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A revision of the genera and species of the Neotropical family Mesembrinellidae (Diptera: Oestroidea)

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Abstract

The Neotropical family *Mesembrinellidae* is revised. A total of 53 valid, extant species are included in the family, including 15 described as new and 38 redescribed based on study of type and non-type material and of the literature. A total of 18 primary types were examined. An additional ca. 2300 specimens, belonging to 47 species, were studied in detail, including dissection and photographic documentation of terminalia, with many females illustrated for the first time. Keys to subfamilies, genera, species-groups and species are provided. Type specimens of six species housed in South American institutions could not be obtained for study, i.e., *M. bequaerti* Séguy, 1925 and the five recently described species *M. andina* (Wolff *et al.*, 2014), *M. carvalhoi* (Wolff *et al.*, 2013b), *M. cordillera* (Wolff & Ramos-Pastrana *in* Wolff *et al.*, 2017), *M. obscura* (Wolff *in* Wolff *et al.*, 2017) and *Laneella patriciae* (Wolff, 2013). We accept the synonymy, proposed by previous authors, of *Eumesembrinella* Townsend, 1931 with *Mesembrinella* Giglio-Tos, 1893. In addition, we synonymize the genera *Albuquerquea* Mello, 1967, *Giovanella* Bonatto *in* Bonatto & Marinoni, 2005, *Henriquella* Bonatto *in* Bonatto & Marinoni, 2005, *Huascaromusca* Townsend, 1918 and *Thompsoniella* Guimarães, 1977 with *Mesembrinella* Giglio-Tos, 1893, **synn. nov.**, retaining three valid genera in the family: *Laneella* Mello, 1967, *Mesembrinella* and *Souzalopesiella* Guimarães, 1977. *Laneella nigripes* Guimarães, 1977 and *Mesembrinella bellardiana* Aldrich, 1922 are fixed as the type species of the genera *Laneella* Mello, 1967 and *Mesembrinella* Giglio-Tos, 1893, respectively, under Article 70.3 of the ICZN Code. We separate *Mesembrinella* into the following species-groups: *M. latifrons* (Mello, 1967), *M. spicata* Aldrich, 1925, *M. bolivar* (Bonatto *in* Bonatto & Marinoni, 2005), *M. aeneiventris* (Wiedemann, 1830), *M. bicolor* (Fabricius, 1805), and *M. anomala* (Guimarães, 1977). The following 15 new species are described: *Laneella fusconitida* Whitworth, **sp. nov.** from Costa Rica, Ecuador and Venezuela, *Laneella fuscosquamata* Whitworth, **sp. nov.** from Guatemala and Mexico, *Laneella purpurea* Whitworth, **sp. nov.** from Costa Rica, *Mesembrinella bullata* Whitworth, **sp. nov.** from Bolivia, *Mesembrinella chantryi* Whitworth, **sp. nov.** from French Guiana and Brazil, *Mesembrinella epandrioaurantia* Whitworth, **sp. nov.** from Venezuela, *Mesembrinella guaramacalensis* Whitworth, **sp. nov.** from Venezuela, *Mesembrinella longicercus* Whitworth, **sp. nov.** from Bolivia, *Mesembrinella mexicana* Whitworth, **sp. nov.** from Mexico, *Mesembrinella nigrocoerulea* Whitworth, **sp. nov.** from Costa Rica, Ecuador and Venezuela, *Mesembrinella serrata* Whitworth, **sp. nov.** from Peru, *Mesembrinella velasquezae* Whitworth, **sp. nov.** from Venezuela, *Mesembrinella violacea* Whitworth, **sp. nov.** from Costa Rica, *Mesembrinella woodorum* Whitworth, **sp. nov.** from Ecuador, and *Mesembrinella zurquiensis* Whitworth, **sp. nov.** from Costa Rica. *Mesembrinella abaca* Hall, 1948 is proposed as a junior synonym of *Mesembrinella socors* (Walker, 1861), **syn. nov.** Lectotypes are designated for *Dexia randa* Walker, 1849 (now *Mesembrinella*) and *Mesembrinella pictipennis* Aldrich, 1922. We analyze the most extensive DNA-barcode dataset for Mesembrinellidae to date, encompassing the three genera considered valid and including 188 sequences (178 new) from 35 species, with data for 23 species provided for the first time. The topology of the resulting Neighbor-Joining tree is mostly congruent with morphology; however, some species show considerable genetic variation that is not reflected by morphology. Finally, we include a corrigendum to the recent Zootaxa paper on Nearctic *Calliphora* Robineau-Desvoidy (Diptera: Calliphoridae) by Tantawi *et al*.

Key words: *Calliphora*, *COI* barcodes, corrigendum, *Laneella*, Laneellinae, lectotypes, *Mesembrinella*, Mesembrinellinae, new synonyms, new species, *Souzalopesiella*, Souzalopesiellinae, taxonomic keys, type species

Introduction

The family Mesembrinellidae (Diptera: Oestroidea) is an exclusively Neotropical group, most abundant and diverse in tropical rain and cloud forests (Guimarães 1977; Vargas & Wood 2009). In this study, 53 species are revised, including redescriptions of 38 species and 15 species described as new. Adults prefer shaded areas and are among the most abundant Oestroidea in tropical rain forests, where they tend to fly close to the forest floor (Hall 1948; Guimarães 1977). Males of an unidentified species in Costa Rica were seen congregating on a hill top (Vargas & Wood 2009). Although their biology is not well understood, many species are attracted to carrion, dung, fruit and decaying vegetation (Hall 1948). Mesembrinellidae have several distinctive spermathecal shapes. This reflects the macrolarviparous habits of all but one of the known species (*Laneella fuscosquamata* Whitworth, **sp. nov.**), which differentiates them from related oviparous groups such as many Calliphoridae. Guimarães (1977) suggested that larvae are retained in the uterus until late in the first instar when they are deposited on a medium to complete their development. Meier *et al.* (1999) termed the condition in Mesembrinellidae as obligate pseudo-placental unilarviparity where the larvae are nourished in the uterus by secretions of the spermathecae. Exactly where the larvae are deposited is unclear, and more research is needed to better understand the life cycle of species in this family.

There has been considerable debate about the taxonomic position of the group, primarily around its rank as a subfamily of Calliphoridae or as a separate family. Shannon (1923) first suggested it should be a subfamily, Mesembrinellinae, within Calliphoridae. Many researchers followed him (Hall 1948; Roback 1951; Mello 1967, 1969; James 1970; Peris & Mariluis 1984; Mariluis 1987; Toma & Carvalho 1995; Bonatto & Marinoni 2005; Vargas & Wood 2009; Marinho *et al*. 2012; Kosmann *et. al*. 2013; Wolff 2013; Wolff *et al.* 2013a; Wolff *et al.* 2013b; Wolff *et al*. 2014).

Guimarães (1977) published the last in-depth taxonomic revision of Mesembrinellidae, reviewing its taxonomic history since Robineau-Desvoidy's (1830) establishment of the group "Muscidae Testaceae". The placement of this taxon was discussed and debated by Macquart (1834, 1844), Brauer & Bergenstamm (1893), Brauer (1895), Surcouf (1919), Shannon (1923), Hall (1948), Roback (1951), Mello (1967, 1969) and James (1970). Guimarães (1977) argued that it deserved family status and elevated Mesembrinellinae to Mesembrinellidae. He redescribed 26 species and described 4 new species. He erected two new subfamilies, Souzalopesiellinae and Laneellinae, in addition to Mesembrinellinae, each represented by a single species, respectively *Souzalopesiella facialis* (Aldrich, 1922) and *Laneella nigripes* Guimarães, 1977. He further divided the Mesembrinellinae into two tribes, Mesembrinellini (with 3 postpronotal setae) and Eumesembrinellini (with 2 postpronotal setae). He placed *Albuquerquea* Mello, 1967, *Eumesembrinella* Townsend, 1918, *Huascaromusca* Townsend, 1931, *Mesembrinella* Giglio-Tos, 1893 and *Thompsoniella* Guimarães, 1977 within Mesembrinellinae. *Albuquerquea* included one species, *A. latifrons* Mello, 1967. *Eumesembrinella* included four species: *E. benoisti* (Séguy, 1925), *E. cyaneicincta* (Surcouf, 1919) with the two subspecies *E. cyaneicincta cyaneicincta* (Surcouf, 1919) and *E. cyaneicincta pauciseta* (Aldrich, 1922), *E. quadrilineata* (Fabricius, 1805), and *E. randa* (Walker, 1849). *Huascaromusca* included seven species: *H. aeneiventris* (Wiedemann, 1830), *H. bequaerti* (Séguy, 1925), *H. decrepita* (Séguy, 1925), *H. purpurata* (Aldrich, 1922), *H. semiflava* (Aldrich, 1925), and *H. vogelsangi* (Mello, 1967). *Mesembrinella* included 14 species: *M. abaca* Hall, 1948, *M. apollinaris* Séguy, 1925, *M. batesi* Aldrich, 1922, *M. bellardiana* Aldrich, 1922 with the two subspecies *M. bellardiana bellardiana* Aldrich, 1922 and *M. bellardiana fuscicosta* Séguy, 1925, *M. bicolor* (Fabricius, 1805), *M. brunnipes* Surcouf, 1919, *M. currani* Guimarães, 1977, *M. flavicrura* Aldrich, 1925, *M. peregrina* Aldrich, 1922, *M. pictipennis* Aldrich, 1922, *M. semihyalina* Mello, 1967, *M. townsendi* Guimarães, 1977, *M. umbrosa* Aldrich, 1922, and *M. xanthorrhina* (Bigot, 1887). *Thompsoniella* contained a single species, *T. anomala* Guimarães, 1977. He provided keys to all species and illustrations for some characters. Most researchers at the time disagreed with Guimarães's elevation of the group to family level and continued treating it as a subfamily of Calliphoridae.

Peris & Mariluis (1984) provided keys to three genera and included keys to three species of *Eumesembrinella*, four species of *Huascaromusca*, and 12 species of *Mesembrinella.* This work generally followed Guimarães's keys but provided a few illustrations, some new range information and some new synonymies. Mariluis (1987) described a new species, *Mesembrinella perisi* (Mariluis, 1987). Toma & Carvalho (1995) were the first to formally conduct a cladistic study of the genera and species of Mesembrinellinae based on 40 morphological characters. Their work was subsequently reviewed in detail by Marinho *et al.* (2017). Rognes (1997) studied 45 adult and larval characters in Oestroidea and generated trees showing relationships within the superfamily. His results provided evidence that Calliphoridae are not monophyletic and he concluded that Mesembrinellinae should be a distinct family. Bonatto

described two new genera, *Henriquella* Bonatto *in* Bonatto & Marinoni, 2005 and *Giovanella* Bonatto *in* Bonatto & Marinoni, 2005, with *M. spicata* Aldrich, 1925 and *Giovanella bolivar* Bonatto *in* Bonatto & Marinoni, 2005 as type species, respectively. Male characteristics of both species were illustrated. *Mesembrinella spicata* was removed from synonymy with *Mesembrinella xanthorrhina* (Bigot, 1887). He also described a new species of *Huascaromusca*, *H. lara* Bonatto *in* Bonatto & Marinoni, 2005. Vargas & Wood (2009) reviewed the status of the taxonomy of Mesembrinellinae. They retained it as a subfamily and placed all species known from Central America within *Mesembrinella*, synonymizing *Eumesembrinella* and *Huascaromusca* under it. Marinho *et al.* (2012) suggested that Mesembrinellinae should become a family, but noted that further studies were needed. Wolff *et al.* (2013a) placed *M. perisi* in *Laneella*, as a new combination, and provided a key to separate *L. perisi* and *L. nigripes*. Wolff later described a new species, *Mesembrinella patriciae* Wolff, 2013. In another study, Wolff *et al.* (2013b) described a new species of *Giovanella*, *G. carvalhoi*, and provided a key to separate this species from *G. bolivar*. Kosmann *et al.* (2013) produced a list of valid Neotropical blow fly names, including names of 9 genera and 33 species of Mesembrinellinae. They also provided a key to Brazilian blow flies, including five genera and 14 species of Mesembrinellinae. Wolff *et al.* (2014) reviewed *Thompsoniella*, described a new species, *T. andina* Wolff *et al.*, 2014, and provided a key to separate males of *T. anomala* from *T. andina* as well as a key to the genera of Mesembrinellinae. Despite the works of Guimarães (1977) and Rognes (1997) recommending elevation of Mesembrinellinae to family rank, most authors continued treating the group as a subfamily of Calliphoridae. Marinho *et al*. (2017) provided convincing arguments that Mesembrinellidae is a monophyletic group deserving family status. Furthermore, they argued that *M. patriciae* is actually a *Laneella*, and they synonymized *Eumesembrinella* with *Mesembrinella* and *Giovanella* with *Huascaromusca*. Subsequently, Wolff & Kosmann (2016), Wolff *et al*. (2017) and Velásquez *et al*. (2017) followed the synonymies of Marinho *et al*. (2017). Wolff & Kosmann (2016) authored a chapter on the Calliphoridae and Mesembrinellidae of Colombia, including seven genera and 21 species. Wolff and Ramos-Pastrana described *Huascaromusca cordillera* Wolff & Ramos-Pastrana *in* Wolff *et al.*, 2017 and *H. obscura* Wolff *in* Wolff *et al.*, 2017, and provided a key to the genus *Huascaromusca* and illustrations of the epandrium, cerci, surstyli and other male characters. They also transferred *Giovanella carvalhoi* to *Huascaromusca* following the findings of Marinho *et al.* (2017). Velásquez *et al.* (2017) provided a checklist of species of calliphorids and mesembrinellids found in Venezuela, which included five genera and eight species of Mesembrinellidae. Cerretti *et al.* (2017) described the first fossil mesembrinellid, from Dominican amber, and addressed the diversity and systematics of the family, recommending that all known species be lumped under the genus *Mesembrinella.*

We here follow Marinho *et al*. (2017) and accept their elevation of the taxon from a subfamily of Calliphoridae to full family rank, as Mesembrinellidae. We also accept their synonymy of *Eumesembrinella* with *Mesembrinella*. We agree with their contention that *Giovanella* and *Huascaromusca* belong together, but we place them under *Mesembrinella* in separate species groups. We synonymize the five genera *Albuquerquea*, *Giovanella*, *Henriquella*, *Huascaromusca* and *Thompsoniella* with *Mesembrinella*. We place the species previously classified within these genera into the following six species-groups: *M. latifrons*, *M. spicata*, *M. bolivar*, *M. aeneiventris*, *M. bicolor*, and *M. anomala*.

Species in the family Mesembrinellidae are found from southern Mexico, around 20°N, through all of Central America to about 37°S in southern South America. Most of this area would be considered Neotropical based on the map provided in Brown (2009: fig. 1.1). This large area contains very diverse habitats, which contributes to the diversity of species found therein. Of the areas studied, Brazil and Venezuela appear to offer the greatest diversity of habitats favorable to Mesembrinellidae and will likely yield a number of additional species.

This study was initiated to address the following issues: to determine the valid species and synonymies of Mesembrinellidae through the examination of previously identified material, including type material wherever possible; to develop keys for the identification of adult Mesembrinellidae of both sexes; to redescribe all previously known species and describe the fifteen new species discovered during this study; to provide illustrations of important diagnostic characters.

Material and methods

Terminology. The terminology used in this paper primarily follows McAlpine (1981) and Rognes (1991), with exceptions as discussed in Whitworth (2006).

Specimen data. Specimen data of holotypes and lectotypes are provided exactly as given on the original labels, cited from the top of the pin down. Label lines are delimited by a slash (/); individual labels are separated by semicolons. In some instances, additional information is provided in square brackets for clarification, for example when the meaning of abbreviated words was not clear. For paralectotypes, allotypes and other paratypes and non-type material examined, label data were transcribed under a standard format and an attempt was made to clarify any confusing information. Many labels were written in Spanish or Portuguese, with a variety of abbreviations. In some cases, abbreviations were difficult to interpret and were transcribed verbatim. Several types of data were standardized, such as dates, which are all written in the format (e.g.) "25.vi.2010". For all specimens examined, the following information is provided: sex; locality data; coordinates and elevation; date of collection; collector(s); and collecting method; museum acronyms are given in parentheses. If any of these data are not provided, they were missing on the label. Specimens examined from the INBIO collection have geographic coordinates in the Lambert Norte system and are expressed as L_N_ or L_S_ plus two six-digit numbers (e.g., "L_N_295100 424600"). To avoid the hazards of shipment, photographs were requested of type specimens and labels of some common and well-known species of Mesembrinellidae housed at USNM. If such specimen photos were inadequate for identification, the types were borrowed for examination. The name-bearing types of the following nominal species were examined photographically and photos were assessed as adequate to confirm identification: *Huascaromusca abaca* Hall, 1948, *Mesembrinella bellardiana*, *M. flavicrura*, *M. umbrosa*, *M. spicata*, *M. semiflava* Aldrich, 1925, and *Souzalopesiella facialis*. Only citations from after 1977 and selected synonyms are provided in the synonymies under each species; Guimarães (1977) is referred to for citations and full lists of synonyms pre-dating 1977.

