bilobate (Fig. 6); fringe of T2 usually entirely black (Fig. 36);

- lateral margin of mesonotum often simply divergent anterior to propodeal spiracle (Fig. 6, 36); mesonotum lacking medial longitudinal carina, or carina poorly developed; widespread (Fig. 36–37) **juvenilis species group**
- Scutellar scale typically narrow and usually lacking transverse carina anterior to scale (Fig. 7), *if* anterior carina present, *then* scutellar scale laterally connected to anterior carina (Fig. 4); fringe of T2 having medial spot of white setae (Fig. 30); mesonotum laterally emarginate anterior to propodeal spiracle (Fig. 4); mesonotum having well-defined medial longitudinal carina; widespread (Fig. 4, 7, 30–31) **indica species group**

americana species group

Diagnosis. The females of this species group can be defined by a unique combination of characters: oblique tubercles on posterior margin of vertex, apex of middle and hind femora rounded laterally and pygidium broad with sides parallel or bowing laterally. The following characters are also diagnostic of the americana species group: the genal carina is weak and clearly separated from the posterolateral head tubercle; the mesosoma is compact; scutellar scale well-defined; and anterior transverse carinae typically present.

Included taxa. Fifteen described species and two subspecies: *T. americana* (Linnaeus), *T. bellifera* (Cresson), *T. compar* (André), *T. cuyana* (Burmeister), *T. dubia albata* (Smith), *T. dubia dubia* (Fabricius), *T. gemina* (Gerstaecker), *T. lasiogastra* (Burmeister), *T. latevittata* (Cresson), *T. lunigera* (Gerstaecker, 1874), *T. maula* Casal, *T. obsoleta* (Klug), *T. ocellaris* (Klug), *T. punctosignata* (André), *T. quadrum* (Klug), *T. simulans* (Smith), and *T. trinacria* (Gerstaecker).

Distribution. Members of this species group range from Colombia to Argentina.

Remarks. The americana species group includes *T. dubia dubia*, one of two species in the genus known from both sexes. Some authors (e.g., Cresson 1902) drew comparisons between species in this and the inermis species groups based on their similarities in size, body shape, and coloration. These groups are differentiated by the truncate hind femur of the inermis species group. Reduction of this femoral truncation, however, occurs in some inermis species group species (see Remarks under inermis species group). This can make these groups especially difficult to separate.

Structural variation in the americana species group is limited. André (1908) mentions that *T. lasiogastra* is so similar to *T. quadrum* that the author could not identify any morphological differences besides coloration and setal patterns. The same problem was found by Casal (1969) regarding the similarities between *T. maula* and *T. latevittata*. In fact, most members of the americana species group can only be separated by subtle differences in coloration and setal patterns. Some of these complexes (e.g., *T. americana* + *T. dubia dubia* + *T. dubia albata* + *T. gemina* + *T. simulans*) may indeed represent a single widespread and variable species.

auriculata species group

Diagnosis. The females of this species group can be immediately recognized by the spots on T2 that are composed of appressed, thickened, bristle-like setae. The following characters are also useful for diagnosis: the head is armed with vertical posterolateral tubercles, the mesosoma is compact, there is an irregular transverse carina in the scutellar area, the mid and hind femora are rounded apically, and the pygidium is broadly ovate.

Included taxon. *Traumatutilla auriculata* (Gerstaecker).

Distribution. The only species in this group is apparently restricted to the northern Atlantic Rainforest in Brazil.

Remarks. This is one of the most distinctive *Trautomutilla* species groups. The coloration, coarse sculpture, and thickened setae draw comparisons to members of the genus *Leucospilomutilla*. Discovery of the male or molecular phylogenetic results may reveal that *T. auriculata* does not actually belong in *Trautomutilla*.

bellica species group

Diagnosis. The 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 taxa. Two described species: *T. bellica* (Cresson) and *T. virginalis* (Gerstaecker).

Distribution. This species group is known from grasslands in Brazil and Paraguay.

Remarks. Cresson (1902) described *T. bellica* and differentiated it from the other *Trautomutilla* by its coloration and setal patterns. Gerstaecker (1874) provided a short and subjective description for *T. virginalis* and this species was only mentioned again by Cresson (1902) when he compared it with *Mutilla dorsovittata* Cresson [= *Suáreztilla calycina* (Gerstaecker)] based only on coloration and setal patterns.

This species group is similar to the inermis species group, which differs most notably by the tubercles on the posterolateral head margin and presence of a scutellar scale. The size of head tubercles in the inermis species group varies greatly, though. Members of the bellica species group might one day be revealed as inermis species group members with secondarily lost head tubercles and scutellar scale.

bifurca species group

Diagnosis. The females of this species group lack integumental markings on T2, rather bearing contrasting patterns of black and white setae, have the head unarmed posterolaterally and the genal carina absent (weakly defined in *T. oxira*). These species also have: the mesosoma compact, the scutellar scale and anterior transverse carina present (weak in *T. oxira*), the femoral apices rounded, and the pygidium broadly ovate.

Included taxa. Three described species: *T. bifurca* (Klug), *T. ira* Casal, and *T. oxira* Casal.

Distribution. This species group is apparently restricted to the Amazon, Caatinga and Cerrado regions of Brazil.

Remarks. The species of the bifurca species group are marked by a contrasting pattern of black and white setae. *Trautomutilla oxira* is rare, known only from the type locality, and differs significantly from the other bifurca species group members in head and mesosomal sculpture. Phylogenetic studies may require this species to be transferred to another group.

Trautomutilla ira and *T. bifurca* are obviously closely related, as the only *Trautomutilla* species to have the gena unarmed. They are differentiated by their distribution (*T. ira* in Caatinga environment and *T. bifurca* in Amazon and Cerrado) and by subtle differences in the T2 setal pattern. Future studies may reveal that *T. ira* and *T. bifurca* are conspecific.

diabolica species group

Diagnosis. The females of this species group can be separated from the other groups lacking postero-lateral head tubercles by their simplified mesosoma: the scutellar scale is narrow, there are no anterior transverse carinae, there is no longitudinal mesonotal carina, and the lateral mesonotal margins are rounded. Additionally, the genal carina is present and the femoral apices rounded.

Included taxon. *Traumatomutilla diabolica* (Gerstaecker).

Distribution. The only species in this group has been recorded from Chile and Argentina; we have not seen any records from Chile.

Remarks. The mesosomal condition of *T. diabolica* makes it impossible to place into one of the more diverse large-bodied species groups with the head unarmed (*indica*, *juvenilis*, and *quadrinotata*). *Traumatomutilla diabolica* lacks a bilobate anterior transverse carina (separating it from the *juvenilis* species group), it lacks lateral mesonotal tubercles (separating it from the *quadrinotata* species group), and lacks a longitudinal mesonotal carina (separating it from the *indica* species group).

gemella species group

Diagnosis. The females of this species group can be recognized by their elongate mesosoma that lacks a scutellar scale or anterior transverse carinae. Additionally, the head is unarmed posterolaterally, the gena is carinate, the femora are rounded apically, and the pygidium is narrow with its lateral carinae weakly defined basally.

Included taxa. Six described species: *T. andrei* (Cresson), *T. angustata* André, *T. chuza* Casal, *T. diopthalma* (Klug), *T. gemella* André, and *T. rastra* Casal.

Distribution. Members of this species group range from Panama to Argentina.

Remarks. Species from the *gemella* species group can be easily separated from other *Traumatomutilla* by the elongated and flattened mesosoma lacking the scutellar scale. Klug (1821) and Cresson (1902) upon the description of *T. diopthalma* and *T. andrei* respectively, make no mention regarding these very conspicuous characteristics. André (1906) however, reports in the descriptions of *T. gemella* and *T. angustata* that these species are similar and can only be separated by coloration and setal patterns. Casal (1969) compared *T. chuza* and *T. rastra* with *T. gemella* and *T. angustata* respectively, and, like André (1906), stated that they could be separated by coloration and setal patterns only.

The mesosomal structure is similar to the *paradoxa* species group (of *Dasymutilla*). Elongation of the mesosoma is also seen in some species of *Ephuta* [e.g. *Ephuta championi* (Cameron)]. This convergence in form is likely tied to some aspect of their biology, possibly in host habitat or mimicry.

indica species group

Diagnosis. The females of this species group can be defined by a unique combination of characters: the head is unarmed posterolaterally, the mesosoma is not elongate, the mesonotum is rounded laterally and has a well-defined medial longitudinal carina, and the femora are rounded apically. The formation of the scutellar scale and anterior transverse carinae are variable, but never with a broadly bilobate anterior transverse carina that is disconnected from the scutellar scale. The genal carina is present and the pygidium has its lateral carinae converging basally, but obscured by dense setae.

Included taxa. Twenty-four described species and six subspecies: *T. abrupta* (Gerstaecker, 1874), *T. aemulata* (Cresson), *T. alhuampa* Casal, *T. borba* (Cresson), *T. cachimba* Casal, *T. centralis boliviana*

Suárez, *T. centralis centralis* (Burmeister), *T. contempta* André, *T. gausapata* Mickel, *T. geographica* (Gerstaecker), *T. graphica* (Gerstaecker), *T. grossa* (Gerstaecker), *T. guayaca* Casal, *T. indica* (Linnaeus), *T. indicoides* Mickel, *T. ingens* André, *T. lineifera* André, *T. manca* (Cresson), *T. mundula* (Cresson), *T. parallela* (Klug), *T. peperina* Casal, *T. pillinata* Casal, *T. scripta borrosa* Casal, *T. scripta scripta* (Gerstaecker), *T. seabrai* Casal, *T. spectabilis chingona* Casal, *T. spectabilis spectabilis* (Gerstaecker), *T. tayguaya* Casal, *T. tristis* (Klug), and *T. unimarginata* (Cresson).

Distribution. Members of this species group range from Colombia to Argentina.