Abbreviations and symbols. Abdominal tergites and sternites are abbreviated as T and ST. T1+2 (syntergite 1+2) is the first apparent abdominal segment, followed by T3–5. In males, the terminal tergites are tergite 6 and syntergosternite 7+8 (Figs 195–238, suffix a), abbreviated as T6 and STS7+8, whereas the sternites are ST1–5 (Figs 239–281, 505) and ST6 (Figs 195–238, suffix d). In females, T6–8 (e.g., Fig. 284) and ST6–8 (Figs 326–369) are associated with the terminalia. ST8 is usually reduced to a small patch of translucent cuticle with a few setulae or, rarely, without setulae. The female T6 is categorized by shape, the two basic shapes observed being an inverted U and an inverted V, with the following subcategories (and their abbreviations): open U (OU); wide U (WU); flattened U (FU); regular V (RV); open V (OV); and wide V (WV) (Figs 282–325). A further explanation of these character states is provided under "Identifications, keys and descriptions", below. Abbreviations used for the main thoracic setae are as follows: ac = acrostichal (pre- and postsutural); dc = dorsocentral (pre- and postsutural); ia = presutural intra-alar; kat = katepisternal; ph = outer posthumeral, ppn = postpronotal. For scutellar setae, the following abbreviations are used: ap = apical seta; sa = subapical seta; lat = lateral seta (there may be a second lateral seta); bas = basal; pb = prebasal; disc = discal; the statement "1 ap" means "1 pair of apical scutellar setae". Under "Material examined", specimens with terminalia dissected or exposed are marked with "*", whereas barcoded specimens are marked with "♦". In the descriptions, the following characters are shortened as follows: fronto-orbital plate = fronto-orbital; genal dilation = gena.

The abbreviations of collections cited in this work are as follows: BG—Bernard Greenberg private collection [currently in TW collection; specimens will ultimately be deposited in a variety of other institutions]; CEUA—Colección Entomológica, Instituto de Biología, Universidad de Antioquia, Medellín, Colombia; CNC—Canadian National Collection of Insects, Arachnids and Nematodes, Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada; DEBU—University of Guelph, Guelph, Ontario, Canada; ECOSC-E—El Colegio de la Frontera Sur, San Cristobal, Mexico; FIOC—Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil; FSCA—Florida State Collection of Arthropods, Gainesville, Florida, USA; INBIO—Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica [NB: all INBIO specimens are now the property of MNCR]; LACM—Los Angeles County Museum of Natural History, Los Angeles, California, USA; MEM—Mississippi State University, Starkville, Mississippi, USA; MIZA—Museo del Instituto de Zoología Agricola Francisco-Fernandez Yépez, Marcay, Venezuela; MJMO—Universidad Centro Occidental, Decanato de Agronomía, Maracay, Lara, Venezuela; MNCR—Museo Nacional de Costa Rica, San José, Costa Rica; MNHN—Museum national d'Histoire naturelle, Paris, France; MZLU—Museum of Zoology, Lund University, Lund, Sweden; MZSP—Museu de Zoologia da Universidade de São Paulo, São Paulo, São Paulo, Brazil; NHMD—Natural History Museum of Denmark, University of Copenhagen, Copenhagen, Denmark; NHMUK—Natural History Museum [formerly British Museum (Natural History)], London, UK; NMW—Naturhistorisches Museum Wien, Vienna, Austria; OUMNH—Oxford University Museum of Natural History, Oxford, UK; TAMU—Texas A&M University, College Station, Texas, USA; TW—Terry Whit-

worth private collection, Tacoma, Washington, USA; UCDC—University of California, R.M. Bohart Museum of Entomology, Davis, California, USA; UNAM—Universidad Nacional Autonoma de Mexico, Mexico City, D.F., Mexico; USNM—National Museum of Natural History [formerly United States National Museum], Smithsonian Institution, Washington, District of Columbia, USA; UVGC—Colección de Artrópodos, Universidad del Valle de Guatemala, Guatemala City, Guatemala; WSUP—M.T. James Entomological Collection, Washington State University, Pullman, Washington, USA.

Dissections and photographs. A variety of characters necessary for the identification of species of Mesembrinellidae are illustrated herein. Other illustrations may be found in Hall (1948), which primarily provided figures of male terminalia. Mello (1967) provided illustrations of both male and female specimens and larvae. Guimarães (1977) provided numerous sketches of male, female and larval characters. In a series of recent papers, Wolff and collaborators provided a variety of sketches of terminalia and other characters for several species, including some new species (Wolff 2013; Wolff *et al.* 2013a, 2013b, 2014, 2017).

The following procedure was used to dissect adult Mesembrinellidae and study and photograph their characters. The abdomen was snapped off a dry specimen by gently lifting it with closed tweezers and rocking it up and down and from side to side. The abdomen usually broke away with ST1–5 intact, but sometimes the break occurred between ST1 and 2 and some photos are missing ST1 because of this. Once detached, the abdomen was submerged in a cold 10% solution of KOH (potassium hydroxide) for about 12 hours to macerate and soften the tissues and cuticle. More heavily sclerotized specimens took longer to clear, weakly sclerotized ones took less time. Some air was usually trapped in the abdomen, preventing it from sinking; in these cases, air bubbles were forced out after a couple of hours in the solution, when the cuticle was soft enough to be compressed without being damaged. Failure to saturate the inside of the abdomen with KOH resulted in additional treatment being required to properly clear the specimen during dissection. Once treated, the abdomen was rinsed in distilled water for about 5 minutes, rinsed in 10% glacial acetic acid to neutralize the KOH and, finally, rinsed in water again. Initial dissections were performed in distilled water; the sternites were separated from the tergites by tearing the pleural membrane between the sclerites with fine-tipped tweezers. ST1–5 were then separated from the terminalia. Sternites and tergites were dehydrated in 95% ethanol. The sternites were then transferred to glycerol in a terminalia vial, whereas the tergites were transferred to xylene, dried, shaped, and glued back on to the fly's thorax or glued to a small square of cardboard pinned below the specimen. The remaining terminalia were then dehydrated in 95% ethanol for about 5 minutes and transferred to glycerol on a depression slide to complete the dissection. For males, the following characters were dissected for most specimens: T1+2–5, T6 and STS7+8 (Figs 195–238, suffix a), ST1–5 (Figs 239–281, 505), ST6 (Figs 195–238, suffix d), pre- and postgonite (Figs 195–238, suffix b), ejaculatory sclerite (Figs 195–238, suffix c), hypandrium (Fig. 196–238, suffix e), epandrium with surstyli and cerci (Figs 15–102, 498–499), and phallus (Figs 105–192, 500–501). In females, characters dissected were: T1+2–5, T6–8 with epiproct and cerci (e.g., Fig. 284), ST1–5, ST6–8 and hypoproct (Figs 326–369), and spermathecae (Figs 370–410). Filiform spermathecae can be very difficult to find in specimens with large amounts of fatty tissue or specimens in poor condition, and it was necessary to use reflected light with sharp contrast (and lots of patience) to locate them. All dissected parts were photographed and placed in a terminalia vial with glycerol pinned below the specimen. Some dissected parts were difficult to lay flat for a good photo, especially the sternites of both sexes, STS7+8 of males and ST6–8, epiproct and cerci, ST6–8 and hypoproct of females. When this problem was encountered, these sclerites were flattened by being placed in a small drop of glycerol on a slide with a tiny slide cover (about 5 x 7 mm). The covers were created by cutting slides into small sections with a glass cutter. For some species, one or more of these characters are not shown, because few specimens were available to dissect and those available were in poor condition. Dissections were performed primarily with a Bausch and Lomb Stereozoom 7 microscope equipped with 10–20x oculars allowing magnification up to 140x. Lighting was provided by a Dolan-Jenner Fiber-Lite MI-LED ILLUMINATOR. Photography was done with a Nikon D90 camera through a Meiji Techno stereomicroscope with a focus range of 7.5–112.5x, using 1.0x or 1.5x objectives. Lighting consisted of fiber optic lights in the microscope base as well as fiber optic goosenecks. Other photos were taken through a Meiji 4200L compound microscope with 10x oculars and 2.5x, 4x, 10x, 20x and 40x objectives, with a built-in LED light for lighting. To improve depth of field, for most photos, series of 5–30 images were stacked using Helicon software version 6.7.1 (heliconsoft.com). Adobe Photoshop CS4 was used to sharpen photos, as some characters were so translucent it was difficult to see their shape. Sternites were especially difficult to photograph in some species, because they were so weakly sclerotized and translucent. To obtain usable photos it was necessary to adjust microscope contrast in order to darken the specimen or reduce

exposure time, but this also darkened the setae, obscuring the sternite shape. In some specimens the area around the sternites, including some of the setae, was erased in Photoshop to reveal the sclerite shape more clearly. To obtain better photos of metallic species, a dome and ring light was used [see Kerr *et al.* (2008) for more information]. Fiber optic lights can produce very bright light, which tends to wash out some colors compared to what is observed under incandescent light. LED lights can also distort natural colors; these factors should be considered when using color characters in keys.

Collection areas and techniques. Most of the material used for this study was borrowed from the institutions listed above. Additional specimens were collected by the first author during visits to the area around Kaw Mountain in French Guiana (04°33'58"N 52°12'43"W) and various areas around in the San José and Heredia Provinces of Costa Rica, in cooperation with researchers at INBIO. Flies were collected with bait traps baited with fish or chicken flesh and entrails. In this study, spoiled fish was a very effective bait. See Whitworth (2010) and the website www.blowflies.net for details about traps and trapping techniques. For this project, the "Pop-up Butterfly Bait Trap" from the BugDorm Store was used to collect Mesembrinellidae. Malaise traps were also used while collecting in French Guiana, but they collected far fewer mesembrinellids than bait traps.

Identifications, keys and descriptions. The keys are written for the identification of dry, pinned specimens. For specimens pinned from liquids, like alcohol, soaking in ethyl acetate or xylene before drying helped restore cuticle colors and "liven up" matted setae. Specimens were sometimes allowed to simply air dry, but better results were obtained by drying under a hot lamp. The keys to species include some character states, especially color, that can be difficult to interpret. The first characters listed in a couplet are usually those considered best to distinguish species, and generally apply to both sexes. Multiple characters are given for each species and for both sexes when possible. Many of the specimens examined for this study came from a tropical environment and were exposed to high heat and relative humidity after they were collected. Others were stored in liquids before being pinned. As a result, characters were sometimes distorted or discolored, making identification difficult. The keys herein are based only on specimens in fair to good condition; poor specimens can be difficult to identify accurately and identifications should be made with caution. Color characters in keys are important but can be misleading. Angle of view and good lighting are very important for interpretation of the colors of various body parts. Patterns of tomentum on the cuticle can be useful to help distinguish species. Tomentum is a fine dust-like covering, or micropubescence, on the cuticle, usually best observed at a low angle from the rear. When tomentum is present on a sclerite, it covers the underlying ground color of the cuticle. If tomentum is weak, the apparent color is a combination of the ground color and the tomentum color. Tomentum patterns can be rubbed off in older or damaged specimens, revealing only the ground color; thus, the interpretation of color can be variable.

The keys are based on descriptions provided herein. Readers should refer to Whitworth (2006) for illustrations of important characters used herein. Other illustrations of key characters can be found in McAlpine (1981) and Rognes (1991). One challenge is to provide readers with precise information on orientation, to allow them to clearly understand the characters. When looking at the whole specimen, "anterior", "posterior", "dorsal" and "ventral" are normally used, but for characters that are more complex, such as body parts, it can be more informative to use terms such as "upper" and "lower", "above" and "below", or "forward" and "backward". For appendages, terms such "basal" and "apical" or "proximal" and "distal" may be used. We have attempted to use orientation terminology consistently for specific characters.

Average body length of five specimens is given (when five or more specimens were available), expressed, for example, as 9.8 mm (7–11/5). In the case of this example, smaller specimens were fairly common. However, in species where occasional "runts" may be found but are nontypical, unusually small specimens were not included. For the head character "frons width", the expression "frons 0.10 (0.09–0.11/5) of head width at narrowest" means that the frons averages one tenth of the head width measured at the point of narrowest frons width in five specimens ranging from 0.09 to 0.11. If possible, we measured a minimum of five specimens of each sex from several different areas; if the number measured was less than five, these were the only specimens available. Usually, the male frons is narrowest midway and the female frons is narrowest at the vertex, but in some species location of the narrowest point may vary. The female frons is broader than the male frons in all species. In most species, male frons width is more useful for distinguishing species than female frons width, which tends to be more variable and overlapping between species. Whitworth (2006: figs 23–24) provided illustrations showing how to calculate the frons to head ratio. Guimarães's (1977) calculations of head to frons ratios are not directly comparable. He used width of frons at vertex, not at narrowest point, which generally inflates ratios for males and sometimes also for females. The shape

and color of head sclerites, including the fronto-orbital plate, frontal vitta, parafacial, ocellar triangle, gena, postgena, occiput, and medium occipital sclerite, are described [see Whitworth (2006: figs 3–4) for head illustrations]. The size of median eye facets compared to lateral eye facets is given; the ratio is typically larger in males than in females. This is given, for example, as "median facets 4x size of lateral facets", and is based on microscopic examination. Frontal setae ascend the fronto-orbital plate toward the vertex; in males with narrower frons, the row usually ends about 40–60% of the distance to the vertex and the frontal vitta is obliterated about midway. In a few species in which males have a broad frons, setae may extend to the ocellar triangle. In females with a much broader frons, the frontal setae typically ascend all the way to the vertex. The ocellar triangle may be small, medium-sized or large, and the anterior ocellus is often larger than the posterior ocelli. Palps are typically robust (stout) and yellow-orange. They are herein described as "typical" unless they vary from this pattern. Characters of the gena include color of the cuticle and tomentum and color and size of setae. Typically, the gena has a horizontal row of stout, dark setae across the lower half, which extends through the gena and across the parafacial to the vibrissa. This condition is given as typical; if not typical, the condition is described. In some species the row is shorter, with only a few weak setae anteriorly. The occiput typically has a row of stout postoccipital setae dorsally. The remainder of the occiput usually has heavy, pale tomentum with dense and fine, pale whitish to golden setae; this pattern usually extends anteriorly onto the postgena. In most species, the occiput has a polished median occipital sclerite located mid-dorsally, exposing the ground color of the cuticle in contrast to the rest of the occiput (Fig. 13). The facial ridge has a row of supravibrissal setae ascending from the vibrissa to the antennal base; the row varies from a few setae at the base to several setae arranged in a row, ascending about 50% up the facial ridge (Fig. 193). There may also be a single row of setae or a cluster of setae in an irregular broad row; the color of the setae varies according to species and the setae may be from weak and fine to stout.

The thorax provides a variety of diagnostic characters (see Whitworth 2006: figs 1–2). Virtually all species in this family have the thorax with tan to brown meral setae in the shape of an inverted L (Fig. 7). This pattern is "typical" in most species, but in some the setae may be unusually pale and fine or dark and stout, and the horizontal section of the L may be short and composed of only 1 or 2 setae. The anterior and posterior thoracic spiracles vary in size and may be small, medium-sized or large, ranging from orange or yellow to brown or black. Figures 5 and 7 are examples of typical anterior and posterior spiracles, where the typical anterior spiracle has a broad oval opening above. Most species have a subscutellum ranging from weakly to moderately or prominently developed. Typically, it is more strongly developed than in most Neotropical calliphorids, but not as strongly developed as in tachinids. Other characters include color and distribution of tomentose stripes on the dorsum of the thorax. The chaetotaxy (setal pattern) of the thorax provides useful diagnostic characters; setae examined include pre- and postsutural acrostichals, dorsocentrals and intra-alars, scutellar setae, and setae on the postpronotal lobe and katepisternum. Setal characters are given as a formula; they may be pre- and postsutural, or anterior and posterior for katepisternal setae. For example, "2:3 ac" means that there are 2 presutural acrostichal setae and 3 postsutural acrostichal setae, or "2:1 kat" means that there are 2 anterior and 1 posterior katepisternal setae. Postpronotal setae are given, for example, as "3x3", which means three setae on each side. The pattern and size of scutellar setae is also noted (see Fig. 194). The typical species has a pair of apical setae, which may be parallel, converging or crossed, a pair of discal setae above, a pair of subapical setae, one or more pairs of lateral setae, a pair of basal setae and a pair of prebasal setae. Almost all species have an apical, basal and discal pair of setae, while the subapical and lateral pairs are absent in some species. Legs may have distinctive coloration on the coxa, trochanter, femur, tibia, tarsus and tarsal claws; distinctive colors are most often observed on the femur, tibia and tarsus. Color patterns on wings are best observed with reflected light from below. Wings may be infuscated (i.e., with dark areas, see Fig. 2) or have maculae (dark spots, see Fig. 3); the location, size and shape of darkened areas can be diagnostic (see Whitworth 2006: fig. 6). Color patterns in wing cells and between veins may also be diagnostic (Fig. 1). Wings without distinctive coloration are referred to as hyaline (Fig. 1). Wing veins and cells may be of a distinctive shape or size. In some species, the wings or wing veins are faintly darkened or yellowed. In a few species, the stem vein is setose dorsally (Fig. 489); if the stem vein is bare dorsally (the most common condition), it is not mentioned. The ratio of the length of two sections of the costal vein (costal index) is a useful character used herein. We follow Guimarães (1977) in providing the ratio of the linear distance between the apices of veins R_{2+3} and R_{4+5} where they meet the costa (section III), divided by the linear distance between the apices of veins R_{4+5} and M where they meet the costa (section IV) (see Fig. 1 for how to measure). Measurements were made with an ocular micrometer and average ratios are given; the number of specimens measured is not provided, but they varied from one to five. Calypter color can be important to separate

species. The upper and lower calypters are each composed of a disc and a rim with a fringe of setae (Fig. 14). In some specimens with a pale disc, the rim may be tan or brown and the setae on the rim dark or pale. Specimens that have been stored in liquid or that are in poor condition may have calypters that are darker than normal. If in doubt, it is best to look at several specimens of a species, especially better-quality specimens, if possible. Presence or absence of setae on the subcostal sclerite is an important character; it is considered "bare" if there are no setae, but in some species may have weak to heavy pubescence; if the pubescence is heavy, it may be mentioned, but this is still considered a "bare" condition. The color of the basicosta and tegula is important as well; the tegula has pronounced dark setae in all known species.

The abdomen is composed of syntergite 1+2, tergites 3–5 and sternites 1–5 (Figs 239–281, 505). All or part of a sclerite may have a distinctive shape, coloration or tomentum pattern (see Whitworth 2006: figs 7–8). Tergites may also have distinctive patterns of lateral, discal or marginal setae (Fig. 8).

A variety of terminalia characters of both sexes can be compared in the figure plates, which can help users of keys identify species. In males, the size and shape of T6 and STS7+8 (Figs 195–238, suffix a), ST6 (Figs 195–238, suffix d), and of the epandrium, surstyli and cerci (Figs 15–102, 498–499) are useful to distinguish species. Other useful male characters include the shape and size of phallic characters (Figs 105–192, 500–501), of the ejaculatory sclerite (Figs 195–238, suffix c), of the pre- and postgonites (Figs 195–238, suffix b), and of the hypandrium (Figs 196–238, suffix e). Figures 195–238 are labeled with the suffixes a–e, where a = T6 and STS7+8, b = pre- and postgonite, c = ejaculatory sclerite, d = ST6 and e = hypandrium. If any one of the above characters is not included for a species, we were unable to isolate and document that character. In females, important characters include the shape of tergites T6–8, of the epiproct and cerci (e.g., Fig. 284), of sternites ST1–5 (Figs 411–454), of ST6–8 and the hypoproct (Figs 326–369), and of the spermathecae (Figs 370–410). The shape of T6 is especially distinctive, with shapes categorized as a variant of an inverted U or inverted V, as follows: open U (OU) (e.g., Fig. 298); wide U (WU) (e.g., Fig. 288); flattened U (FU) (e.g., Fig. 282); regular V (RV) (e.g., Fig. 292); open V (OV) (e.g., Fig. 311); and wide V (WV) (e.g., Fig. 301). The T6 sclerite is U-shaped when its middle rear margin is a smooth curve; it is V-shaped when its middle rear margin has an inverted V-shaped notch. Spermathecae can be categorized into several shapes, the most common being filiform (Fig. 376); however, they may also may be pyriform (pear-shaped) as in *M. flavicrura* (Fig. 397), bulbous as in *Souzalopesiella facialis* (Fig. 410) or tuberform as in *Laneella* spp. (Figs 370–374). Guimarães (1977: figs 139–146) illustrated these various conditions. Filiform spermathecae were often very difficult to locate during dissection; sometimes only fragments could be found, as can be seen in Figs 375, 377, 380, 387, 399 and 403.

For each species, we attempted to examine primary types. If this was not possible, we examined paratypes or previously reliably identified specimens, if available. When possible, specimens were examined from a variety of regions, which provided a better idea of intra-specific variation. For rarer species, few specimens were available and these were sometimes in poor condition, so further studies of variation are recommended as new material becomes available. In the case of a few species, no specimens could be obtained for study and we had to rely on published descriptions for characters and for their inclusion in the keys. It was very difficult to obtain loans of type material housed in some Neotropical countries, and visiting museums in person was often problematic. Researchers in this region need to work with their institutions to facilitate study of type material by outside researchers. This is especially critical to allow confirmation of the identity of new species. For example, it was not possible to obtain loans of type specimens of several recently described species from Colombia, including *L. patriciae*, *M. andina*, *M. carvalhoi*, *M. cordillera* and *M. obscura*.

DNA analysis. In an effort to further clarify species' identities, molecular data for selected specimens were uploaded to the Barcode of Life Database (BOLD; www.boldsystems.org) (Ratnasingham & Herbert 2007). The right rear leg of each specimen was removed and submitted to the Canadian Centre for DNA Barcoding (CCDB; www.ccdb.ca) at the Biodiversity Institute of Ontario to perform DNA barcoding from the mitochondrial gene *COI*, using standard high throughput methods (Ivanova *et al*. 2006). All laboratory analyses were completed at CCDB. This method required relatively recently collected material, usually no more than about 20 years old, for high success. With older specimens (20–45 years old), special barcode amplification was used in an attempt to obtain good sequences. This consisted of amplifying smaller areas (mini-barcodes: 221 bp, 134 bp) within the barcode region to produce good, short sequences that could be effective for species' identification, instead of amplifying the whole region (658 bp), which tended to fail in older specimens (Hajibabei *et al.* 2006; Hebert *et al.* 2013). All sequences were checked for potential errors and only high-quality sequences (mean PHRED > 40) (see Ratnasingham &

Hebert 2007) were included in the analysis. A neighbor-joining (NJ) tree, was generated in BOLD using the K2P distance model (Fig. 488). It includes a total of 188 sequences (178 generated during this study, 10 previously published) representing 35 species. Each specimen is labeled with a unique code starting with TLW (= Terry Lee Whitworth), e.g., "TLW232". To further confirm the position of several species within the genus *Laneella*, a Bayesian analysis was run using part of the data. For this analysis, *COI* was partitioned by codons and a model of evolution was determined for each codon using the jModelTest (Posada & Crandall 1998) and the AIC criterion (Posada & Buckley 2004). The corresponding model of evolution used for the Bayesian analysis was GTR + Γ + I for *COI*1st and *COI*3rd, and HKY + Γ + I for *COI*2nd. We ran the MC^3 (Metropolis Coupled Markov Chain Monte Carlo) chain in MrBayes v3.2.3 (Huelsenbeck & Ronquist 2001) for 10,000,000 generations.

A preliminary assessment of the topology of the tree was made to detect potential misidentifications and to assure the quality of the barcode data. Where barcodes indicated a possible problem, specimens were re-examined, re-keyed and, if necessary, their identification was changed. In other instances, barcode data showed considerable genetic variation for several species that is not reflected by morphology. See discussion of this problem under *M. bicolor* and in Whitworth *et al.* (2007) for factors that can make barcode data unreliable for species' delimitation. The barcode data produced during this project are available on the BOLD site at boldsystems.org and in GenBank (Tab. 1).

TABLE 1. GenBank numbers, BOLD numbers, voucher numbers and countries of origin of DNA-barcoded specimens of Mesembrinellidae.

Species name	GenBank number	BOLD number	Voucher number	Country
Laneella fusconitida	MK813283	BNNR300-15	TLW301	Costa Rica
Laneella fusconitida	MK813183	BNNR301-15	TLW302	Costa Rica
Laneella fusconitida	MK813241	BNNR302-15	TLW303	Costa Rica
Laneella fusconitida	MK813340	BNNR303-15	TLW304	Costa Rica
Laneella fusconitida	MK813262	BNNR304-15	TLW305	Costa Rica
Laneella fuscosquamata	MK813319	BNNR441-17	TLW444	Mexico
Laneella fuscosquamata	MK813179	BNNR442-17	TLW445	Mexico
Laneella nigripes	MK813282	BNNR382-17	TLW385	Brazil
Laneella perisi	MK813286	BNNR271-15	TLW271	Costa Rica
Laneella perisi	MK813178	BNNR272-15	TLW272	Costa Rica
Laneella perisi	MK813260	BNNR273-15	TLW273	Costa Rica
Laneella perisi	MK813240	BNNR274-15	TLW274	French Guiana
Laneella perisi	MK813246	BNNR275-15	TLW275	Costa Rica
Laneella purpurea	MK813191	BNNR294-15	TLW295	Costa Rica
Laneella purpurea	MK813223	BNNR295-15	TLW296	Costa Rica
Laneella purpurea	MK813306	BNNR296-15	TLW297	Costa Rica
Mesembrinella anomala	MK813298	BNNR198-15	TLW198	Venezuela
Mesembrinella anomala	MK813244	BNNR455-17	TLW458	Venezuela
Mesembrinella batesi	MK813344	BNNR227-15	TLW227	Ecuador
Mesembrinella batesi	MK813207	BNNR228-15	TLW228	Ecuador
Mesembrinella batesi	MK813230	BNNR229-15	TLW229	Ecuador
Mesembrinella batesi	MK813345	BNNR230-15	TLW230	Ecuador
Mesembrinella batesi	MK813194	BNNR419-17	TLW422	Peru
Mesembrinella batesi	MK813281	BNNR420-17	TLW423	Peru
Mesembrinella batesi	MK813202	BNNR421-17	TLW424	Brazil
Mesembrinella bellardiana	MK813175	BNNR232-15	TLW232	Brazil
Mesembrinella bellardiana	MK813171	BNNR233-15	TLW233	Brazil
Mesembrinella bellardiana	MK813201	BNNR234-15	TLW234	Brazil

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TABLE 1. (Continued)

Species name	GenBank number	BOLD number	Voucher number	Country
Mesembrinella bellardiana	MK813210	BNNR235-15	TLW235	Brazil
Mesembrinella bellardiana	MK813185	BNNR236-15	TLW236	Ecuador
Mesembrinella bellardiana	MK813251	BNNR358-15	TLW360	Peru
Mesembrinella bellardiana	MK813291	BNNR359-15	TLW361	Peru
Mesembrinella benoisti	MK813301	BNNR237-15	TLW237	French Guiana
Mesembrinella benoisti	MK813322	BNNR238-15	TLW238	French Guiana
Mesembrinella benoisti	MK813279	BNNR239-15	TLW239	French Guiana
Mesembrinella benoisti	MK813216	BNNR240-15	TLW240	French Guiana
Mesembrinella benoisti	MK813302	BNNR241-15	TLW241	French Guiana
Mesembrinella bicolor	MK813181	BNNR193-15	TLW193	Costa Rica
Mesembrinella bicolor	MK813198	BNNR222-15	TLW222	Peru
Mesembrinella bicolor	MK813272	BNNR223-15	TLW223	Peru
Mesembrinella bicolor	MK813233	BNNR224-15	TLW224	Peru
Mesembrinella bicolor	MK813204	BNNR225-15	TLW225	Peru
Mesembrinella bicolor	MK813232	BNNR226-15	TLW226	Ecuador
Mesembrinella bicolor	MK813334	BNNR242-15	TLW242	French Guiana
Mesembrinella bicolor	MK813209	BNNR243-15	TLW243	French Guiana
Mesembrinella bicolor	MK813255	BNNR244-15	TLW244	French Guiana
Mesembrinella bicolor	MK813231	BNNR245-15	TLW245	French Guiana
Mesembrinella bicolor	MK813227	BNNR246-15	TLW246	French Guiana
Mesembrinella bicolor	MK813321	BNNR247-15	TLW247	French Guiana
Mesembrinella bicolor	MK813237	BNNR248-15	TLW248	Ecuador
Mesembrinella bicolor	MK813205	BNNR249-15	TLW249	Ecuador
Mesembrinella bicolor	MK813220	BNNR250-15	TLW250	Ecuador
Mesembrinella bicolor	MK813172	BNNR345-15	TLW347	Panama
Mesembrinella bicolor	MK813252	BNNR346-15	TLW348	Panama
Mesembrinella bicolor	MK813221	BNNR347-15	TLW349	Trinidad and Tobago
Mesembrinella bicolor	MK813213	BNNR348-15	TLW350	Suriname
Mesembrinella bicolor	MK813294	BNNR349-15	TLW351	Costa Rica
Mesembrinella bicolor	MK813296	BNNR352-15	TLW354	Costa Rica
Mesembrinella bicolor	MK813186	BNNR353-15	TLW355	Costa Rica
Mesembrinella bicolor	MK813315	BNNR354-15	TLW356	Costa Rica
Mesembrinella bicolor	MK813247	BNNR355-15	TLW357	Costa Rica
Mesembrinella bicolor	MK813187	BNNR370-15	TLW372	Trinidad and Tobago
Mesembrinella bicolor	MK813285	BNNR423-17	TLW426	Panama
Mesembrinella bicolor	MK813190	BNNR424-17	TLW427	Panama
Mesembrinella bicolor	MK813346	BNNR425-17	TLW428	Brazil
Mesembrinella bicolor	MK813245	BNNR438-17	TLW441	Ecuador
Mesembrinella bicolor	MK813289	BNNR439-17	TLW442	Ecuador
Mesembrinella bicolor	MK813293	BNNR440-17	TLW443	Peru
Mesembrinella bicolor	MK813214	BNNR454-17	TLW457	Brazil
Mesembrinella brunnipes	MK813238	BNNR426-17	TLW429	Peru
Mesembrinella brunnipes	MK813243	BNNR427-17	TLW430	Bolivia
Mesembrinella bullata	MK813218	BNNR435-17	TLW438	Bolivia
Mesembrinella chantryi	MK813192	BNNR311-15	TLW312	French Guiana
Mesembrinella chantryi	MK813199	BNNR312-15	TLW313	French Guiana

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TABLE 1. (Continued)