Remarks. The *indica* species group is one of the largest in *Trautomutilla* and because of their large size and abundance they were more widely discussed in literature than other groups. Gerstaecker (1874) compared *T. spectabilis spectabilis* with *T. tristis* and stated that both species differ solely in coloration and setal patterns, which, according to the same author, are also evident when comparing *T. scripta scripta* with *T. graphica*, and *T. geographica* with *T. parallela*. Several authors have compared different species of the *indica* species group with *T. parallela* focusing almost exclusively on differences in coloration and setal patterns, the first of these being the comments provided by Klug (1821) in which the author reports the similarities between *T. graphica* and *T. parallela*. Burmeister (1875) mentions the striking similarity between *T. centralis centralis* and *T. parallela* and states that both species have the same overall shape, sculpture and coloration and setal patterns, differing by the black tibial spur and the more elongated mesosoma with a wider mesonotal region of *T. centralis centralis*. Cresson (1902) compared several species of the *indica* species group: *T. graphica* with *T. parallela*, *T. unimarginata* with *T. mundula*, *T. manca* with *T. graphica* and *T. aemulata* with *T. graphica*. The same author, following the description of *Mutilla optata* (= *T. parallela*), stated that this species, *T. manca*, *T. borba* and/or *T. auxiliaris* are very similar and may be considered to be all the same species as *T. parallela* in future studies. In this particular case, the comparisons were made based solely on coloration and setal patterns since *T. auxiliaris* (inermis group) is structurally distinct from *T. manca*, *T. borba* and *T. parallela*. André (1903) stated that *T. lineifera* had the same overall shape and sculpture as *T. parallela*, differing only in coloration and setal patterns, which also occurs between *T. contempta* and *T. scripta scripta* according to André (1908) and *T. indicoides* and *T. indica* according to Mickel (1945). The first mention of the main characteristics of the *indica* species group was made by Mickel (1952) upon the description of *T. gausapata*, where the author states that this species is similar to *T. borba*, *T. parallela* and *T. indicoides* since all four have a longitudinal carina on the dorsum of the mesosoma and that these species can only be differentiated by coloration and setal patterns.

inermis species group

Diagnosis. The females of this species group can be defined by a unique combination of characters: the head is armed with posterolateral tubercles, the middle and hind femora are truncate apically; and the pygidium is either broad with laterally bowing sides or has its lateral carina undefined in the basal half. Additionally, the gena is carinate, the mesosoma is compact, and the scutellar scale is present.

Included taxa. Twenty-seven described species and two subspecies: *T. aequinoctialis* (Gerstaecker), *T. auxiliaris* (Cresson), *T. baguala* Casal, *T. caipira* Casal, *T. chapada* (Cresson), *T. chasca* Casal, *T. chilca* Casal, *T. confluens* André, *T. consimilis* (André), *T. coya* Casal, *T. crixia* (Cresson), *T. crona* Casal, *T. demissa* (Cresson), *T. dictynna* (Cameron), *T. gurisa* Casal, *T. inermis affinis* (Burmeister), *T. inermis inermis* (Klug), *T. ipanema* (Cresson), *T. ispijala* Casal, *T. laida* Casal, *T. maipa* Casal, *T. moinga* Casal, *T. pereirai* Suárez, *T. pertela* Casal, *T. tetrastigma* (Gerstaecker), *T. trivirgata* (Gerstaecker), *T. vagabunda* (Smith), *T. vivax* (Gerstaecker), and *T. zebrata* (Gerstaecker).

Distribution. Members of this species group range from Colombia to Argentina.

Remarks. The inermis species group is the only species group maintained here that had been formally established. Casal (1969) initially defined this group by a set of six characteristics: presence of genal

carina, presence of tubercles on posterior margin of vertex, propodeal spiracle with posterior internal fovea, presence of a scutellar scale with anterolateral carinae, femora truncated apically, and pygidium broad with longitudinal striae. Four of these six characteristics, however, are common in *Traumatomutilla* and some even vary within the inermis species group, such as the presence of striae on the pygidium. The only combination of characteristics that can be used to define the inermis species group is the presence of tubercles in the posterior margin of the vertex with the femora truncated apically. This group may be subdivided in the future, as variation is prevalent in apparently substantial structural characteristics, especially regarding the shape and sculpture of the pygidium.

The extent of truncation of the mid and hind femora varies within this species group and even within some species. Casal (1969) did not include *T. baguala* and *T. coya* in the inermis species group apparently because he viewed their femoral condition as rounded, although he did not state this explicitly. A weak truncation, along with narrow sulcation on its posterior face, is present in specimens of *T. baguala* and *T. coya*. In species with the truncation weak, specimen wear can functionally obliterate any trace of the truncation, leading these specimens to be misidentified to the americana species group. These easily misidentified species include *T. baguala*, *T. coya*, and *T. tetrastigma*. The lack of additional features to differentiate these groups suggests that they are close relatives.

integella species group

Diagnosis. The females of this species group can be defined by having the head armed with postero-lateral tubercles, the middle and hind femora are truncate apically, and the pygidium has complete well-defined lateral carinae that converge basally. Additionally, the gena is carinate, the mesosoma is compact, and the scutellar scale is present.

Included taxa. Three described species: *T. integella* (Cresson), *T. luscoides* (André), and *T. verecunda* (Cresson).

Distribution. Members of this species group are known from the Amazonian and Cerrado regions of Brazil.

Remarks. Finding synapomorphies that can define the integella species group has proven to be difficult, however, the combination of apical truncated femora and subtriangular, narrow pygidium defined by strong sharp lateral carinae laterally throughout its extension is unique among the *Traumatomutilla*. The shape of T1 is consistent within the group, but can occur in the same manner in other species groups of the genus. The scutellar scale and its anterolateral carinae are reduced and the tubercles on the posterior margin of vertex are oblique and sublinear in all species of the integella species group.

juvenilis species group

Diagnosis. The females of this species group can be recognized by their mesosomal sculpture: the scutellar scale is broad and separated from the bilobate anterior transverse carina. Other important features include: head unarmed posterolaterally, at most having the occipital carina transversely swollen; femora rounded apically; and pygidium ovate, with lateral carinae converging basally, but weak and obscured by dense setae.

Included taxa. Seven described species and four subspecies: *T. bispiculata* André, *T. bivittata bivittata* (Gerstaecker), *T. bivittata rubroguttata* (André), *T. bruchi* André, *T. duplicata duplicata* (Gerstaecker), *T. duplicata feia* Casal, *T. estrella* (Cresson), *T. guarata* Casal, *T. immaculiceps* André, *T. juvenilis* (Gerstaecker), and *T. miniata* (Gerstaecker).

Distribution. Members of this species group range from Colombia to Argentina.

Remarks. This species group includes *T. bispiculata*, one of only two *Trautomutilla* species known from both sexes. Species from the juvenilis species group can be recognized by the bilobate transverse carina anterior to the scutellar scale. Gerstaecker (1874) did not speak of the relations between other species and *T. bivittata*, *T. duplicata* and *T. miniata*, but stated that *T. juvenilis* is closely related to *T. parallela* (indica group). These two species, however, are structurally distinct and their similarity is limited to coloration. Cresson (1902) reported that *T. juvenilis* has the “same form” as *T. manca* (indica group), and is differentiated from the latter by the mesosoma not being distinctly emarginated. The same author also stated that *T. duplicata* bears the same form and sculpture that *T. bivittata*, while André (1908) reported that *T. bispiculata* was similar to *T. miniata*, differing in subtle features of the mesosoma and color.

This group is difficult to differentiate from the indica species group, due to similarities in size, color, and general form, coupled with the necessity to compare mesosomal carinae that are often obscured by dense setae. For roughly 95% of individuals, however, these groups can be easily separated using the T2 fringe. In the juvenilis species group, this fringe is generally entirely black medially (e.g. Fig. 36–37), while most members of the indica species group have a whitish medial setal patch on the T2 fringe (e.g. Fig. 30–31).

quadrinotata species group

Diagnosis. Females of this species group can be separated from other *Trautomutilla* by the laterally dentate mesonotum. In all of the included species, the head is unarmed posterolaterally; the gena is carinate; the scutellar scale is narrow, the anterior transverse carinae are lacking; and the pygidium is narrow, with its lateral carinae converging basally, obscured by dense setae.

Included taxa. Thirteen described species: *T. ameliae* Casal, *T. austera* (Gerstaecker), *T. funebris* (Gerstaecker, 1874), *T. incerta* (Spinola), *T. lugubrina* (Dalla Torre), *T. quadrinotata* (Klug), *T. quadripustulata* (Klug), *T. sancta* (Gerstaecker), *T. sigillata* (Gerstaecker), *T. sodalicia* (Kohl, 1882), *T. solemnis* (Cresson), *T. tabatinga* Casal and *T. ursina* (Gerstaecker).

Distribution. Members of this species group range from Colombia to Argentina.

Remarks. Members of the quadrinotata species group are easily recognized by the conspicuous projecting tubercle on each side of the mesonotum. This character was mentioned by Klug (1821) upon the description of *T. quadrinotata* and *T. quadripustulata*. In the same study, the author stated that *T. quadrinotata* has two tubercles on each side of the mesosoma, while *T. quadripustulata* has four tubercles. Of these four tubercles referenced by Klug, the first pair references the diagnostic mesonotal tubercles and the second pair refers to the propodeal spiracles, which protrude due to the emarginate mesonotum. In addition to the apparently armed propodeal spiracle, the mesosoma of *T. quadripustulata* has the pronotal spiracle and the anterolateral margin projected. Expansions or angulations of the mesosomal spiracles or humeral angle vary within the quadrinotata species group and even occur in other species groups of *Trautomutilla*. Spinola (1841) also included the lateral mesonotal tubercles in his description of *T. incerta*, while Gerstaecker (1874) made no mention of this structure in the descriptions of *T. sancta*, *T. austera*, *T. sigillata* and *T. ursina*. André (1908) stated that *T. lugubrina* differs from *T. quadripustulata* only in color pattern of T2. Casal (1969) made the first attempt to organize these species in a species group after the description of *T. ameliae*, where he reported that *T. ameliae* was part of the group of *T. quadripustulata*, including *T. quadrinotata*, *T. funebris*, *T. solemnis*, *T. sancta*, and *T. sigillata*.

tabapua species group

Diagnosis. The females of this species group can be immediately recognized by the longitudinal tubercles on the elongate T1 and base of T2. The following combination of characters also diagnoses this

group: the head is armed with a posterolateral tubercle; the femora are rounded apically; the frons has a longitudinal carina; and the pygidium is narrow with the lateral carinae converging basally. Additionally, the gena is carinate and the mesosoma has a scutellar scale and weak anterior transverse carinae.

Included taxon. *Traumatomutilla tabapua* Casal.

Distribution. This species group appears to be widespread in the Amazon region of northern South America.

Remarks. The apically rounded femora, tubercles on the posterior margin of the vertex and narrow pygidium can occur in other species groups of *Traumatomutilla*. The species of the tabapua species group, however, can be easily distinguished by the longitudinal frontal carina and tubercles on T1 and the base of T2. Additionally, T1 is more slender, elongated and petiolated in the tabapua species group than in the other species groups and the pygidium is generally smooth and unsculptured, at most with faint traces of longitudinal rugae medially.

trochanterata species group

Diagnosis. Females of this species group can be defined by a unique combination of characters: head armed with posterolateral tubercles (rarely absent), the femora are rounded apically, and the pygidium is narrow with the lateral carinae convergent basally. The gena is always carinate and many species have this carina strong and connecting to the posterolateral tubercle. The mesosoma is compact or moderate and has a scutellar scale present.

Included taxa. Fifteen described species and three subspecies: *T. bellicosa* (Cresson), *T. latona* Mickel, *T. lusca* (Klug), *T. moesta* (Gerstaecker), *T. ormena* Casal, *T. rectilineata* (André), *T. paraiba* Casal, *T. piasta* Casal, *T. preta* Casal, *T. tijuca* Casal, *T. triangulifera* André, *T. trochanterata mirina* Casal, *T. trochanterata trochanterata* (Gerstaecker), *T. trochanterata urupema* Casal, *T. tulumba* Casal, *T. valuta* Casal, *T. xiringa* Casal, and *T. zayapa* Casal.

Distribution. Members of this species group range from Panama to Argentina.

Remarks. The trochanterata species group was previously mentioned by Casal (1969) under the name of “*T. preta* group”, including six of the 42 new species described in the same study. We have chosen to name this group for *T. trochanterata* because it is an older name and is a more common species, and because we have expanded the definition of this group beyond Casal’s apparent scope for the “*T. preta* group”. Casal (1969) wrote an adequate description for *T. preta*, but then described *T. ormena*, *T. zayapa*, *T. piasta* and *T. xiringa* by listing differences between these species and *T. preta*. Mickel (1952) mentioned that *T. latona* was similar to *T. trochanterata*, differing only in coloration, setal patterns, and pygidial sculpture. One particular species of this group, *T. tijuca* differs greatly from the remaining species in that the tubercles of the vertex are absent and the pygidium is broader and with bowed sides as in the americana species group, not strongly convergent basally; it can be placed in the trochanterata species group based on the supplemental characters mentioned in the key above.

vitelligera species group

Diagnosis. The females of this species group can be defined 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. Additionally, the gena is carinate and the pygidium is broadly ovate.

Included taxon. *Traumatomutilla vitelligera* (Gerstaecker).

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

Remarks. *Traumatomutilla vitelligera* is distinct in color, structure, and distribution. It can be diagnosed by its entirely silver head setae and entirely black mesosomal setae (Fig. 44–45). This distinctive setal pattern can be approximated by other species that have their bright mesosomal setal patches lost or obscured due to specimen wear or condition. We have seen valid records of *T. vitelligera* only from Ecuador and Peru and hypothesize that historical records from other countries (Nonveiller 1990) are based on misidentified or mislabeled specimens. As in *T. diabolica*, 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 species group), bilobate anterior transverse carina separated from scutellar scale (juvenilis species group), and lateral mesonotal tubercles (quadrinotata species group)].

Discussion

The species groups proposed in this study present the first broadly applied subgeneric classification for *Traumatomutilla*. We hypothesize that these are natural groups based on apparent synapomorphies or unique combinations of characters as written in the diagnoses for each group. The phylogeny of *Traumatomutilla*, however, is far from understood. Additionally, without treating males, this subgeneric classification ignores half the morphological data in this system. Sadly, relatively few *Traumatomutilla* males are actually described and only two males are associated with females. Phylogenetic analyses and new sex association discoveries are likely to necessitate adjustments to the components and diagnoses of these species groups.

Even with the aforementioned deficiencies and the risk of inaccuracies, we believe this contribution is a necessary step for the revision of *Traumatomutilla*. By subdividing this enormous genus, revisionary works, including new species descriptions, can be completed in manageable chunks as the data and resources become available. The distribution and abundance data provided (Table 2), including 83 new country records for 49 species, present a fuller overview of diversity and distribution in this genus. This is the first of many papers needed to eventually make this diverse group of wasps functional for future studies in evolution and ecology.

Acknowledgments

We thank the reviewers, James Pitts and David Luz, and the editors, Lawrence Hribar and David Plotkin, of this manuscript. We are grateful to the collection managers and curators that provided material for this study, including: Christine LeBeau (AMNH), John Rawlins (CMNH), Gabriel Melo (DZUP), Agni  le Touret-Alby (MNH), Felipe Vivallo (MNRJ), Orlando Tobias Silveira (MPEG), and Carlos Brand  o (MZSP). This research was supported by the Coordena  o de Aperfei  oamento de Pessoal de N  vel Superior (CAPES), Programa de P  s-Gradua  o em Entomologia do Instituto Nacional de Pesquisas da Amaz  nia (PPG-ENT) and Project PRJ 12.10 Entomologia na Amaz  nia – Diversidade de Insetos of the Conselho Nacional de Pesquisas of the Conselho Nacional de Pesquisas (CNPq). KAW was supported by CNPq’s Sciences Without Borders program (Complexos mim  ticos em vespas da fam  lia Mutillidae (Insecta, Hymenoptera): padr  es de mimetismo e diversidade nos biomas brasileiros: Processo 370106/2013-0). The authors would also like to thank the Programa de Apoio a N  cleos de Excel  ncia (Pronex) of the Funda  o de Amparo    Pesquisa do Estado do Amazonas (FAPEAM), process #1437/2007 and to CAPES Pro-Equipamentos, Dra. Neusa Hamada/CNPq for logistic support.

Literature Cited

- André, E. 1903. Mutillides nouveaux ou imparfaitement connus de divers pays. *Annales de la Société Entomologique de France* 72: 417–459.
- André, E. 1906. Nouvelles espèces de Mutillidae d'Amérique. *Zeitschrift für Systematische Hymenopterologie und Dipterologie* 6: 33–48.
- André, E. 1908. Descriptions de quelques nouveaux Mutillides du Musée National de Hongrie. *Annales historico-naturales Musei nationalis hungarici* 6: 375–383.
- Bartholomay, P. R. B., K. A. Williams, D. R. Luz, and E. F. Morato. 2015. *Frigitilla* gen. nov., a new genus of Amazonian Mutillidae (Hymenoptera). *Zootaxa* 3957: 49–58.
- Brothers, D. J. 2006. Familia Mutillidae. p. 577–594. *In*: F. Fernández and M. J. Sharkey (eds.). *Introducción a los Hymenoptera de la Región Neotropical*. Sociedad Colombiana de Entomología y Universidad Nacional de Colombia, Bogotá D.C. 894 p.
- Burmeister, H. C. C. 1875. Mutillae Argentinae. *Boletín de la Academia Nacional de Ciencias Exactas existente en la Universidad de Córdoba* 1: 461–502.
- Cambra, R. A., D. J. Brothers, and D. Quintero. 2016. Review of *Frigitilla* Williams in Bartholomay *et al.*, 2015, with description of a new species from Panama (Hymenoptera: Mutillidae). *Zootaxa* 4189: 395–400.
- Casal, O. H. 1969. Sobre *Traumatomutilla* André (Hymenoptera, Mutillidae). *Physis* 28: 279–298.
- Cresson, E. T. 1902. Descriptions of some *Mutilla* from Brazil. *Transactions of the American Entomological Society* 28: 1–82.
- Gerstaecker, A. 1874. Mutillarum Americae meridionalis indigenarum synopsis systematica et synonymica. *Archiv für Naturgeschichte* 40: 41–77, 299–328.
- Klug, J. C. F. 1821. *Entomologiae Brasilianae specimen*. *Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum* 10: 277–324.
- Luz, D. R., K. A. Williams, and P. R. Bartholomay. 2016. The mutillid wasps of the *Dasymutilla paradoxa* species-group (Hymenoptera: Mutillidae). *Zootaxa* 4193: 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. 1952. The Mutillidae (wasps) of British Guiana. *Zoologica, New York* 37: 105–150.
- Nonveiller, G. 1990. Catalogue of the Mutillidae, Myrmosidae and Bradynobaenidae of the Neotropical Region including Mexico (Insecta, Hymenoptera). *Hymenopterorum Catalogus (Nova Editio)*, 18. Den Haag, SPB Academic Publishing. 150 p.
- Pilgrim, E. M., K. A. Williams, D. G. Manley, and J. P. Pitts. 2009. Addressing the *Dasymutilla quadriguttata* species group and species-complex (Hymenoptera: Mutillidae): several distinct species or a single, morphologically variable species? *Journal of the Kansas Entomological Society* 82: 231–249.
- Pitts, J. P. 2005. Description of a new species in the *Sphaerophthalma pennsylvanica* species group (Hymenoptera: Mutillidae). *Zootaxa* 1050: 39–43.
- Pitts, J. P., F. D. Parker, and T. L. Pitts-Singer. 2004. A review of the *Sphaerophthalma uro* species group (Hymenoptera: Mutillidae), with taxonomic changes. *Journal Kansas Entomological Society* 77: 223–234.
- Quintero, D., and Cambra, R. A. 1996a. Contribución a la sistemática de las mutílidas (Hymenoptera) del Perú, en especial las de la Estación Biológica BIOLAT, Río Manu, Pakitza. p. 327–357. *In*: D. E. Wilson and A. Sandoval (eds.), *Manu: The biodiversity of Southeastern Peru*. Smithsonian Institution Press, Washington DC, 672 p.
- Quintero D., and Cambra, R. A., 1996b. Mutillidae of Paraguay. *Sphecos* 30: 11–14.
- Spinola, M. 1841. Hyménoptères recueillis à Cayenne en 1839 par M. Leprieur, pharmacien de la Marine Royale. Seconde Partie. Porte-Aiguillons. *Annales de la Société Entomologique de France* 10: 85–149. [Mutillidae - p. 86–98, pl. 3].
- Suárez, F. J. 1960. Datos sobre Mutílidos neotropicales. I. Nuevas especies de Sphaerophthalminae [sic !] (Hymenoptera). *EOS*, 36: 451–480.
- Williams, K. A. 2012. Systematics of Mutillidae (Hymenoptera) with special emphasis on *Dasymutilla* and their allies. All Graduate Theses and Dissertations. Paper 1200. Utah State University Press;

Logan, UT, USA. 327 p. (Available at ~ <http://digitalcommons.usu.edu/etd/1200/>. Last accessed October 2016.)