Species name	GenBank number	BOLD number	Voucher number	Country
Mesembrinella chantryi	MK813292	BNNR313-15	TLW314	French Guiana
Mesembrinella currani	MK813348	BNNR251-15	TLW251	Peru
Mesembrinella currani	MK813337	BNNR252-15	TLW252	Peru
Mesembrinella currani	MK813297	BNNR254-15	TLW254	Peru
Mesembrinella currani	MK813290	BNNR255-15	TLW255	Peru
Mesembrinella currani	MK813242	BNNR384-17	TLW387	Brazil
Mesembrinella decrepita	MK813267	BNNR257-15	TLW257	Venezuela
Mesembrinella decrepita	MK813303	BNNR258-15	TLW258	Venezuela
Mesembrinella decrepita	MK813328	BNNR259-15	TLW259	Venezuela
Mesembrinella decrepita	MK813305	BNNR376-15	TLW378	Venezuela
Mesembrinella epandrioaurantia	MK813270	BNNR305-15	TLW306	Venezuela
Mesembrinella epandrioaurantia	MK813229	BNNR306-15	TLW307	Venezuela
Mesembrinella epandrioaurantia	MK813308	BNNR307-15	TLW308	Venezuela
Mesembrinella epandrioaurantia	MK813331	BNNR308-15	TLW309	Venezuela
Mesembrinella epandrioaurantia	MK813313	BNNR309-15	TLW310	Venezuela
Mesembrinella flavicrura	MK813323	BNNR266-15	TLW266	Costa Rica
Mesembrinella flavicrura	MK813203	BNNR267-15	TLW267	Costa Rica
Mesembrinella flavicrura	MK813253	BNNR268-15	TLW268	Costa Rica
Mesembrinella flavicrura	MK813327	BNNR269-15	TLW269	Costa Rica
Mesembrinella flavicrura	MK813326	BNNR342-15	TLW344	Costa Rica
Mesembrinella flavicrura	MK813304	BNNR453-17	TLW456	Costa Rica
Mesembrinella guaramacalensis	MK813266	BNNR292-15	TLW293	Venezuela
Mesembrinella guaramacalensis	MK813188	BNNR293-15	TLW294	Venezuela
Mesembrinella lara	MK813257	BNNR270-15	TLW270	Venezuela
Mesembrinella longicercus	MK813317	BNNR297-15	TLW298	Bolivia
Mesembrinella longicercus	MK813325	BNNR298-15	TLW299	Bolivia
Mesembrinella longicercus	MK813330	BNNR299-15	TLW300	Bolivia
Mesembrinella mexicana	MK813264	BNNR375-15	TLW377	Mexico
Mesembrinella mexicana	MK813276	BNNR392-17	TLW395	Mexico
Mesembrinella mexicana	MK813259	BNNR393-17	TLW396	Mexico
Mesembrinella mexicana	MK813273	BNNR394-17	TLW397	Mexico
Mesembrinella mexicana	MK813263	BNNR403-17	TLW406	Mexico
Mesembrinella mexicana	MK813336	BNNR404-17	TLW407	Mexico
Mesembrinella nigrocoerulea	MK813307	BNNR325-15	TLW327	Costa Rica
Mesembrinella nigrocoerulea	MK813258	BNNR326-15	TLW328	Costa Rica
Mesembrinella nigrocoerulea	MK813341	BNNR329-15	TLW331	Costa Rica
Mesembrinella quadrilineata	MK813335	BNNR276-15	TLW276	Peru
Mesembrinella quadrilineata	MK813338	BNNR277-15	TLW277	Peru
Mesembrinella quadrilineata	MK813268	BNNR278-15	TLW278	Brazil
Mesembrinella quadrilineata	MK813226	BNNR279-15	TLW279	Brazil
Mesembrinella quadrilineata	MK813261	BNNR280-15	TLW280	Bolivia
Mesembrinella randa	MK813193	BNNR281-15	TLW281	Brazil
Mesembrinella randa	MK813269	BNNR282-15	TLW282	Brazil
Mesembrinella randa	MK813284	BNNR283-15	TLW283	Brazil
Mesembrinella randa	MK813339	BNNR284-15	TLW284	Brazil
Mesembrinella semihyalina	MK813295	BNNR389-17	TLW392	Brazil

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TABLE 1. (Continued)

Species name	GenBank number	BOLD number	Voucher number	Country
Mesembrinella semihyalina	MK813176	BNNR429-17	TLW432	Brazil
Mesembrinella socors	MK813314	BNNR195-15	TLW195	Costa Rica
Mesembrinella socors	MK813280	BNNR196-15	TLW196	Guatemala
Mesembrinella socors	MK813300	BNNR197-15	TLW197	Guatemala
Mesembrinella socors	MK813254	BNNR415-17	TLW418	Guatemala
Mesembrinella socors	MK813184	BNNR416-17	TLW419	Ecuador
Mesembrinella socors	MK813278	BNNR417-17	TLW420	Ecuador
Mesembrinella socors	MK813177	BNNR452-17	TLW455	Guatemala
Mesembrinella spicata	MK813329	BNNR289-15	TLW290	Costa Rica
Mesembrinella spicata	MK813239	BNNR290-15	TLW291	Costa Rica
Mesembrinella spicata	MK813212	BNNR291-15	TLW292	Costa Rica
Mesembrinella spicata	MK813333	BNNR343-15	TLW345	Costa Rica
Mesembrinella spicata	MK813200	BNNR344-15	TLW346	Costa Rica
Mesembrinella spicata	MK813287	BNNR350-15	TLW352	Costa Rica
Mesembrinella spicata	MK813211	BNNR351-15	TLW353	Costa Rica
Mesembrinella spicata	MK813234	BNNR371-15	TLW373	Costa Rica
Mesembrinella spicata	MK813288	BNNR372-15	TLW374	Costa Rica
Mesembrinella spicata	MK813250	BNNR374-15	TLW376	Mexico
Mesembrinella spicata	MK813311	BNNR456-17	TLW459	Costa Rica
Mesembrinella townsendi	MK813265	BNNR192-15	TLW319	Peru
Mesembrinella townsendi	MK813197	BNNR315-15	TLW316	Peru
Mesembrinella townsendi	MK813228	BNNR316-15	TLW317	Peru
Mesembrinella townsendi	MK813195	BNNR317-15	TLW318	Peru
Mesembrinella townsendi	MK813249	BNNR318-15	TLW320	Peru
Mesembrinella townsendi	MK813189	BNNR446-17	TLW449	Peru
Mesembrinella townsendi	MK813182	BNNR447-17	TLW450	Peru
Mesembrinella townsendi	MK813173	BNNR448-17	TLW451	Peru
Mesembrinella umbrosa	MK813309	BNNR336-15	TLW338	Costa Rica
Mesembrinella umbrosa	MK813347	BNNR338-15	TLW340	Costa Rica
Mesembrinella umbrosa	MK813299	BNNR339-15	TLW341	Costa Rica
Mesembrinella umbrosa	MK813320	BNNR340-15	TLW342	Costa Rica
Mesembrinella umbrosa	MK813224	BNNR368-15	TLW370	Costa Rica
Mesembrinella uniseta	MK813180	BNNR401-17	TLW404	Costa Rica
Mesembrinella uniseta	MK813206	BNNR402-17	TLW405	Costa Rica
Mesembrinella uniseta	MK813235	BNNR405-17	TLW408	Costa Rica
Mesembrinella violacea	MK813222	BNNR265-15	TLW265	Costa Rica
Mesembrinella violacea	MK813196	BNNR330-15	TLW332	Costa Rica
Mesembrinella violacea	MK813215	BNNR397-17	TLW400	Costa Rica
Mesembrinella violacea	MK813217	BNNR407-17	TLW410	Costa Rica
Mesembrinella zurquiensis	MK813316	BNNR331-15	TLW333	Costa Rica
Mesembrinella zurquiensis	MK813318	BNNR332-15	TLW334	Costa Rica
Mesembrinella zurquiensis	MK813343	BNNR333-15	TLW335	Costa Rica
Mesembrinella zurquiensis	MK813236	BNNR334-15	TLW336	Costa Rica
Mesembrinella zurquiensis	MK813332	BNNR335-15	TLW337	Costa Rica
Mesembrinella zurquiensis	MK813208	BNNR377-15	TLW379	Costa Rica
Mesembrinella zurquiensis	MK813312	BNNR378-15	TLW380	Costa Rica

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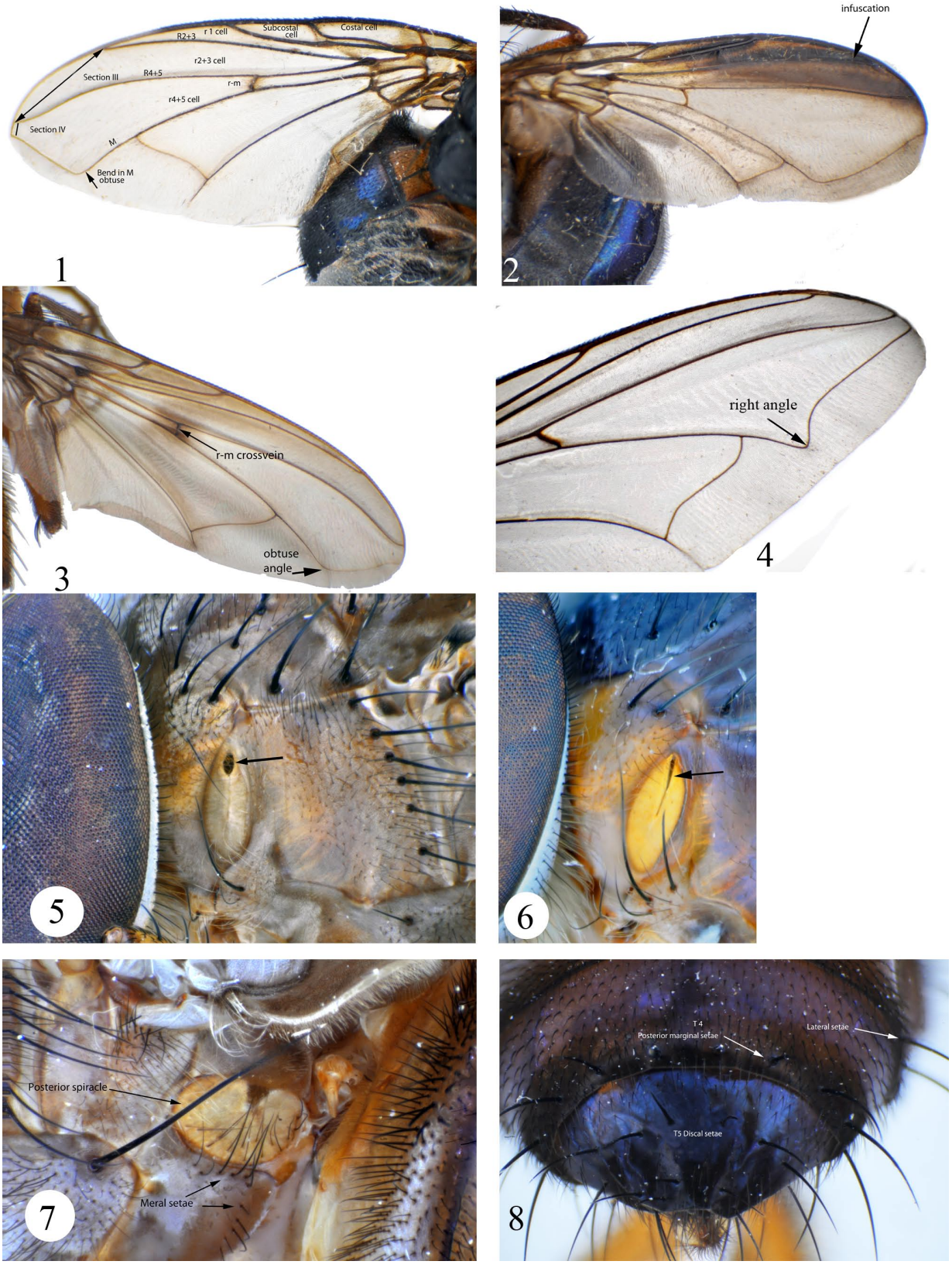
TABLE 1. (Continued)

Species name	GenBank number	BOLD number	Voucher number	Country
Mesembrinella zurquiensis	MK813275	BNNR379-15	TLW381	Costa Rica
Mesembrinella zurquiensis	MK813271	BNNR380-15	TLW382	Costa Rica
Mesembrinella zurquiensis	MK813219	BNNR381-15	TLW383	Costa Rica
Mesembrinella zurquiensis	MK813310	BNNR399-17	TLW402	Costa Rica
Mesembrinella zurquiensis	MK813274	BNNR408-17	TLW411	Costa Rica
Mesembrinella zurquiensis	MK813256	BNNR409-17	TLW412	Costa Rica
Mesembrinella zurquiensis	MK813248	BNNR410-17	TLW413	Costa Rica
Mesembrinella zurquiensis	MK813277	BNNR411-17	TLW414	Costa Rica
Mesembrinella zurquiensis	MK813342	BNNR412-17	TLW415	Costa Rica
Souzalopesiella facialis	MK813174	BNNR260-15	TLW260	Costa Rica
Souzalopesiella facialis	MK813225	BNNR262-15	TLW262	Costa Rica
Souzalopesiella facialis	MK813324	BNNR264-15	TLW264	Venezuela

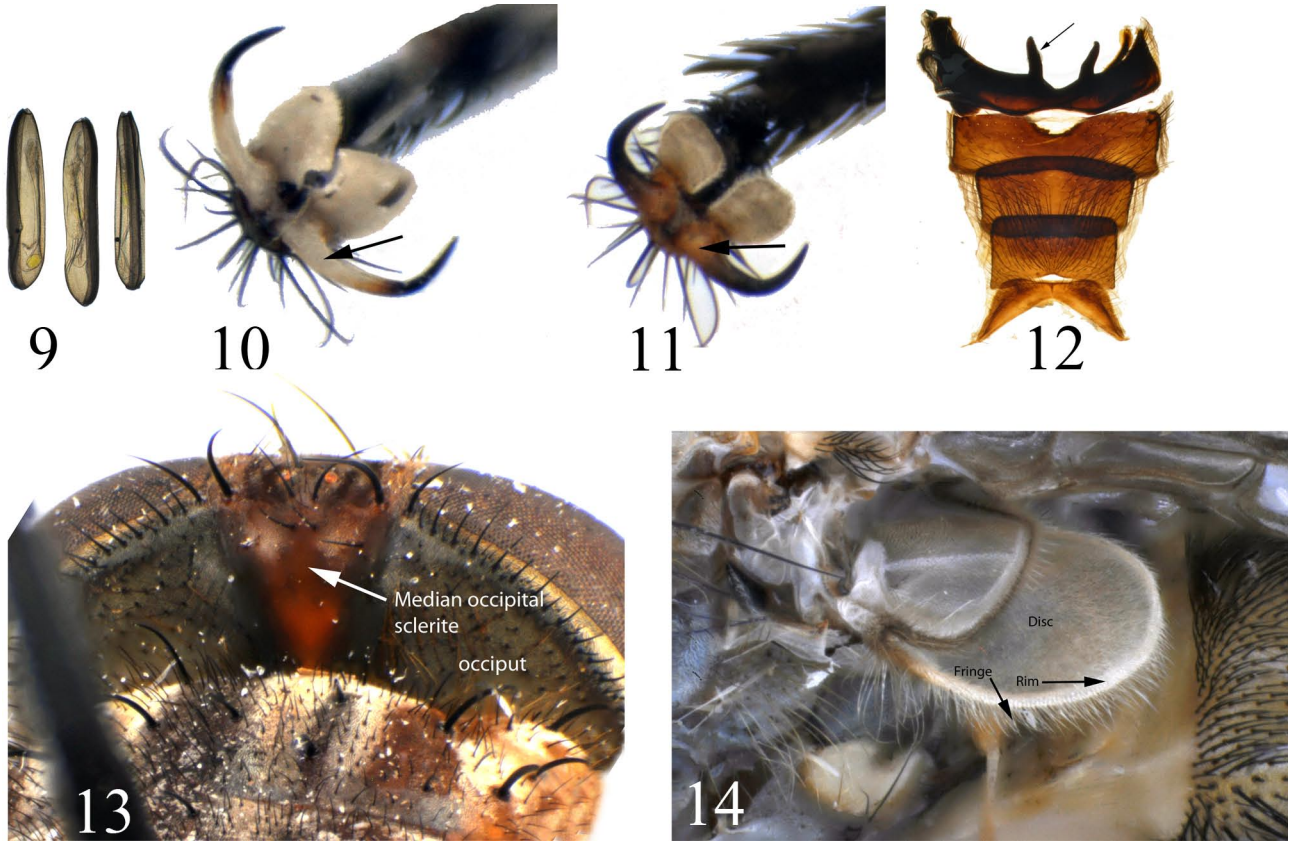
Taxonomy

Family Mesembrinellidae Shannon, 1926

Diagnosis. This is a morphologically diverse family with species ranging from 7 to 17 mm in body length, sharing many characters with Calliphoridae. Thorax usually subshiny, blue, tan or brown, sometimes with pale to tan tomentose stripes. Abdomen often with shiny blue to brown cuticle with pale tomentum. Anterior thoracic spiracle normally ovate, with a broad oval opening above (Fig. 5); in a few species the anterior spiracle has a long, narrow opening gradually widening above (Fig. 6). Posterior thoracic spiracle varying in size from small to large, reniform (= kidney-shaped), with an opening midway along upper margin and a fringe of long, ventrally-directed setae (Fig. 7). Most species have a subscutellum ranging from weakly to moderately or prominently developed, different from the closely related Calliphoridae where the subscutellum is not developed or at most weak. Row of meral setae in shape of an inverted L, with setae ranging from pale and fine to dark and stout (Fig. 7). Horizontal portion of inverted L usually composed of about 5 or more setae, in some species shorter, composed of only 2–3 setae or, rarely, absent. Wing with bend of vein M evenly curved (usually forming an obtuse angle, Figs 1, 3) in most species, vs. normally angulate (at a right or acute angle) in Calliphoridae (Fig. 4). Frons width typically much narrower in males than in females, with frons to head ratios often providing valuable species-specific characters. Female frons broader, with width ranges often overlapping between species. Female with cruciate (crossed) setae just anterior to ocellar triangle. Male terminalia: most species with a roughly rectangular or square-shaped epandrium and medium-sized surstylus and cercus, adjacent at base (Figs 15, 55, 63, 87); in the *spicata*-group the epandrium is elongate and the surstylus and cercus are tiny (Figs 27, 29); in the *bolivar*-group there is a narrow neck between the epandrium and the (swollen) base of the cercus, with surstylus and cercus widely separated in lateral view (Figs 31, 33); in the *anomala*-group the epandrium is reduced and the surstylus is enlarged (Fig. 99). In most species the phallus is slender with epiphallus of various lengths and shapes, from long and slender (Fig. 105) to short and blunt (Fig. 165); hypophallic lobes often of unique shape from rounded (Fig. 106) to oval (Fig. 111) or rectangular (Fig. 182); in a few species the phallus is highly modified (Figs 117–120). In males of most species ST1 is broad, ST2–4 are gradually narrowing (e.g., Fig. 239) and ST5 is usually broad and bilobed, sometimes modified (Figs 239, 245, 247, 249). Female with ST1–5 oval to nearly square or rectangular (Figs 411–454). Female postabdomen not telescopic; dorsum of ovipositor with large T6, ranging from a flattened (e.g., Fig. 282) to a regular U or V shape (e.g., Fig. 287), often with distinctive spiracles; T7 smaller and either bilobed (Fig. 282) or divided (Fig. 289); T8 much reduced, divided (Fig. 284) or continuous (Fig. 303); epiproct and cerci as in Figs 282–325. Venter of ovipositor composed of ST6, ST7, a greatly reduced ST8, and hypoproct (Fig. 326). Spermathecae (three in number) of three distinctive types: filiform (Figs 375–396; most species), tuberform (Figs 370–374; genus *Laneella*, though significantly shorter in *L. fuscosquamata*), or bulbous (Figs 397, 410; *M. flavicrura* and *Souzalopesiella facialis*).



FIGURES 1–8. Diagnostic characters of Mesembrinellidae and Calliphoridae. **1.** Wing of *Mesembrinella flavicrura* Aldrich, showing veins and cells. **2.** Wing of *M. currani* Guimarães, showing infuscated anterior margin. **3.** Wing of *Laneella fusconitida* **sp. nov.**, showing dark macula around crossvein r-m. **4.** Wing of *Calliphora vomitoria* (Linnaeus), showing acute bend of vein M. **5.** Anterior spiracle of *Mesembrinella batesi* Aldrich, showing broad oval opening above. **6.** Anterior spiracle of *M. bolivar* (Bonatto), showing long, narrow opening gradually widening above. **7.** Meral setae and posterior spiracle of *M. bicolor* (Fabricius). **8.** Last abdominal tergites of *M. vogelsangi* (Mello), showing setae.

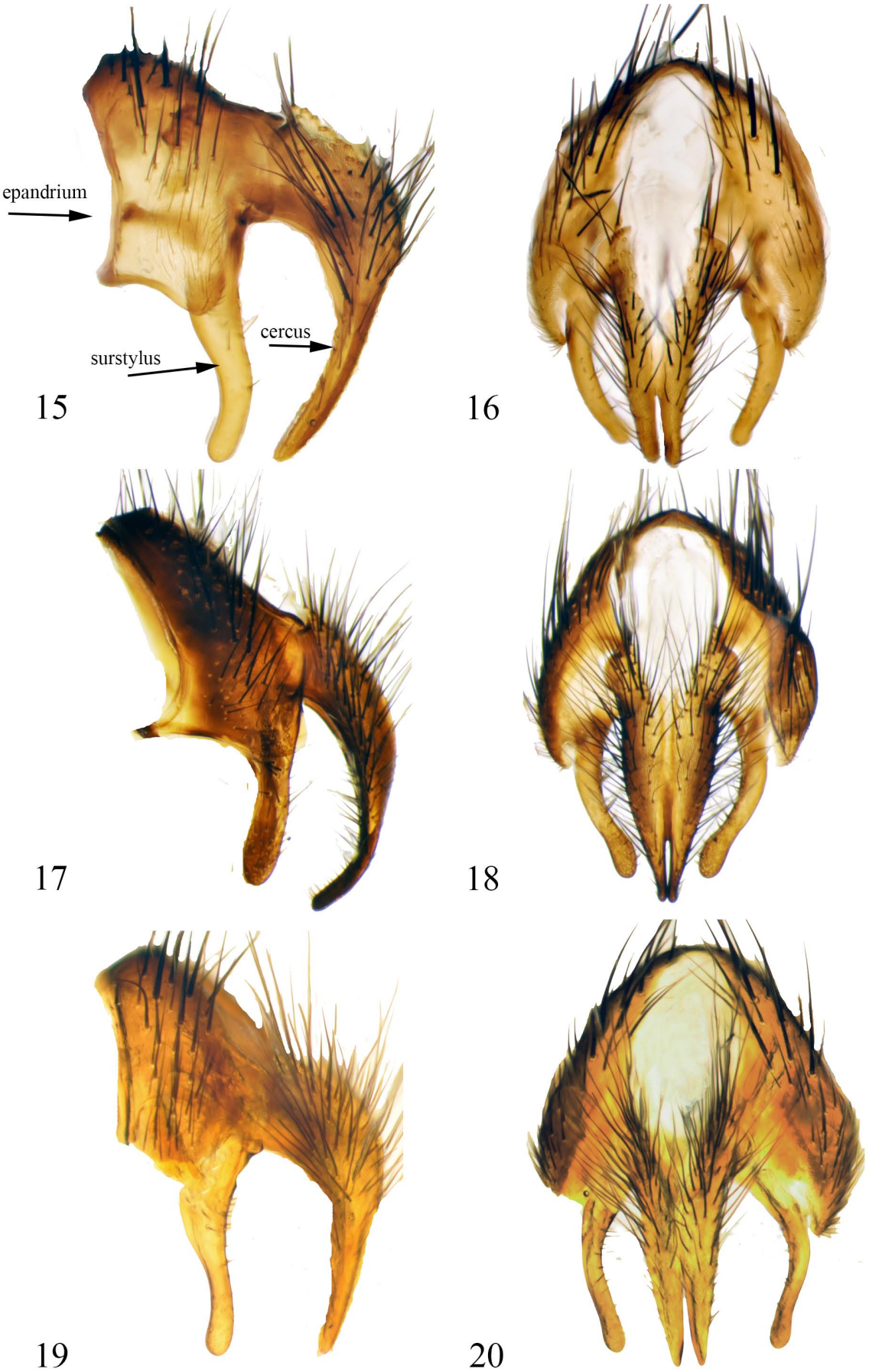


FIGURES 9–14. Diagnostic characters of Mesembrinellidae. **9.** Eggs of *Laneella fuscosquamata* **sp. nov. 10.** *L. perisi* (Mariluis), ventral view of tarsal claws, showing pale basal half. **11.** *L. fusconitida* **sp. nov.**, ventral view of tarsal claws, showing darker base. **12.** *M. spicata* Aldrich, ventral view of male sternites, showing long projections on rear margin of ST5. **13.** *M. bicolor* (Fabricius), posterior view of female occiput, showing median occipital sclerite. **14.** *M. socors* (Walker), upper and lower calypters, showing disc, rim and fringe.

Status of genera in Mesembrinellidae. Several studies have questioned the validity of most of the genera in the family (Vargas & Wood 2009; Moll 2014; Marinho *et al*. 2017). It has even been argued that only the genus *Mesembrinella* should be retained as valid (Cerretti *et al*. 2017). We accept Marinho's synonymy of *Eumesembrinella* with *Mesembrinella* (Marinho *et al*. 2017). Based on our study of specimens of most previously described species and of the fifteen new species described herein, we retain three subfamilies, Laneellinae, Mesembrinellinae and Souzalopesiellinae, and three genera, *Laneella*, *Mesembrinella* and *Souzalopesiella*. We synonymize the genera *Albuquerquea*, *Giovanella*, *Henriquella*, *Huascaromusca* and *Thompsoniella* with *Mesembrinella*, and species of *Mesembrinella* are classified within six groups: the *M. latifrons*-group, the *M. spicata*-group, the *M. bolivar*-group, the *M. aeneiventris*-group, the *M. bicolor*-group, and the *M. anomala*-group. These groupings help us discuss species in a logical manner, but they are tentative and we are aware that future phylogenetic studies may suggest further changes in the classification. Characters of each species-group are discussed in detail further on.

Remarks. The detailed key below can be used to separate Mesembrinellidae from Neotropical Calliphoridae. The reniform posterior spiracle readily distinguishes mesembrinellids from calliphorids, sarcophagids and tachinids. Other features of sarcophagids are the three conspicuous black stripes on a gray- to gold-pruinose thorax and the checkered abdomen. Sarcophagids typically also have two larger and two smaller notopleural setae on the notopleuron, whereas mesembrinellids have only two stout notopleural setae. Tachinids have a prominently developed subscutellum, rare in mesembrinellids, and normally they have a bare arista (except in Dexiini), which is setose in mesembrinellids. Other similar flies include muscids, which sometimes have a posterior spiracle similar to mesembrinellids but lack meral setae, always present in mesembrinellids.

The keys to genera and species of Mesembrinellidae provided herein were developed following Guimarães (1977), and are the first comprehensive taxonomic keys for the family Mesembrinellidae published since then.



FIGURES 15–20. Left lateral and posterior views of epandrium, cerci and surstyli of *Laneella* spp. **15–16.** *L. fusconitida* **sp. nov. 17–18.** *L. fuscosquamata* **sp. nov. 19–20.** *L. nigripes* Guimarães.

Key to separate Mesembrinellidae from Neotropical Calliphoridae

1 Posterior thoracic spiracle large, reniform, with opening on upper margin and a fringe of long setae (Fig. 7); anterior spiracle small and usually ovate (droplet-shaped), with a more or less broad oval opening above (Fig. 5) or, rarely, with a long, narrow opening gradually widening above (Fig. 6); subscutellum usually from weakly to moderately or (rarely) prominently developed; body color often somewhat testaceous (yellowish or reddish brown), as in Fig. 455; gena usually 1/4–1/2 of eye height; bend of vein M obtuse (Figs 1, 3). . . . . **Mesembrinellidae**

- Posterior thoracic spiracle smaller and more circular, closed anteriorly by a larger triangular felt-like lappet and posteriorly by a smaller circular lappet (Rognes 1991: fig. 5); anterior spiracle similar, but opening usually narrower above; subscutellum usually undeveloped or weakly developed; body color usually shiny green, blue, purple or bronze; gena usually about 1/2 eye height; bend of vein M usually acute or right-angled (Fig. 4) . . . . . **Calliphoridae**

Key to subfamilies and genera of Mesembrinellidae

1 A large, dark brown fly (13–15 mm in length); abdomen robust, shiny black or dark brown with ST2–4 wider than long; each segment with two horizontal rows of stout black setae, one row along the posterior margin, the other in the posterior third of the segment (Fig. 281); presutural intra-alar seta absent; setae on facial ridge ascending about half way to antennal base (Fig. 193); male frons width 0.02/5 of head width at narrowest. Male terminalia with surstylus slender and straight, cercus long and slender with uniform curve forward (Figs 101–102). Phallus in lateral view with epiphallus short and angled forward (Fig. 191); in dorsal view with pair of lateral processes just behind hypophallic lobes (Fig. 192). Female: spermathecae bulbous (Fig. 410); T6 of terminalia of FU shape, T7 large and rectangular, recessed midway anteriorly (Fig. 325); [known from Brazil, Costa Rica, Ecuador, Guatemala, Panama, Trinidad, Venezuela] . . . . . **Souzalopesiellinae** [genus *Souzalopesiella*; one species, *Souzalopesiella facialis*]

- A usually smaller fly (most species 12 mm or less in length); abdomen usually shiny, with metallic highlights; setae on sternites usually much weaker and not limited to two rows; sternites usually rounded, not quadrate. Male epandrium, cerci and surstyli as in Figs 15–100; phallus without lateral processes (Figs 105–190). Females usually with spermathecae filiform or tuberform, not bulbous (except in *M. flavicrura*); T6 of terminalia usually not of FU shape (except *Laneella*) **2**

2 Male with surstylus and cercus both curving forward (Figs 15, 17, 19, 21, 23); phallus in lateral view with epiphallus long and slender, curving backward (Figs 105, 107, 109, 111, 113); phallus in dorsal view with hypophallic lobes short and circular or semicircular (Figs 106, 108, 110, 112, 114); frons narrow, 0.01–0.02 of head width at narrowest. Females with tuberform spermathecae (Figs 370–374), shorter but still tuberform (Fig. 371) in *L. fuscosquamata*; T6 of FU shape (Figs 284–286). Five of six species in this genus with a more or less shiny brown thorax (one species shiny blue), all medium-sized (10–13 mm); two species with basal half of tarsal claws pale white to pale yellowish (Fig. 10). [Known from Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Mexico, Paraguay (Marinho *et al.* 2017) and Venezuela] . . . . . **Laneellinae** [genus *Laneella*; six known species]

- Male normally with surstylus curved backward or straight and cercus curved forward; phallus in lateral view usually with epiphallus short to moderate in length; hypophallic lobes rarely circular but usually narrow or, if wider, more elongate; frons width variable. Females usually with filiform spermathecae (except bulbous in *M. flavicrura*; Fig. 397), most species with some metallic blue to black colors on abdomen in both sexes; female with T6 usually not so flattened, usually of distinct inverted U or V shape (Figs 287–313); widespread from southern Mexico to Argentina . . . . . **Mesembrinellinae** [genus *Mesembrinella*; 6 species-groups and 48 species]