Williams, K. A., D. J. Brothers, and J. P. Pitts. 2011a. New species of *Tobantilla* Casal, 1965 and a new genus and species, *Gogoltilla chichikovi* gen. et sp. nov., from Argentina (Hymenoptera: Mutillidae). *Zootaxa* 3064: 41–68.

Williams, K. A., D. G. Manley, E. K. Pilgrim, C. D. von Dohlen, and J.P. Pitts. 2011b. Multi-faceted assessment of species validity in the *Dasymutilla bioculata* species group (Hymenoptera: Mutillidae). *Systematic Entomology* 36: 180–191.

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.

Received November 15, 2016; Accepted February 28, 2017.

Review Editor Lawrence Hribar.

Table 1. Species placed in species-groups and their method of identification. “Primary type” refers to taxa studied from the holotype, lectotype, or type series; “Reference material” includes taxa wherein specimens compared with the Holotype and/or identified by other specialists were studied; “Literature” refers to taxa identified by the authors using available keys and original descriptions.

Species-group	Species	Primary type	Reference material	Literature
americana	<i>T. americana</i> (Linnaeus, 1758)		X	
	<i>T. bellifera</i> (Cresson, 1902)	X		
	<i>T. compar</i> (André, 1895)	X		
	<i>T. cuyana</i> (Burmeister, 1875)		X	
	<i>T. dubia albata</i> (Smith, 1879)		X	
	<i>T. dubia dubia</i> (Fabricius, 1804)		X	
	<i>T. gemina</i> (Gerstaecker, 1874)		X	
	<i>T. lasiogastra</i> (Burmeister, 1875)		X	
	<i>T. latevittata</i> (Cresson, 1902)	X		
	<i>T. lunigera</i> (Gerstaecker, 1874)		X	
	<i>T. maula</i> Casal, 1969	X		
	<i>T. obsoleta</i> (Klug, 1821)		X	
	<i>T. ocellaris</i> (Klug, 1821)		X	
	<i>T. punctosignata</i> (André, 1906)		X	
	<i>T. quadrum</i> (Klug, 1821)		X	
	<i>T. simulans</i> (Smith, 1855)		X	
	<i>T. trinacria</i> (Gerstaecker, 1874)		X	
auriculata	<i>T. auriculata</i> (Gerstaecker, 1874)		X	
bellica	<i>T. bellica</i> (Cresson, 1902)	X		
	<i>T. virginalis</i> (Gerstaecker, 1874)			X
bifurca	<i>T. bifurca</i> (Klug, 1821)		X	
	<i>T. ira</i> Casal, 1969	X		
	<i>T. oxira</i> Casal, 1969	X		
diabolica	<i>T. diabolica</i> (Gerstaecker, 1874)		X	
gemella	<i>T. andrei</i> (Cresson, 1902)	X		
	<i>T. angustata</i> André, 1906	X		
	<i>T. chuza</i> Casal, 1969	X		
	<i>T. diopthalma</i> (Klug, 1821)		X	
	<i>T. gemella</i> André, 1906	X		
	<i>T. rastra</i> Casal, 1969	X		
indica	<i>T. abrupta</i> (Gerstaecker, 1874)		X	
	<i>T. aemulata</i> (Cresson, 1902)	X		
	<i>T. alhuampa</i> Casal, 1969	X		
	<i>T. borba</i> (Cresson, 1902)	X		
	<i>T. cachimba</i> Casal, 1969	X		

Species-group	Species	Primary type	Reference material	Literature
indica	<i>T. centralis boliviana</i> Suarez, 1960			X
	<i>T. centralis centralis</i> (Burmeister, 1875)		X	
	<i>T. contempta</i> André, 1908		X	
	<i>T. gausapata</i> Mickel, 1952	X		
	<i>T. geographica</i> (Gerstaecker, 1874)		X	
	<i>T. graphica</i> (Gerstaecker, 1874)		X	
	<i>T. grossa</i> (Gerstaecker, 1874)		X	
	<i>T. guayaca</i> Casal, 1969	X		
	<i>T. indica</i> (Linnaeus, 1758)		X	
	<i>T. indicoides</i> Mickel, 1945		X	
	<i>T. ingens</i> André, 1903	X		
	<i>T. lineifera</i> André, 1903	X		
	<i>T. manca</i> (Cresson, 1902)	X		
	<i>T. mundula</i> (Cresson, 1902)	X		
	<i>T. parallela</i> (Klug, 1821)		X	
	<i>T. peperina</i> Casal, 1969	X		
	<i>T. pillinata</i> Casal, 1969	X		
	<i>T. scripta borrosa</i> Casal, 1969	X		
	<i>T. scripta scripta</i> (Gerstaecker, 1874)		X	
	<i>T. seabrai</i> Casal, 1969	X		
	<i>T. spectabilis chingona</i> Casal, 1969	X		
	<i>T. spe. spectabilis</i> (Gerstaecker, 1874)		X	
	<i>T. tayguaya</i> Casal, 1969	X		
	<i>T. tristis</i> (Klug, 1821)		X	
	<i>T. unimarginata</i> (Cresson, 1902)	X		
inermis	<i>T. aequinoctialis</i> (Gerstaecker, 1874)		X	
	<i>T. auxiliaris</i> (Cresson, 1902)	X		
	<i>T. baguala</i> Casal, 1969	X		
	<i>T. caipira</i> Casal, 1969	X		
	<i>T. chapada</i> (Cresson, 1902)	X		
	<i>T. chasca</i> Casal, 1969	X		
	<i>T. chilca</i> Casal, 1969	X		
	<i>T. confluens</i> André, 1908		X	

Species-group	Species	Primary type	Reference material	Literature
inermis	<i>T. consimilis</i> (André, 1895)	X		
	<i>T. coya</i> Casal, 1969	X		
	<i>T. crixia</i> (Cresson, 1902)	X		
	<i>T. crona</i> Casal, 1969	X		
	<i>T. demissa</i> (Cresson, 1902)		X	
	<i>T. dictynna</i> (Cameron, 1895)		X	
	<i>T. gurisa</i> Casal, 1969	X		
	<i>T. inermis affinis</i> (Burmeister, 1854)		X	
	<i>T. inermis inermis</i> (Klug, 1821)		X	
	<i>T. ipanema</i> (Cresson, 1902)	X		
	<i>T. ispiala</i> Casal, 1969	X		
	<i>T. laida</i> Casal, 1969	X		
	<i>T. maipa</i> Casal, 1969	X		
	<i>T. moinga</i> Casal, 1969	X		
	<i>T. pereirai</i> Suarez, 1960	X		
	<i>T. pertela</i> Casal, 1969	X		
	<i>T. tetrastigma</i> (Gerstaecker, 1874)		X	
	<i>T. trivirgata</i> (Gerstaecker, 1874)		X	
	<i>T. vagabunda</i> (Smith, 1879)		X	
	<i>T. vivax</i> (Gerstaecker, 1874)		X	
	<i>T. zebrata</i> (Gerstaecker, 1874)		X	
integella	<i>T. integella</i> (Cresson, 1902)	X		
	<i>T. luscoides</i> (André, 1908)			X
	<i>T. verecunda</i> (Cresson, 1902)	X		
juvenilis	<i>T. bispiculata</i> André, 1907		X	
	<i>T. bivittata bivittata</i> (Gerstaecker, 1874)		X	
	<i>T. bivittata rubroguttata</i> (André, 1901)		X	
	<i>T. bruchi</i> André, 1908		X	
	<i>T. dup. duplicata</i> (Gerstaecker, 1874)		X	
	<i>T. duplicata feia</i> Casal, 1969	X		
	<i>T. estrella</i> (Cresson, 1902)	X		
	<i>T. guarata</i> Casal, 1969	X		
	<i>T. immaculiceps</i> André, 1901	X		
	<i>T. juvenilis</i> (Gerstaecker, 1874)		X	
	<i>T. miniata</i> (Gerstaecker, 1874)		X	
quadrinotata	<i>T. ameliae</i> Casal, 1969	X		
	<i>T. austera</i> (Gerstaecker, 1874)		X	
	<i>T. funebris</i> (Gerstaecker, 1874)		X	
	<i>T. incerta</i> (Spinola, 1841)		X	
	<i>T. lugubrina</i> (Dalla Torre 1897)		X	