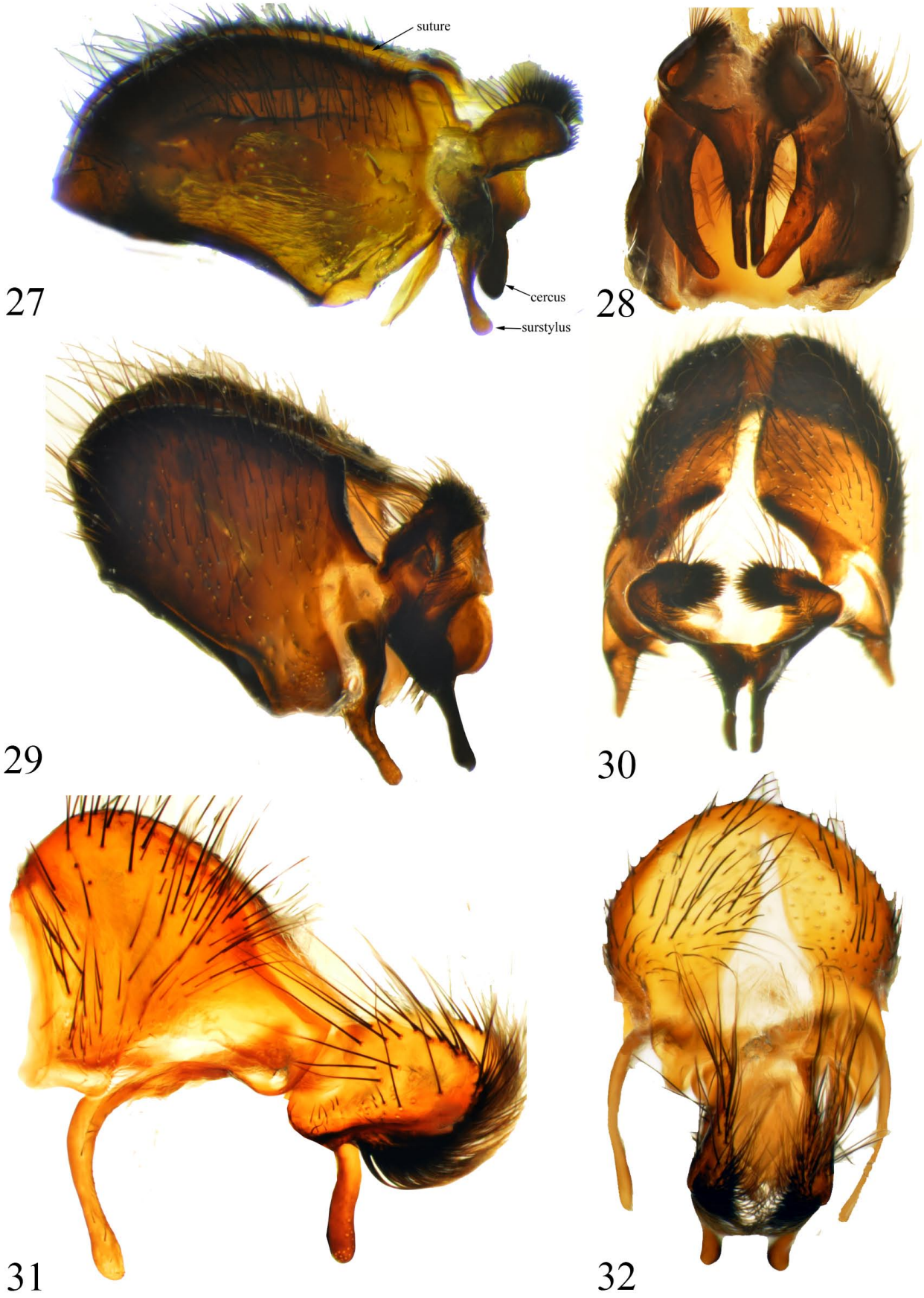
Subfamily Laneellinae Guimarães, 1977

Genus *Laneella* Mello, 1967

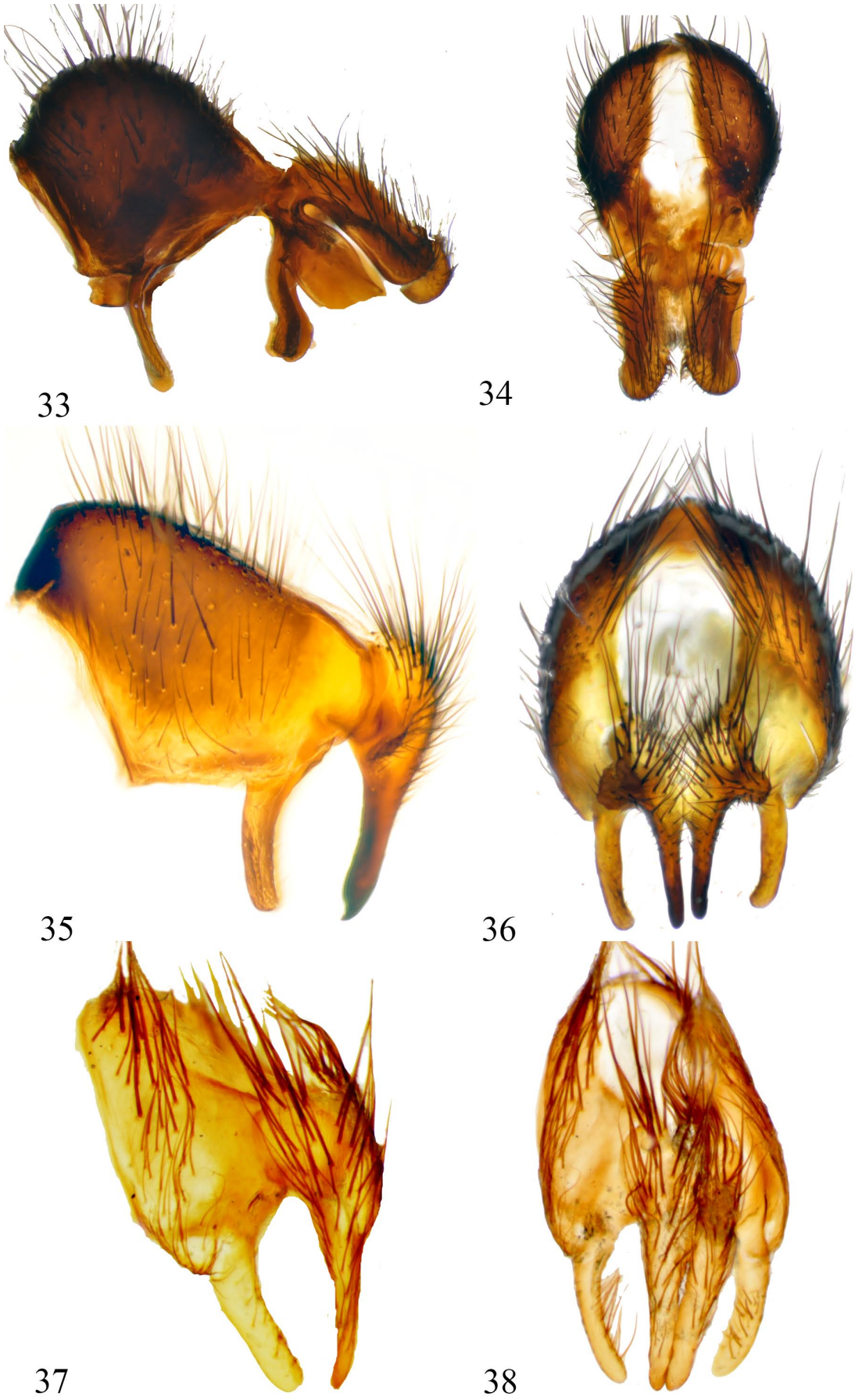
Laneella Mello, 1967: 3. Type species: *Mesembrinella brunnipes* Surcouf, 1919 *sensu* Mello, 1967, by original designation. Misidentification, = *Laneella nigripes* Guimarães, 1977; *teste* Guimarães (1977). Herewith fixed under Article 70.3 of the Code (I.C.Z.N 1999).

Diagnosis. Dorsum of thorax more or less shiny brown in five of the six known species; one species (*L. purpurea*) with thorax and abdomen entirely metallic purple. Males with both surstylus and cercus curved forward and epandrium usually smaller than in most other mesembrinellids (Figs 15, 17, 19, 21, 23). Phallus narrow in dorsal view just before anterior edge of hypophallic lobe; lobes distinctive, short and rounded, with prominent serrations (as in Fig. 106); epiphallus long and slender with gentle curve posteriorly (Figs 105, 107, 109, 111, 113). Male sternites usually with coarse, dense setae (Figs 239–243), unlike those in other genera and species-groups. Females with T6 flattened (FU shape), a condition not found in most other mesembrinellids (Figs 282–286), and usually with tuberform spermathecae (Figs 370–374).

FIGURES 21–26. Left lateral and posterior views of epandrium, cerci and surstyli of *Laneella* and *Mesembrinella* spp. **21–22.** *L. perisi* (Mariluis). **23–24.** *L. purpurea* **sp. nov. 25–26.** *M. latifrons* (Mello).



FIGURES 27–32. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **27–28.** *M. mexicana* **sp. nov. 29–30.** *M. spicata* Aldrich. **31–32.** *M. epandrioaurantia* **sp. nov.**



FIGURES 33–38. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **33–34.** *M. woodorum* **sp. nov. 35–36.** *M. aeneiventris* (Wiedemann). **37–38.** *M. bolivar* (Bonatto).

Remarks. Three of the six known species in the genus have more or less shiny brown abdomens, two have abdomens with metallic reflections and one has a gleaming purple abdomen. Males in this genus have the surstylus and cercus both curving forward (Figs 15, 17, 19, 21, 23). In Mesembrinellinae, the species-groups have surstylus straight with cercus curved forward or surstylus and cercus curved toward each other. Females have tuberform spermathecae (Figs 370–374), although those of *L. fuscosquamata* are about half the length of those of other species (Fig. 371). Eggs were found in the abdomen of a specimen of *L. fuscosquamata*, see discussion under that species. Known from Brazil, Colombia (Wolff 2013), Costa Rica, Mexico, Guatemala and French Guiana.

The NJ barcode analysis recovered two distantly separated clades for *Laneella*, the first containing *L. nigripes*, *L. perisi*, *L. patriciae* and *L. fusconitida*, the second *L. purpurea* and *L. fuscosquamata*. To be more certain about the relationships among the species of this genus, we decided to run a Bayesian analysis using part of the data representing all species. The topology from this analysis (results not shown here) recovered a polyphyletic *Laneella* with *L. purpurea* and *L. fuscosquamata* in a distant, separate clade sister to all other Mesembrinellidae, confirming the NJ findings. These results are not congruent with morphology; thus, it is possible that the morphological characters used to place *L. purpurea* and *L. fuscosquamata* within *Laneella* are the result of convergent evolution and not character states shared through common ancestry. Also, it is important to note that both analyses are based only on *COI*, and one marker is not enough to resolve the evolution of a group. Further studies using more markers are needed to elucidate the phylogenetic relationships among species of this genus.

Key to species of *Laneella*

1 Basal half of tarsal claws pale, white to pale yellowish (Fig. 10); wing with infuscation along costa or tip of wing; male with basal 2/3 of cerci slender in dorsal view, as in Figs 20, 22. Female terminalia as in Figs 284–285 . . . . . **2**

\- Basal half of tarsal claw orange, brown or black (Fig. 11); area along costa with at most faint infuscation, distal portion of wing not infuscated; male with basal 2/3 of cerci much broader in dorsal view in two of three species (Figs 18, 24). Female terminalia distinctive, as in Figs 282–283, 286 . . . . . **3**

2 Wing with anterior edge infuscated from junction of subcosta-costa posteriorly to R_{4+5} and distally to tip; palpus brown to black; row of black postocular setae ending about 2/3 of way from top of eye to gena, with pale yellowish below that; anterior half of T4 with solid whitish band of tomentum; fore and mid femora dark reddish-brown, hind femur orange to brown; [known from Brazil and Paraguay] . . . . . ***L. nigripes***

\- Wing with distal 1/2–1/3 of tip infuscated, also cells r_1, r_{2+3} and r_{4+5} and junction of vein CuA1 and crossvein dm-cu darkened; palpus orange; row of black postocular setae reaching gena; midsegment of T4 with four transverse pale spots; all femora orange; [known from Brazil, Colombia, Costa Rica and Ecuador] . . . . . ***L. perisi***

3 Thorax and abdomen dark metallic bluish-purple (Fig. 457); base of wing with cells and veins darkened; disc, rims and setae of calypters dark brown; anterior half of basicosta brown, posterior half more or less reddish-brown; [known primarily from western and central Costa Rica] . . . . . ***L. purpurea* sp. nov.**

\- Thorax brown to reddish-brown, not metallic; base of wing not darkened; calypters with disc, rims and fringe of setae light to moderately brown; basicosta orange **4**

4 Wing with distinctive brown spot around crossvein r-m (Fig. 3); abdomen shiny brown or bluish-purple; wing with section IV about 0.25 of section III or less **5**

\- Wing without darkened area around crossvein r-m; abdomen shiny metallic blue to purple; wing with section IV about 0.46 of section III; [known from Mexico and Guatemala] . . . . . ***L. fuscosquamata* sp. nov.**

5 Abdomen bluish-purple, mid and hind femora with apices dark brown; [known only from Colombia] . . . . . ***L. patriciae***

\- Abdomen shiny brown; mid and hind femora with apices orange; [known from Costa Rica, Ecuador and Venezuela] . . . . . ***L. fusconitida* sp. nov.**

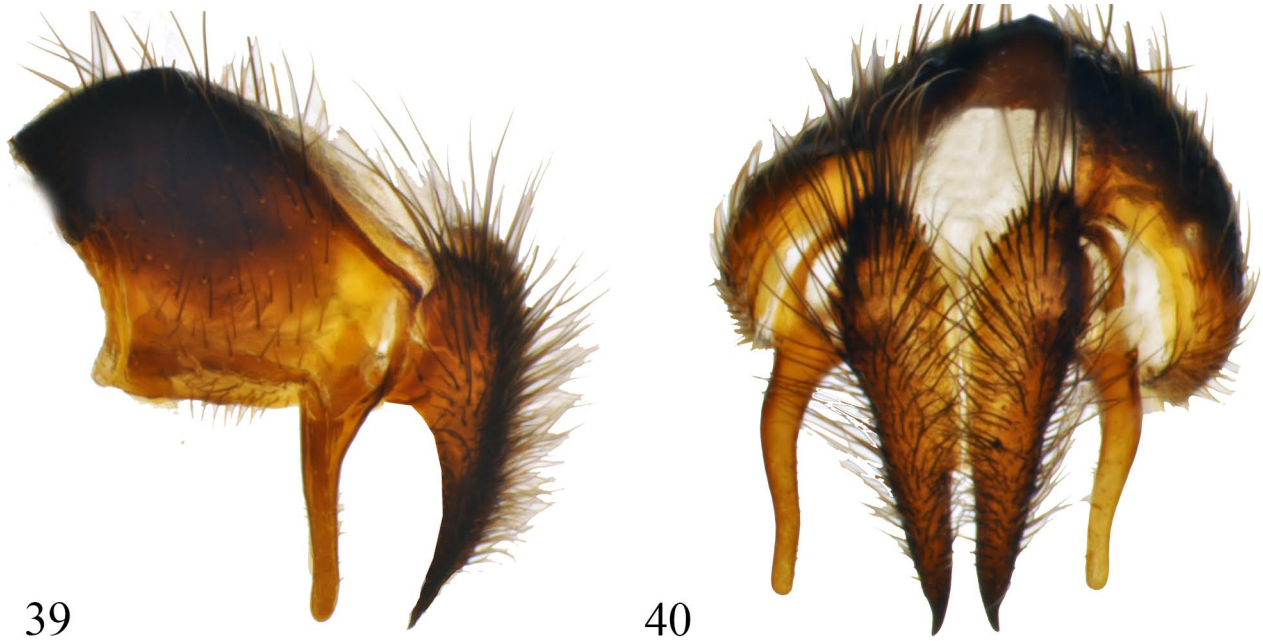
Laneella fusconitida Whitworth, sp. nov.

(Figs 3, 11, 15–16, 105–106, 195, 239, 282, 326, 370, 411, 455, 488)

Diagnosis. A fairly large shiny brown fly averaging 12 mm (11–13/5) in length (Fig. 455). Basal half of tarsal claws dark orange, brown or black (Fig. 11). vs. pale in *L. nigripes* and *L. perisi* (Fig. 10); abdomen shiny brown, compared to bluish-purple in the similar *L. patriciae*; all femora orange vs. with apices dark brown in *L. patriciae*; wing with distinct brown macula around crossvein r-m (Fig. 3), similar to *L. patriciae*; section IV 0.25 of section III. Epandrium, cerci and surstyli as in Fig. 15. Female with tuberform spermathecae (Fig. 370).

Description. *Male*. Head. Frons narrow, 0.012 (0.010–0.015/5) of head width at narrowest, about equal to width of base of arista; fronto-orbital slender and pale orange; frontal setae ascending about 30% of distance to ver-

tex; lower 1/3 of frontal vitta orange, upper 2/3 obliterated; parafacial pale yellow and narrow above, wider below; gena orange with horizontal row of short, dark setae; postgena orange with long golden setae; occiput with silvery tomentum and weak golden setae; median occipital sclerite shiny orange; first flagellomere and pedicel orange; palpus typical; eye with median facets about 3x size of lateral eye facets; ocellar triangle small, ocelli about equal in size; supravibrissal setae only in basal 1/6 of facial ridge.



FIGURES 39–40. Epandrium, cerci and surstyli of *Mesembrinella decrepita* Séguy. **39.** Left lateral view. 40. Posterior view.

Thorax. Dorsum brown to reddish-brown with two broad irregular whitish tomentose stripes; pleura orange; chaetotaxy: ac 2:3, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae very fine brown, 1 pair converging ap, 1 sa, 2 lat, 1 stout bas, 1weak pb, 1 disc subscutellum weakly developed; spiracles orange and medium-sized. Legs: femora orange, tibiae and tarsi tan; tarsal claws with basal 2/3 orange and tips black. Wing faintly yellowish, darker along costa; crossvein r-m surrounded by small dark brown spot (Fig. 3); subcostal sclerite without setae, with heavy pubescence; basicosta orange, tegula tan; section IV 0.25 of section III; calypters tan; rim of upper calypter dark with short reddish setae, rim of lower calypter brown with long reddish setae.

Abdomen. T1+2 and anterior half of T3 orange; posterior half of T3 and all of T4 brown; T5 dark brown; T4–5 with row of stout setae on rear margin; disc of T5 without row of stout setae, whole segment with short fine setae; T3 with cluster of lateral setae. *Terminalia* similar to those of other *Laneella* in lateral view (Fig. 15); in posterior view cerci more slender than in other species (Fig. 16); phallus in lateral view as in Fig. 105; in dorsal view, hypophallic lobes rounded, similar to other *Laneella* (Fig. 106); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 195, ST1–5 as in Fig. 239.

Female. Similar to male except frons 0.272 (0.26–0.28/5) of head width at narrowest. T6 of FU shape, narrowed medially; T7 bilobed, with deep indentation posteriorly, similar to *L. perisi*; T8 as separate sclerites lateral to base of cerci (Fig. 282); ST6–8 and hypoproct as in Fig. 326; spermathecae tuberform (Fig. 370); ST1–5 as in Fig. 411.

Type material. HOLOTYPE ♂* (Costa Rica, **San José**; LACM; Fig. 455), labeled: COSTA RICA: San José Zurquí de / Moravia. Tower path. 10.05°N / 84.02°W. 1600 m. 2–9 AUG 2013. / Fish bait trap, ZADBI-996. #107515; HOLOTYPE / Laneella / fusconitida / T.L. Whitworth.

ALLOTYPE ♀: Costa Rica, **San José.** Zurquí de Moravia, North Pasture, 1600 m, 28.ii.2013, bait trap with fish, ZADBI-512 #106177 (LACM).

PARATYPES: Costa Rica, **Cartago.** 1 ♂*, Paraiso, P.N. Tapanti, 1600 m, 2–4.xii.2012, Malaise trap, ZADBI-331 #106167 (LACM); 1 ♂, same data except 10–17.ii.2013, ZADBI-508 #106173 (LACM). **Guanacaste.** 1 ♀, P.N. Volcan Tenorio, 1650 m, 4.xi.2003–15.ii.2014, Malaise trap, L_N_295100 424600 #76952, J. Azofeifa (INBIO). **Puntarenas.** 1 ♀, Monteverde, 20–24.vi.1986, D.J. Keller (LACM); 1 ♀*, 1 ♀, same data except 20–25.viii.1991, 1500 m, D.M. Wood (CNC). **San José.** 1 ♂*, 1 ♂, 1 ♀, Zurquí de Moravia, Tower path, 10.05°N 84.02°W, 1600 m, 2–9.viii.2013, fish bait trap, ZADBI-996 #107515 (LACM); 1 ♂, same data except 1600 m, 17–23.xi.2012, Malaise

trap #2, ZADBI-245 #105453 (LACM); 1 m, 1 ♀, same data except 10–17.v.2013, Malaise trap #4, ZADBI-745 #106771 (LACM); 1 ♀*, same data except 5–12.vii.2013, emergence trap over dry branches, ZADBI-920 (LACM); 1 ♀♦ (TLW305), same data except 16–23.iv.2013, ZADBI-1087 #107689 (LACM); 1 ♂*, Zurquí de Moravia, Creek 2 north, 18–25.iv.2013, 250 m, Malaise trap, ZADBI-512, 105944 (LACM); 1 ♀, 1 ♂♦ (TLW302), Zurquí de Moravia, creek 2, 1600 m, 22.x.2012, ZADBI-158 #105267 (LACM); 1 ♂, 1 ♀, Zurquí de Moravia, creek 2 North, 1600 m, 3–10.v.2013, Malaise trap #2, ZADBI-716 #106721 (LACM); 1 ♂, same data except 26.vii–2.viii.2013, ZADBI-970 (LACM); Zurquí de Moravia, 1600 m, 21.x.2012, #105240, Bait trap with human dung, ZADBI (LACM); 4 ♂♂, Zurquí de Moravia, creek 2 North, 23–30.viii.2013, Malaise trap #2, ZADBI-1094 #107696 (LACM); 1 ♀*, 1 ♀♦ (TLW301), 1 ♀, Zurquí de Moravia, North Pasture, 1600 m, 28.ii.2013, bait trap with fish, ZADBI-512 #106177 (LACM); 1 ♀, Zurquí de Moravia, end path tower, 1600 m, 21.x.2012, bait trap with chicken, ZADBI-128 #105232 (LACM); 2 ♀♀, Est. Zurquí, 500 m antes de Tunel, 1600 m, iv.1991, L_N_226800 535200, G. Maass (INBIO); 1 ♀, Zurquí de Moravia, creek 2, 21.x.2012, bait trap with chicken, ZADBI-129 #105233 (LACM); 1 ♀, Zurquí de Moravia, tower path, 1600 m, 14–21.vi.2013, Malaise trap #4, ZADBI-862 #107012 (LACM); 1 ♀, same data except 12–19.iv.2013, ZADBI-713 #106718 (LACM); 2 ♀♀♦ (TLW303–304), Zurquí de Moravia, Tower path, 1600 m, 5–12.vii.2013, emergence trap over dry branches 30 m, ZADBI-920 #107168 (LACM). Ecuador, **Napo.** 1 ♀, Rio Azuela, bei Reventador, 1600 m, 8–11.vi.1977, W. Schacht (NHMUK). Venezuela, **Aragua.** 1 ♂, Rancho Grande, 18–27.ii.1971, 1100 m, G. & M. Wood (CNC); 1 ♂, same data [but no elevation] except 20.ix.1973, B. Villegas (UCDC); same data except 1.vi.1981, A. Field (MIZA). **Pinchincha.** 2♀, Bellavista Cloud Forest Res., 0°4′13″S 78°40′30″W, 2200 m, 9–13.v.2009, at light, S. Luc (UGG).

Additional material examined. Costa Rica, **Cartago.** 1 ♂, 2 ♀♀, Paraiso, P.N. Tapanti, 1600 m, 30.xii.2012–6.i.2013, Malaise trap, ZADBI-502 #106167 (LACM); 1 ♂, same data except 10–17.ii.2013, ZADBI-508 #106173 (LACM); 1 ♀, P.N. Tapanti, Rio Dos Amigos, A.C. Amistad, 1480 m, iii.1994, L_N_187600 560250 #2782, G. Mora, A. Solis, E. Ulate (INBIO); 1 ♀, Quebrada Segunda Ref. Nac. Fauna Silv. Tapanti, 1250 m, iv.1992, L_N_194000 560000, R. Vargas (INBIO). **Puntarenas.** 1 ♀, Est. Pittier Sendero Altamira, 900 m, NO. de la Estación, 1700–1740 m, 4.x.1995, L_S_331500 576800 #7413, M. Moraga (INBIO); 1 ♀, Est. Pittier, Rio Gemelo, 700 m E de la Estación, 1600 m, 2–8.i.1996, Malaise, L_S_330900 578000 #8418, M. Moraga (INBIO); 1 ♀, Est. La Casona, 1520 m, Res. Biol. Monteverde, iv.1992, L_N_253250 449700, N. Obando (INBIO); 1 ♀, same data except 1500 m, vi.1991, L_N_253250 449700 #1714 (INBIO); 1 ♀, Monteverde, 20–24.vi.1986, D.J. Keller (LACM); 2 ♀♀, same data except 20–25.viii.1991, 1500 m, D.M. Wood (CNC). **San José.** 2 ♂♂, Zurquí de Moravia, Tower path, 10.05°N 84.02°W, 1600 m, 2–9.viii.2013, fish bait trap, ZADBI-996 #107515 (LACM); 1 ♂, 1 ♀, same data except 9–16.viii.2013, ZADBI-1022 #107541 (LACM); 1 ♂, 1 ♀, Zurquí de Moravia, creek 2, 21.x.2012, bait trap with chicken, ZADBI-129 #105233 (LACM); 1 ♂*, same data except 1600 m, 18–25.i.2013 (LACM); 2 ♀♀, same data except 22.x.2012, ZADBI-158 #105267 (LACM); 1 ♂, 4 ♀♀, Zurquí de Moravia, creek 2 North, 1600 m, 3–10.v.2013, Malaise trap #2, ZADBI-716 #106721 (LACM); 1 ♂, same data except 29.xi.2012–7.xii.2012, ZADBI-276 #105534 (LACM); 1 ♂, 4 ♀♀, Zurquí de Moravia, North Pasture, 1600 m, 28.ii.2013, bait trap with fish, ZADBI-512 #106177 (LACM); 1 ♀, same data except 17–23.xi.2012, ZADBI-245 #105453 (LACM); 1 ♀*, 3 ♀♀, Zurquí de Moravia, Tower path, 1600 m, 5–12.vii.2013, emergence trap over dry branches 30 m, ZADBI-920 #107168 (LACM); 1 ♀, same data except 16–23.viii.2013, emergence trap over leaf litter 75 m, ZADBI-1087 #107689 (LACM); 1 ♀, Est. Zurquí 500 m antes de Tunel, 1600 m, iv.1991, L_N_226800 535200, G. Maass (INBIO); 1 ♀, Zurquí de Moravia, 1600 m, x–xii.1989, P. Hanson (INBIO); 2 ♀♀, Zurquí de Moravia, creek 2, 1600 m, 10–17.xi.2012, Malaise trap #2, ZADBI-209 #105399 (LACM); 1 ♀, same data except 29.xi–7.xii.2012, ZADBI-276 #105534 (LACM); 2 ♀♀, same data except 3–10.v.2013, ZADBI-716 #106721 (LACM); 1 ♀, Zurquí de Moravia, Tower path, 1600 m, 5–12.vii.2013, emergence trap over dry branches 30 m, ZADBI-920 #107168 (LACM); 1 ♀, same data except 100 m, 12–19.vii.2013, emergence trap over leaf litter, ZADBI-941 #107260 (LACM); 1 ♀, Zurquí de Moravia, creek 2, 21.x.2012, bait trap with chicken, ZADBI-129 #105233 (LACM); 1 ♂, same data except 26.vii.2013–2.viii.2013, ZADBI-970 #107489 (LACM); 5 ♀♀, Zurquí de Moravia, Tower path, 1600 m, 10–17.v.2013, Malaise trap #4, ZADBI-745 #106771 (LACM); 1 ♀, Zurquí de Moravia, creek 2 north, 1600 m, 17–24.v.2013, Malaise trap #2, ZADBI-775 #106801 (LACM); 3 ♀♀, Zurquí de Moravia, Tower path, 1600 m, 14–21.vi.2013, Malaise trap #4 250 m, ZADBI-862 #107012 (LACM); 1 ♀, same data except emergence trap over vegetation 50 m, ZADBI-867 #107017 (LACM); 2 ♀♀, same data except emergence trap over dry branches 300 m, ZADBI-864 #107014 (LACM); 2 ♀♀, Zurquí de Moravia, end path tower, 1600 m, 21.x.2012, bait trap with chicken, ZADBI-128 #105232 (LACM); 3 ♀♀, Zurquí de Moravia, tower path, 1600 m, 26.vii–2.viii.2013,

emergence trap over dry branches 300 m, ZADBI-981 #107500 (LACM); 1 ♀, Zurquí de Moravia, creek 1, 1600 m, 14–21.xii.2012, emergence trap over vegetation 50 m, ZADBI-345 #105667 (LACM). Ecuador, **Pichincha.** 1 ♀, Bellavista Cloudforest Reserve 0°00'55.77″N 78°40′49.73″W, 2200–2300 m, Tropical Cloudforest General collecting, 24–26.vii.2007, CPDT Gillett (NHMUK). Venezuela, **Aragua.** 1 ♂, Rancho Grande, 1100 m, 1.vi.1981, A. Field (MIZA); 1 ♂, same data except 20.ix.1973, B. Villegas (UCDC).

Distribution. Costa Rica, Ecuador, Venezuela.

Remarks. This species was the most common mesembrinellid collected in the Zurquí de Moravia area of San José Province, Costa Rica. Five specimens (TLW301–305) were barcoded and formed a distinct cluster (Fig. 488). This species is closely related to *L. patriciae*, which is found in Colombia (Marinho *et al.* 2017); barcodes show that there is 3.48% genetic difference between the two species.

Etymology. The species name *fusconitida* is a combination of the Latin *fusco* (brown) and *nitida* (shining), which in combination describe the body color of this species.

Laneella fuscosquamata Whitworth, sp. nov.

(Figs 9, 17–18, 107–108, 196, 240, 283, 327, 371, 412, 456, 488)

Diagnosis. A fairly large fly averaging 12.25 mm (11–13/4) in length. Basal half of tarsal claws darkened: orange, brown or black; thorax brown to reddish-brown; wing without brown spot on crossvein r-m; abdomen shiny metallic blue to purple; wing with section IV about 0.41. Male terminalia distinctive, in lateral view, cercus long and curved forward (Figs 17–18). Female terminalia as in Fig. 283; spermathecae tuberform, shorter than in other species of *Laneella* (Fig. 371).

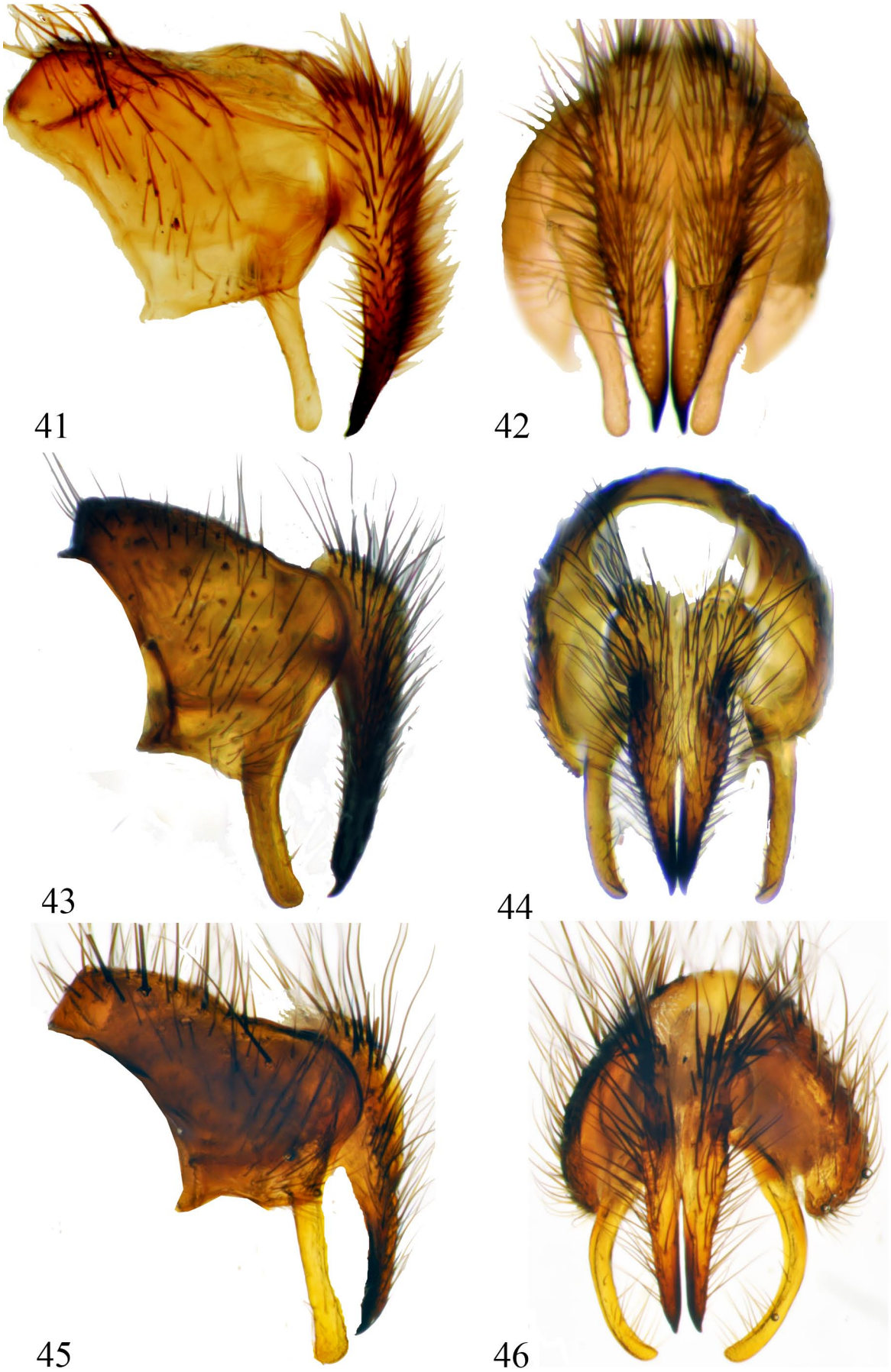
Description. *Male* [three specimens known]. Head. Frons 0.02/3 of head width at narrowest. Fronto-orbital, frontal vitta, parafacial and gena dark orange; frontal setae ascending 40% of distance to vertex; frontal vitta dark, obliterated about midway; gena with typical row of setae and with scattered dark setae; postgena and occiput dark with silvery tomentum and fine golden setae, median occipital sclerite shiny black; antenna dark orange except distal 2/3 of arista black; palpus typical; eye with median facets 3x size of lateral facets; ocellar triangle small, ocelli equal in size; facial ridge with long, stout black supravibrissal setae ascending facial ridge to about 40% of distance to antennal base.