Species-group	Species	Primary type	Reference material	Literature
quadrinotata	<i>T. quadrinotata</i> (Klug, 1821)		X	
	<i>T. quadripustulata</i> (Klug, 1821)		X	
	<i>T. sancta</i> (Gerstaecker, 1874)		X	
	<i>T. sigillata</i> (Gerstaecker, 1874)		X	
	<i>T. sodalicia</i> (Kohl, 1882)		X	
	<i>T. solemnis</i> (Cresson, 1902)	X		
	<i>T. tabatinga</i> Casal, 1969	X		
	<i>T. ursina</i> (Gerstaecker, 1874)		X	
vitelligera	<i>T. vitelligera</i> (Gerstaecker, 1874)		X	
tabapua	<i>T. tabapua</i> Casal, 1969	X		
trochanterata	<i>T. bellicosa</i> (Cresson, 1902)	X		
	<i>T. latona</i> Mickel, 1952			X
	<i>T. lusca</i> (Klug, 1821)		X	
	<i>T. moesta</i> (Gerstaecker, 1874)		X	
	<i>T. ormena</i> Casal, 1969	X		
	<i>T. paraiba</i> Casal, 1969	X		
	<i>T. piasta</i> Casal, 1969	X		
	<i>T. preta</i> Casal, 1969	X		
	<i>T. rectilineata</i> (André, 1898)	X		
	<i>T. tijuca</i> Casal, 1969	X		
	<i>T. triangulifera</i> André, 1906			X
	<i>T. trochanterata mirina</i> Casal, 1969	X		
	<i>T. tro. trochanterata</i> (Gerstaecker, 1874)		X	
	<i>T. trochanterata urupema</i> Casal, 1969	X		
	<i>T. tulumba</i> Casal, 1969	X		
	<i>T. valuta</i> Casal, 1969	X		
	<i>T. xiringa</i> Casal, 1969	X		
	<i>T. zayapa</i> Casal, 1969	X		
unplaced species	<i>T. hemicycla</i> (Gerstaecker, 1874)			
	<i>T. puella</i> (Gerstaecker, 1874)			
Totals	138 taxa (136 studied)	70	61	5

Table 2. Overview of material examined for this study. New country records are listed in bold. Country records based on literature: ¹ Nonveiller 1990; ² Quintero and Cambra 1996a; ³ Quintero and Cambra 1996b.

Species-group	Species	Specimens examined	Collections	Distribution
	<i>T. americana</i> (Linnaeus, 1758)	31	AMNH,ASUT,CASC,EMUS, FSCA,IAVH,MNHN,UMSP, USNM	Brazil ¹ Colombia Guyana ¹ Suriname ¹ Venezuela
	<i>T. bellifera</i> (Cresson, 1902)	17	ANSP,CMNH,DZUP,EMUS, MPEG,MZSP,UMSP	Brazil ¹
	<i>T. compar</i> (André, 1895)	24	ANSP,BMNH,CMNH,EMUS, FSCA,IAVH,MNHN	Argentina ¹ Brazil ¹ Colombia ¹ Paraguay Venezuela ¹
	<i>T. cuyana</i> (Burmeister, 1875)	109	AEIC,AMNH,CISC,CMNH, CUIC,EMUS,FSCA,MNHN, SEMC,USNM,ZMUC	Argentina ¹ Bolivia Paraguay
	<i>T. dubia albata</i> (Smith, 1879)	197	AMNH,BMNH,CASC,CMNH, CUIC,DEL,DZUP,EMUS, FSCA,IAVH,ICN,INPA, MCZC,MNCN,MNHN,MNRJ, MPEG,MZSP,PMNH,UMSP, UNAL,USNM	Brazil ¹ Colombia Guyana Peru ² Suriname Venezuela
	<i>T. dubia dubia</i> (Fabricius, 1804)	9	AMNH,BMNH,CUIC,UMSP, ZMUC	Brazil ¹ Guyana ¹
americana	<i>T. gemina</i> (Gerstaecker, 1874)	17	CESC,MNCN,MNHN,MPEG, MZSP,UMSP	Argentina ¹ Brazil ¹ Peru
	<i>T. lasiogastera</i> (Burmeister, 1875)	52	AMNH,BMNH,CMNH,CUIC, DEL,EMUS,FSCA,MNCN, MNHN,RPSP,UCDC,UMSP, ZMUC	Argentina ¹ Bolivia Paraguay Brazil
	<i>T. latevittata</i> (Cresson, 1902)	389	AEIC,ANSP,BMNH,CASC, CMNH,DZUP,MNCN,MNHN, MNRJ,MPEG,MZSP,UMSP	Brazil ¹
	<i>T. lunigera</i> (Gerstaecker, 1874)	3	MNHN	Brazil ¹
	<i>T. maula</i> Casal, 1969	272	AMNH,DZUP,EMUS,FSCA, MNRJ,MNHN,MPEG,MZSP, UMSP,USNM,ZMUC	Brazil ¹ French Guiana
	<i>T. obsoleta</i> (Klug, 1821)	70	AMNH,CMNH, DZUP,EMUS, MPEG,MZSP,UMSP,USNM	Bolivia Brazil ¹ Paraguay

Species-group	Species	Specimens examined	Collections	Distribution
americana	<i>T. ocellaris</i> (Klug, 1821)	78	AMNH, ANSP, BMNH, CMNH, DZUP, MNRJ, MPEG, MZSP, UMSP, ZMUC	Brazil ¹ Paraguay
	<i>T. punctosignata</i> (André, 1906)	15	CZMA, DZUP, MNCN, MNRJ, MPEG, UEFS, UMSP	Brazil ¹
	<i>T. quadrum</i> (Klug, 1821)	192	AMNH, ANSP, CESC, CMNH, CPDC, DZUP, EMUS, FSCA, MNCN, MNHN, MNRJ, MPEG, MZSP, UFES, UMSP, USNM	Argentina ¹ Bolivia Brazil ¹ Paraguay ³
	<i>T. simulans</i> (Smith, 1855)	42	AMNH, MNCN	Peru ² Venezuela ¹
	<i>T. trinacria</i> (Gerstaecker, 1874)	163	AMNH, CESC, CISC, CMNH, CUIC, DEI, EMUS, FSCA, UMSP, USNM, ZMUC	Argentina ¹ Brazil Uruguay
auriculata	<i>T. auriculata</i> (Gerstaecker, 1874)	6	DZUP, MNRJ, MZSP, ZMUC	Brazil ¹
bellica	<i>T. bellica</i> (Cresson, 1902)	15	CMNH, DZUP, MPEG, UMSP	Brazil ¹
	<i>T. virginalis</i> (Gerstaecker, 1874)	14	AMNH, CUIC, DZUP, MZSP, UMSP, ZMUC	Brazil ¹ Paraguay
bifurca	<i>T. bifurca</i> (Klug, 1821)	235	AMNH, CASC, CESC, CMNH, CZMA, DZUP, MPEG, MNCN, MNRJ, MZSP, RPSP, UFT	Brazil ¹
	<i>T. ira</i> Casal, 1969	1600	AMNH, CPDC, CMNH, DGMC, DZUP, EMUS, FSCA, MCZC, MNRJ, MPEG, MZSP, UEFS	Brazil ¹
	<i>T. oxira</i> Casal, 1969	7	AMNH, DZUP	Brazil ¹
diabolica	<i>T. diabolica</i> (Gerstaecker, 1874)	3	USNM, UMSP, ZMUC	Argentina ¹ Chile ¹
diopthalma	<i>T. andrei</i> (Cresson, 1902)	1	CMNH	Brazil ¹
	<i>T. angustata</i> André, 1906	6	AMNH, CESC, IAVH, MNHN, UMSP	Brazil ¹ Colombia Peru ²
	<i>T. chuza</i> Casal, 1969	9	AMNH, ASUT, CASC, FSCA, MPEG	Brazil ¹
	<i>T. diopthalma</i> (Klug, 1821)	4	AMNH, CMNH, MNHN	Bolivia Brazil ¹

Species-group	Species	Specimens examined	Collections	Distribution
diopthalma	<i>T. gemella</i> André, 1906	30	AMNH,DZUP,MNRJ,MNHN, MZSP,UFES,UMSP	Brazil ¹
	<i>T. rastra</i> Casal, 1969	4	AMNH,MNRJ	Argentina ¹ Brazil ¹
	<i>T. abrupta</i> (Gerstaecker, 1874)	1	MNCN	Brazil ¹
	<i>T. aemulata</i> (Cresson, 1902)	6	ANSP,CMNH,MZSP,UMSP	Brazil ¹
	<i>T. alhuampa</i> Casal, 1969	16	AMNH,CMNH,CUIC,EMUS, MNCN,INPA,UMSP	Argentina ¹
	<i>T. borba</i> (Cresson, 1902)	62	ANSP,CASC,CMNH,DZUP, MNCN,MNRJ,MZSP,UMSP	Paraguay ³
	<i>T. cachimba</i> Casal, 1969	5	AMNH	Brazil ¹
	<i>T. centralis boliviana</i> Suarez, 1960	1	FSCA	Bolivia ¹
	<i>T. centralis centralis</i> (Burmeister, 1875)	399	AMNH,BMNH,CASC,CISC, CMNH,CUIC,DEI,DGMC, EMUS,FSCA,MCZC,MNHN, MNCN,SEMC,UMSP,USNM, ZMUC	Argentina ¹ Paraguay Bolivia
	<i>T. contempta</i> André, 1908	53	AEIC,ANSP,BMNH,CESC, CISC,DEI,EMUS,FSCA, MNCN,MZSP,UMSP,USNM, ZMUC	Argentina Bolivia ¹ Paraguay
indica	<i>T. gausapata</i> Mickel, 1952	81	BMNH,CMNH,CPDC,CZMA, DEI,DZUP,EMUS,FSCA, INHS,MNRJ,MNHN,MPEG, MZSP,UCRC,UEFS,UFRR, UFT,UMSP,ZMUC	Brazil ¹ Guyana ¹ Venezuela ¹
	<i>T. geographica</i> (Gerstaecker, 1874)	42	AMNH,BMNH,CUIC,DZUP, EMUS,MNCN,MNRJ,MPEG, MZSP,UFT,UMSP	Brazil ¹
	<i>T. graphica</i> (Gerstaecker, 1874)	467	AMNH,ANSP, CASC,CMNH, CPDC,CUIC,DEI,DGMC, DZUP,EMUS,FSCA,MCZC, MNHN,MNRJ,MNCN,MPEG, MZSP,TAMU,UCDC,UEFS, UFT,UMMZ,UMSP,ZMUC	Argentina ¹ Bolivia Brazil ¹ Paraguay ^{1,3} Peru ²

Species-group	Species	Specimens examined	Collections	Distribution
	<i>T. grossa</i> (Gerstaecker, 1874)	96	AMNH, CESC, CISC, CUIC, DGMC, DEI, DZUP, EMUS, FSCA, MNHN, MNCN, MZSP, UMSP, UNSM, USNM	Argentina ¹ Brazil ¹ Uruguay
	<i>T. guayaca</i> Casal, 1969	43	AMNH, BMNH, EMUS, FSCA, IAVH, ICN, MNHN, UCRC, UNAL	Brazil Colombia Ecuador ¹ Venezuela
	<i>T. indica</i> (Linnaeus, 1758)	531	AMNH, ANSP, BMNH, BYUC, CASC, CISC, CMNH, CPDC, CUIC, CZMA, DEI, DZUP, EMUS, FMNH, FSCA, MNRJ, MNCN, MPEG, MZSP, UEFS, UMSP, USNM, ZMUC	Brazil ¹ Colombia ¹ French Guiana ¹ Guyana ¹ Suriname ¹ Trinidad ¹ Venezuela ¹
	<i>T. indicoides</i> Mickel, 1945	22	AMNH, BMNH, CUIC, DEI, DGMC, EMUS, FSCA, UMMZ, UMSP, USNM	Bolivia ¹ Brazil Paraguay Peru ^{1,2}
indica	<i>T. ingens</i> André, 1903	18	BMNH, EMUS, FSCA, MNHN, UMSP	Argentina ¹
	<i>T. lineifera</i> André, 1903	19	CZMA, DZUP, MNHN, MZSP, UEFS	Brazil ¹
	<i>T. manca</i> (Cresson, 1902)	128	ANSP, CMNH, DEI, DZUP, MNHN, MZSP, UEFS, UMSP	Brazil ¹
	<i>T. mundula</i> (Cresson, 1902)	8	ANSP, CMNH, DZUP, FSCA, MNRJ, MZSP	Brazil ¹
	<i>T. parallela</i> (Klug, 1821)	156	AMNH, ANSP, CMNH, CUIC, DEI, DZUP, EMUS, FMNH, FSCA, IAVH, ICN, MCZC, MNRJ, MNCN, MPEG, MZSP, UCDC, UMSP, UNIR, ZMUC	Argentina ¹ Bolivia ¹ Brazil ¹ Colombia Paraguay ³
	<i>T. peperina</i> Casal, 1969	18	AMNH, FSCA, MNCN, MZSP	Argentina ¹ Brazil Paraguay
	<i>T. pillinata</i> Casal, 1969	1	AMNH	Brazil ¹
	<i>T. scripta borrosa</i> Casal, 1969	19	AMNH, EMUS, FSCA, MNCN, UMSP	Argentina ¹

Species-group	Species	Specimens examined	Collections	Distribution
indica	<i>T. scripta scripta</i> (Gerstaecker, 1874)	22	CESC, CUIC, DZUP, EMUS, FSCA, MCZC, MNCN, MNHN, MZSP, UMSP, USNM	Argentina ¹ Bolivia ¹ Brazil ¹ Uruguay ¹
	<i>T. scabrai</i> Casal, 1969	1	AMNH	Brazil ¹
	<i>T. spectabilis chingona</i> Casal, 1969	6	AMNH	Argentina ¹
	<i>T. spectabilis spectabilis</i> (Gerstaecker, 1874)	258	AMNH, ANSP, BMNH, CISC, CMNH, CUIC, DEL, DZUP, EMUS, FSCA, MNHN, MNCN, MNRJ, MPEG, MZSP, PMNH, UFES, UMSP, USNM, ZMUC	Argentina Brazil¹ Paraguay
	<i>T. tayguaya</i> Casal, 1969	1	USNM	Colombia ¹
	<i>T. tristis</i> (Klug, 1821)	91	AMNH, ANSP, CASC, CISC, CMNH, CUIC, DZUP, EMUS, FSCA, MCZC, MNCN, MNHN, MNRJ, MPEG, MZSP, UMSP, USNM, ZMUC	Argentina ¹ Bolivia Brazil¹ Paraguay Venezuela ¹
	<i>T. unimarginata</i> (Cresson, 1902)	26	ANSP, CMNH, CUIC, DZUP, MPEG	Brazil ¹
	<i>T. aequinoctialis</i> (Gerstaecker, 1874)	22	AMNH, CASC, CUIC, DEL, FSCA, IAVH, MNHN, UMSP, USNM, ZMUC	Colombia Venezuela¹
	<i>T. auxiliaris</i> (Cresson, 1902)	11	ANSP, CMNH, DZUP, MPEG	Brazil ¹
	<i>T. baguala</i> Casal, 1969	29	AMNH, EMUS, FSCA	Argentina ¹
inermis	<i>T. caipira</i> Casal, 1969	29	AFIC, AMNH, CASC, CESC, DZUP, FSCA, MZSP, USNM	Argentina ¹ Bolivia Brazil ¹ Paraguay ^{1,3}
	<i>T. chapada</i> (Cresson, 1902)	12	ANSP, CMNH	Brazil ¹
	<i>T. chasca</i> Casal, 1969	6	AMNH, INHS, ZMUC	Brazil Paraguay³
	<i>T. chilca</i> Casal, 1969	103	AMNH, ANSP, DZUP, EMUS, FSCA, MZSP, UMMZ, USNM	Argentina ¹ Brazil Paraguay³
	<i>T. confluens</i> André, 1908	11	AMNH, FSCA, USNM	Argentina ¹ Paraguay
	<i>T. consimilis</i> (André, 1895)	5	MNHN	Brazil ¹
	<i>T. coya</i> Casal, 1969	23	AMNH, EMUS, FSCA	Argentina ¹

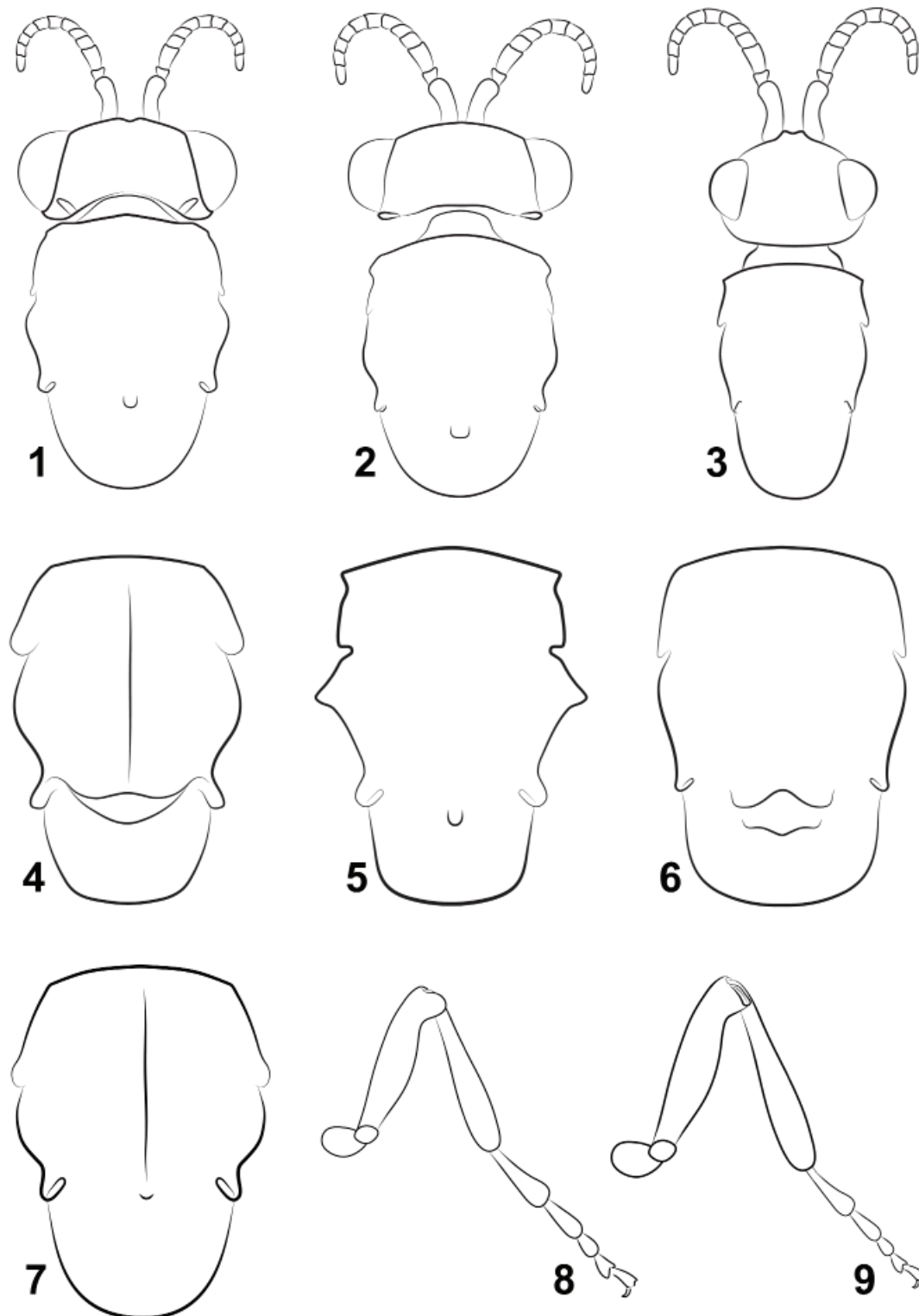
Species-group	Species	Specimens examined	Collections	Distribution
	<i>T. crixa</i> (Cresson, 1902)	25	ANSP, CMNH, DZUP, MNCN, MZSP	Brazil ¹
	<i>T. crona</i> Casal, 1969	3	AMNH	Brazil ¹
	<i>T. demissa</i> (Cresson, 1902)	71	ANSP, CMNH, DZUP, FSCA, MNRJ, MPEG, MZSP	Brazil ¹
	<i>T. dictynna</i> (Cameron, 1895)	6	AMNH, CASC, EMUS, UMSP, USNM	Costa Rica Panama ¹
	<i>T. gurisa</i> Casal, 1969	7	AMNH, CMNH, MNHN	Argentina ¹ Bolivia Paraguay ³
	<i>T. inermis affinis</i> (Burmeister, 1854)	131	AMNH, ANSP, CASC, CUIC, DEL, DGM, DZUP, MCZC, MNCN, MNRJ, MZSP, UFES, UMSP, USNM, ZMUC	Brazil ¹ Colombia ¹ French Guiana ¹
	<i>T. inermis inermis</i> (Klug, 1821)	161	ANSP, CMNH, CPDC, CUIC, DEL, DZUP, EMUS, FSCA, MNCN, MNRJ, MNHN, MPEG, MZSP, UFES, UFES, ZMUC	Brazil ¹
inermis	<i>T. ipanema</i> (Cresson, 1902)	10	ANSP, CMNH, DZUP, EMUS, MNRJ, MZSP	Brazil ¹
	<i>T. ispijala</i> Casal, 1969	1	AMNH	Brazil ¹
	<i>T. laida</i> Casal, 1969	13	AMNH, MZSP, UMSP, USNM, ZMUC	Argentina ¹
	<i>T. maipa</i> Casal, 1969	16	AMNH, DZUP, EMUS, MNRJ, MZSP	Brazil ¹
	<i>T. moinga</i> Casal, 1969	11	AMNH, MNRJ, MNHN, MZSP	Brazil ¹
	<i>T. pereirai</i> Suarez, 1960	10	MNRJ, MZSP, MNHN	Brazil ¹
	<i>T. pertela</i> Casal, 1969	38	AMNH, ANSP, CASC, MNRJ, MZSP	Brazil ¹
	<i>T. tetrastigma</i> (Gerstaecker, 1874)	65	AMNH, CESC, DZUP, FSCA, MNHN, MNCN, MPEG, MZSP	Argentina ¹ Brazil ¹ Uruguay ¹
	<i>T. trivirgata</i> (Gerstaecker, 1874)	1	UMSP	Colombia ¹
	<i>T. vagabunda</i> (Smith, 1879)	15	AMNH, CMNH, DZUP, MZSP, UMMZ, USNM	Bolivia Brazil ¹ Paraguay

Species-group	Species	Specimens examined	Collections	Distribution
inermis	<i>T. vivax</i> (Gerstaecker, 1874)	9	DZUP, FSCA, MNRJ, MZSP, UMSP, USNM, ZMUC	Brazil ¹ Paraguay
	<i>T. zabrata</i> (Gerstaecker, 1874)	29	AMNH, DEL, FSCA, MNHN, MZSP, USNM	Argentina Brazil ¹ Paraguay
	<i>T. integella</i> (Cresson, 1902)	6	CMNH, DZUP, MNHN, UMSP	Brazil ¹
	<i>T. lusoides</i> (André, 1908)	2	DZUP, INPA	Brazil ¹
integella	<i>T. verecunda</i> (Cresson, 1902)	3	CMNH, MNRJ, MZSP	Brazil ¹
	<i>T. bispiculata</i> André, 1907	202	AEIC, AMNH, BMNH, CUIC, DEL, EMUS, FSCA, MNHN, MNCN, UMSP, USNM, ZMUC	Argentina ¹ Bolivia Paraguay ³
	<i>T. bivittata bivittata</i> (Gerstaecker, 1874)	96	AMNH, ANSP, BMNH, CMNH, CUIC, DEL, DZUP, EMUS, FMNH, MCZC, MNHN, MNCN, MZSP, UMMZ, UMSP, USNM, ZMUC	Argentina Brazil ¹ Paraguay
	<i>T. bivittata rubroguttata</i> (André, 1901)	42	AMNH, ANSP, BMNH, CESC, CISC, CMNH, DGMC, EMUS, FSCA, MNCN, MNHN, RPSP, UMSP	Argentina Brazil Paraguay ^{1,3}
juvenilis	<i>T. bruchi</i> André, 1908	45	AMNH, BMNH, DGMC, EMUS, FSCA, MNHN, UMSP, USNM	Argentina ¹ Paraguay ³
	<i>T. duplicata duplicata</i> (Gerstaecker, 1874)	73	AMNH, ANSP, BMNH, CESC, CMNH, CUIC, DZUP, DEL, EMUS, FSCA, MNCN, MNRJ, MZSP, UMSP, USNM, ZMUC	Argentina ¹ Brazil ¹ Paraguay ^{1,3} French Guiana ¹ Uruguay
	<i>T. duplicata feia</i> Casal, 1969	4	AMNH	Argentina ¹ Brazil ¹
	<i>T. estrella</i> (Cresson, 1902)	4	CMNH, FSCA, MNCN	Bolivia Brazil ¹
	<i>T. guarata</i> Casal, 1969	48	AMNH, CPDC, DZUP, MNCN, MNRJ, MZSP, UFES	Brazil ¹
	<i>T. immaculiceps</i> André, 1901	22	AMNH, DGMC, FSCA, MNHN, UMMZ, UMSP, USNM, ZMUC	Argentina Paraguay ^{1,3}

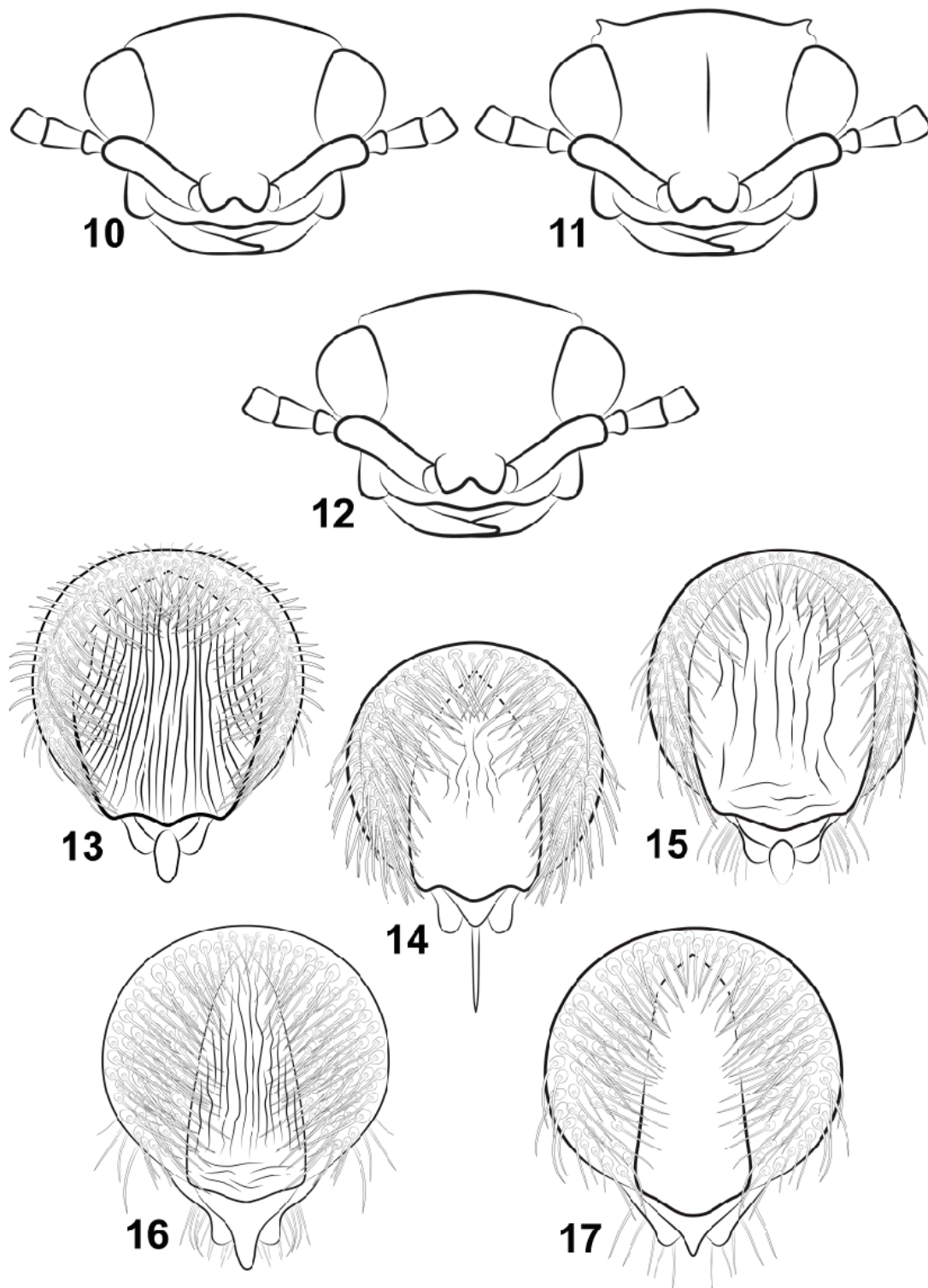
Species-group	Species	Specimens examined	Collections	Distribution
juvenilis	<i>T. juvenilis</i> (Gerstaecker, 1874)	227	AEIC, ANSP, CASC, CISC, CMNH, CUIC, DEI, DGCM, DZUP, EMUS, FMNH, MNCN, MNHN, MNRJ, MPEG, MZSP, UMSP, USNM	Bolivia Brazil ¹
	<i>T. miniata</i> (Gerstaecker, 1874)	74	AMNH, BMNH, CUIC, DEI, DGMC, EMUS, FSCA, MNHN, UMSP, USNM, ZMUC	Argentina ¹ Paraguay ³
	<i>T. ameliae</i> Casal, 1969	13	AMNH, EMUS, ZMUC	Argentina ¹ Bolivia Paraguay
	<i>T. austera</i> (Gerstaecker, 1874)	26	DEI, DZUP, MNCN, MNRJ, MNHN, MZSP, UMSP, ZMUC	Brazil ¹
	<i>T. funebris</i> (Gerstaecker, 1874)	2	MNCN	Brazil ¹
quadrinotata	<i>T. incerta</i> (Spinola, 1841)	48	ASUT, CASC, CISC, CMNH, DEI, DZUP, EMUS, FMNH, IAVH, IEPA, ICN, MCZC, MNRJ, MNCN, MPEG, MZSP, UMSP, UMRM, UNAL, UNSM, USNM, ZMUC	Ecuador Bolivia Brazil ¹ Colombia French Guiana ¹ Guyana ¹ Peru ² Venezuela
	<i>T. lugubrina</i> (Dalla Torre 1897)	35	AMNH, CASC, DEI, MNCN, MNHN, MNRJ, MZSP, UMSP	Brazil ¹
	<i>T. quadrinotata</i> (Klug, 1821)	163	AMNH, ANSP, CASC, CMNH, CPDC, CUIC, DEI, DZUP, MNCN, MNHN, MNRJ, MZSP, UEFS, UFES, UMSP, USNM, ZMUC	Brazil ¹
	<i>T. quadripustulata</i> (Klug, 1821)	40	AMNH, ANSP, BMNH, CMNH, CZMA, DEI, EMUS, FSCA, MNCN, MNRJ, MPEG, MZSP, UMSP, USNM	Bolivia Brazil ¹
	<i>T. sancta</i> (Gerstaecker, 1874)	62	AMNH, ANSP, BMNH, CMNH, CUIC, DZUP, EMUS, MNRJ, MPEG, MNHN, MZSP, UMSP, USNM, ZMUC	Bolivia ¹ Brazil ¹ Paraguay ³
	<i>T. sigillata</i> (Gerstaecker, 1874)	2	MZSP	Brazil ¹

Species-group	Species	Specimens examined	Collections	Distribution
quadrinotata	<i>T. sodalicia</i> (Kohl, 1882)	4	MNH	Bolivia ¹ , Brazil ¹ , Ecuador ¹ , Peru ¹
	<i>T. solemnis</i> (Cresson, 1902)	31	ANSP, CMNH, CPDC, CZMA, DGM, DZUP, MNRJ, MZSP, UFS, UMSP, USNM	Brazil ¹
	<i>T. tabatinga</i> Casal, 1969	1	AMNH	Brazil ¹
	<i>T. ursina</i> (Gerstaecker, 1874)	3	DZUP, UMSP	Brazil ¹
	<i>T. tabapua</i> Casal, 1969	8	AMNH, MNHN, MPEG	Brazil ¹
tabapua	<i>T. bellicosa</i> (Cresson, 1902)	10	AMNH, ANSP, CMNH, DZUP, EMUS, FSCA, MZSP	Argentina Bolivia Brazil ¹
	<i>T. latona</i> Mickel, 1952	23	CMNH, DZUP, FSCA, IAVH, MPEG, UMSP	Brazil ¹ Colombia Guyana ¹ Trinidad ¹
	<i>T. lusca</i> (Klug, 1821)	252	DZUP, EMUS, FSCA, MNCN, MNHN, MNRJ, MPEG, MZSP	Brazil ¹
	<i>T. moesta</i> (Gerstaecker, 1874)	72	AMNH, ANSP, BMNH, CMNH, CPDC, DEI, DZUP, EMUS, FSCA, MNHN, MPEG, MZSP, UFS, UFES, UMSP, USNM, ZMUC	Argentina Bolivia Brazil ¹ Paraguay ³
	<i>T. ormena</i> Casal, 1969	23	AMNH, DZUP, EMUS, FSCA, IEPA, MNCN, MNHN, MPEG, MZSP, ZMUS	Argentina Bolivia Brazil ¹
trochanterata	<i>T. paraiba</i> Casal, 1969	1	AMNH	Brazil ¹
	<i>T. piasta</i> Casal, 1969	8	CPDC, MZSP, UFS	Brazil ¹
	<i>T. preta</i> Casal, 1969	16	AMNH, CMNH, DZUP, MNRJ	Brazil ¹
	<i>T. rectilineata</i> (André, 1898)	28	ANSP, CMNH, DZUP, MNHN, MZSP	Brazil ¹
	<i>T. tijuca</i> Casal, 1969	10	AMNH, DEI, DZUP, MNRJ, MZSP,	Brazil ¹
	<i>T. triangulifera</i> André, 1906	2	DZUP	Brazil ¹
	<i>T. troch. mirina</i> Casal, 1969	1	AMNH	Brazil ¹
	<i>T. trochanterata trochanterata</i> (Gerstaecker, 1874)	32	AMNH, DZUP, FSCA, MNHN, MZSP, UMSP, USNM	Argentina Bolivia Brazil ¹ Paraguay ³

Species-group	Species	Specimens examined	Collections	Distribution
trochanterata	<i>T. troch. urupema</i> Casal, 1969	7	AMNH,DZUP	Brazil ¹
	<i>T. tulumba</i> Casal, 1969	22	AMNH,BMNH,FSCA,USNM	Argentina Bolivia ¹ Paraguay
	<i>T. valuta</i> Casal, 1969	4	AMNH,EMUS,MPEG	Brazil ¹
	<i>T. xiringa</i> Casal, 1969	7	AMNH,MNRJ,UEFS,UMSP	Brazil ¹
	<i>T. zayapa</i> Casal, 1969	3	AMNH,UFES	Brazil ¹
vitelligera	<i>T. vitelligera</i> (Gerstaecker, 1874)	36	AMNH,ANSP,CUIC,DGMC, EMUS,FSCA,MNCN,UMSP, USNM,ZMUC	Brazil ¹ Chile ¹ Ecuador ¹ Paraguay ^{1,3} Peru ^{1,2} Venezuela ¹



Figures 1–9. Main morphological characteristics of *Traumatotutilla* species groups. **1)** Head and mesosoma, dorsal view, *T. luscooides* (integella group). **2)** Head and mesosoma, dorsal view, *T. tabapua* (tabapua group). **3)** Head and mesosoma, dorsal view, *T. gemella* (gemella group). **4)** Mesosoma, dorsal view, *T. indica* (indica group). **5)** Mesosoma, dorsal view, *T. quadrinotata* (quadrinotata group). **6)** Mesosoma, dorsal view, *T. juvenilis* (juvenilis group). **7)** Mesosoma, dorsal view, *T. unimarginata* (indica group). **8)** Hind leg, lateral view, *T. luscooides* (integella group). **9)** Hind leg, lateral view, *T. trochanterata* (trochanterata group).



Figures 10–17. Main morphological characteristics of *Trautomutilla* species groups. **10)** Head, frontal view, *Trautomutilla dubia albata* (americana group). **11)** Head, frontal view, *T. tabapua* (tabapua group). **12)** Head, frontal view, *T. trochanterata* (trochanterata group). **13)** Pygidium, posterior view, *T. inermis* (inermis group). **14)** Pygidium, posterior view, *T. luscoides* (integella group). **15)** Pygidium, posterior view, *T. maula* (americana group). **16)** Pygidium, posterior view, *T. trochanterata* (trochanterata group). **17)** Pygidium, posterior view, *T. tabapua* (tabapua group).



Figures 18–19. *Traumatotutilla americana* (Linnaeus, 1758). 18) Habitus, dorsal view. 19) Habitus, lateral view. Scale bar: 2 mm.



Figure 20–21. *Traumatotutilla auriculata* (Gerstaecker, 1874). 20) Habitus, dorsal view. 21) Habitus, lateral view. Scale bar: 3 mm.



Figures 22–23. *Traumatomutilla bellica* (Cresson, 1902). **22)** Habitus, dorsal view. **23)** Habitus, lateral view. Scale bar: 2 mm.



Figures 24–25. *Traumatomutilla bifurca* (Klug, 1821). **24)** Habitus, dorsal view. **25)** Habitus, lateral view. Scale bar: 2 mm.



Figures 26–27. *Traumatotutilla diabolica* (Gerstaecker, 1874). **26)** Habitus, dorsal view. **27)** Habitus, lateral view. Scale bar: 3 mm.



Figures 28–29. *Traumatotutilla gemella* André, 1906. **28)** Habitus, dorsal view. **29)** Habitus, lateral view. Scale bar: 3 mm.



Figures 30–31. *Traumatomutilla indica* (Linnaeus, 1758). **30)** Habitus, dorsal view. **31)** Habitus, lateral view. Scale bar: 2 mm.



Figures 32–33. *Traumatomutilla inermis* (Klug, 1821). **32)** Habitus, dorsal view. **33)** Habitus, lateral view. Scale bar: 3 mm.



Figures 34–35. *Traumatutilla integella* (Cresson, 1902). **34)** Habitus, dorsal view. **35)** Habitus, lateral view. Scale bar: 3 mm.



Figures 36–37. *Traumatutilla juvenilis* (Gerstaecker, 1874). **36)** Habitus, dorsal view. **37)** Habitus, lateral view. Scale bar: 3 mm.



Figures 38–39. *Traumatomutilla quadrinotata* (Klug, 1821). **38)** Habitus, dorsal view. **39)** Habitus, lateral view. Scale bar: 5 mm.



Figures 40–41. *Traumatomutilla tabapua* Casal, 1969. **40)** Habitus, dorsal view. **41)** Habitus, lateral view. Scale bar: 2 mm.



Figures 42–43. *Traumatotutilla trochanterata* (Gerstaecker, 1874). **42)** Habitus, dorsal view. **43)** Habitus, lateral view. Scale bar: 2 mm.



Figures 44–45. *Traumatotutilla vitelligera* (Gerstaecker, 1874). **44)** Habitus, dorsal view. **45)** Habitus, lateral view. Scale bar: 3 mm.