Thorax brown to dark orange with heavy yellowish tomentum and irregular bare, shiny brown areas; pleura a dark orange; chaetotaxy: ac 2:3, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae typical; 1 pair converging ap; 1 sa, 2 lat, 1 bas, 1 weak pb, 1 disc; subscutellum weakly developed; spiracles brown. Legs dark orange. Wing hyaline; subcostal sclerite without setae, with heavy pubescence only; basicosta orange; tegula dark orange; section IV 0.46 (0.41–0.51/3) of section III; upper and lower calypters dark brown; rim of upper calypter dark with short setae, rim of lower calypter brown with long reddish-brown setae.

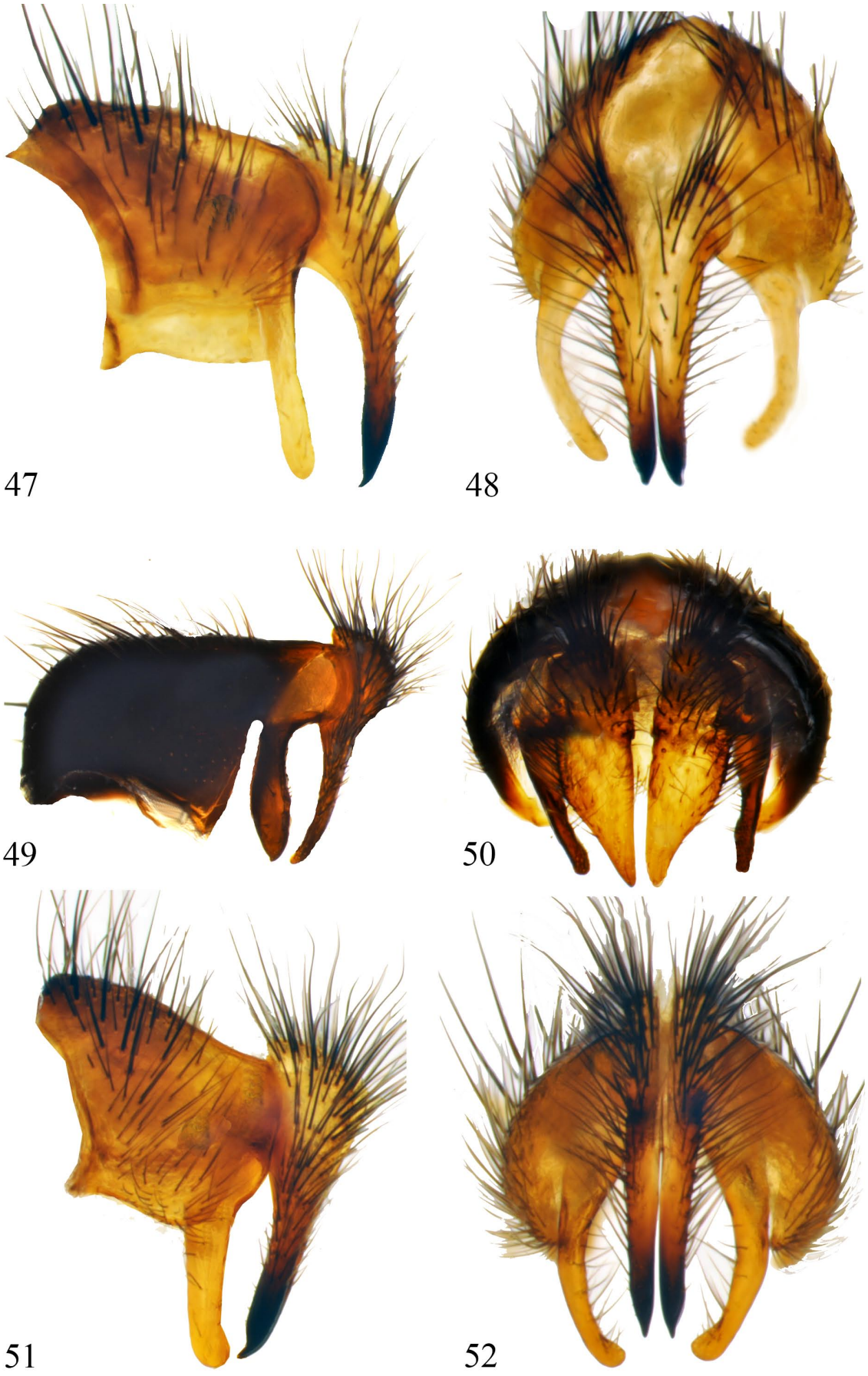
Abdomen shiny metallic blue to purple with heavy white tomentum, T1+2 orange tinted; T3 with long slender lateral marginal setae, T4 with row of long slender marginal setae; disc of T5 without row of stout setae, whole segment with long fine setae. *Terminalia* in lateral view with surstylus parallel-sided, angling slightly forward; cercus large, robust, arching backward then curving forward in lower half (Fig. 17); in posterior view cercus broad at base, gradually narrowing to tip (Fig. 18); phallus in lateral view with long slender epiphallus curving posteriorly (Fig. 107); in dorsal view hypophallic lobes large and circular (Fig. 108); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 196; ST1–5 as in Fig. 240.

Female. Similar to male except frons broad, 0.32 (0.30–0.33/3) of head width at narrowest. T6 flattened, parallel-sided; T7 and T8 divided as separate sclerites; posterior edge of epiproct recessed midway (Fig. 283); ST6 in shape of inverted pear, ST8 divided, ST6–8 unusually narrow (Fig. 327); spermathecae tuberform (Fig. 371), about half as long as in other *Laneella*; ST1–5 broad with stout, dark setae (Fig. 412).

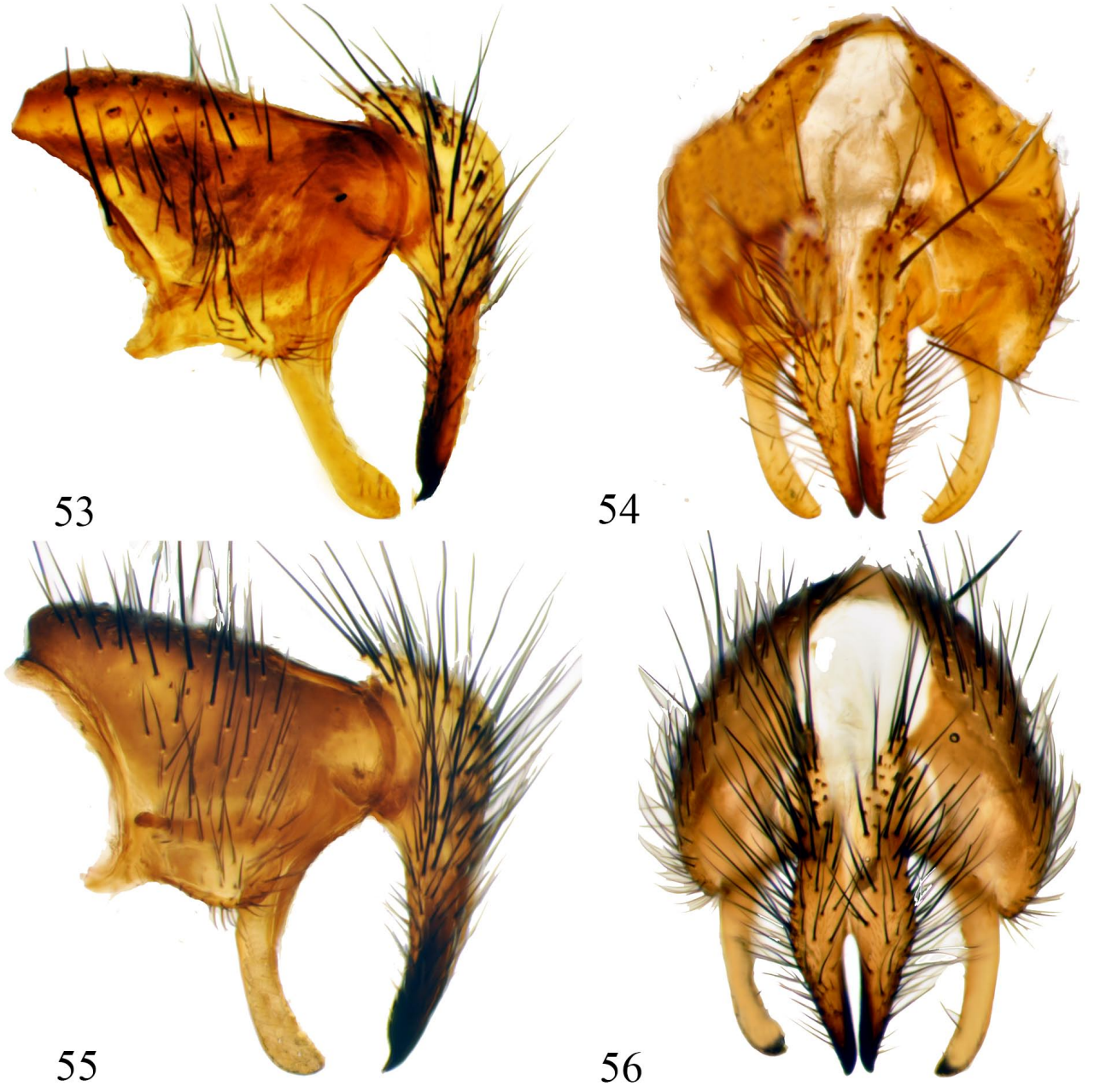
Egg. Of *Phaonia*-type [A. Grzywacz, pers. comm.; see Skidmore (1985) and Grzywacz *et al.* (2012)]. Translucent white, elongated, with dorsal surface flat or slightly concave and ventral surface convex, appearing to have a fully-developed eggshell ready for oviposition (Fig. 9). Micropyle at anterior pole set in a funnel-shaped area surrounded by slightly raised folds; posterior pole rounded. Median area on whole dorsal surface of egg broad, with broadly foliate hatching pleats throughout its entire length; hatching pleats probably with hexagonal pattern [detailed SEM investigation required]; hatching pleats simple along entire margin, not denticulate. Remaining egg chorion with distinct hexagonal pattern.



FIGURES 41–46. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **41–42.** *M. lara* (Bonatto). **43–44.** *M. nigrocoerulea* **sp. nov. 45–46.** *M. purpurata* Aldrich.



FIGURES 47–52. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **47–48.** *M. semiflava* Aldrich. **49–50.** *M. uniseta* Aldrich. **51–52.** *M. violacea* **sp. nov.**



FIGURES 53–56. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **53–54.** *M. vogelsangi* (Mello). **55–56.** *M. zurquiensis* **sp. nov.**

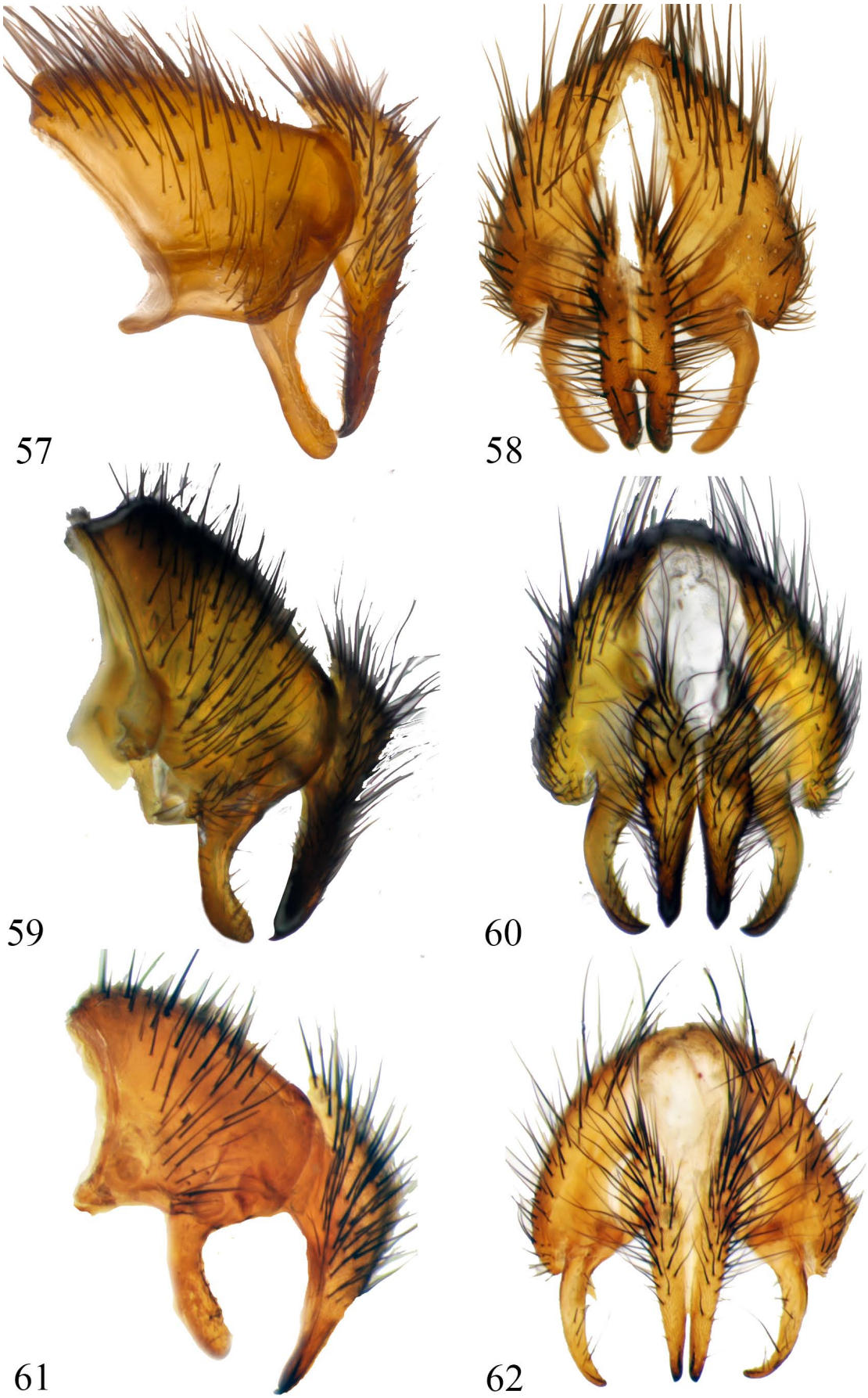
Type material. HOLOTYPE ♂♦* (TLW444) (Mexico, **Federal**; USNM; Fig. 456), labeled: R.E.P.S.A. [= Ecological Reserve of Pedegral of San Angel] Ciudad / de MEXICO / 25 Noviembre-15 / Troncoso D. / Trampa NTP-80; Troncoso D. / Nuñez C.; HOLOTYPE / Laneella / fuscosquamata / T.L. Whitworth.

ALLOTYPE ♀♦ (TLW445): same data as holotype (USNM).

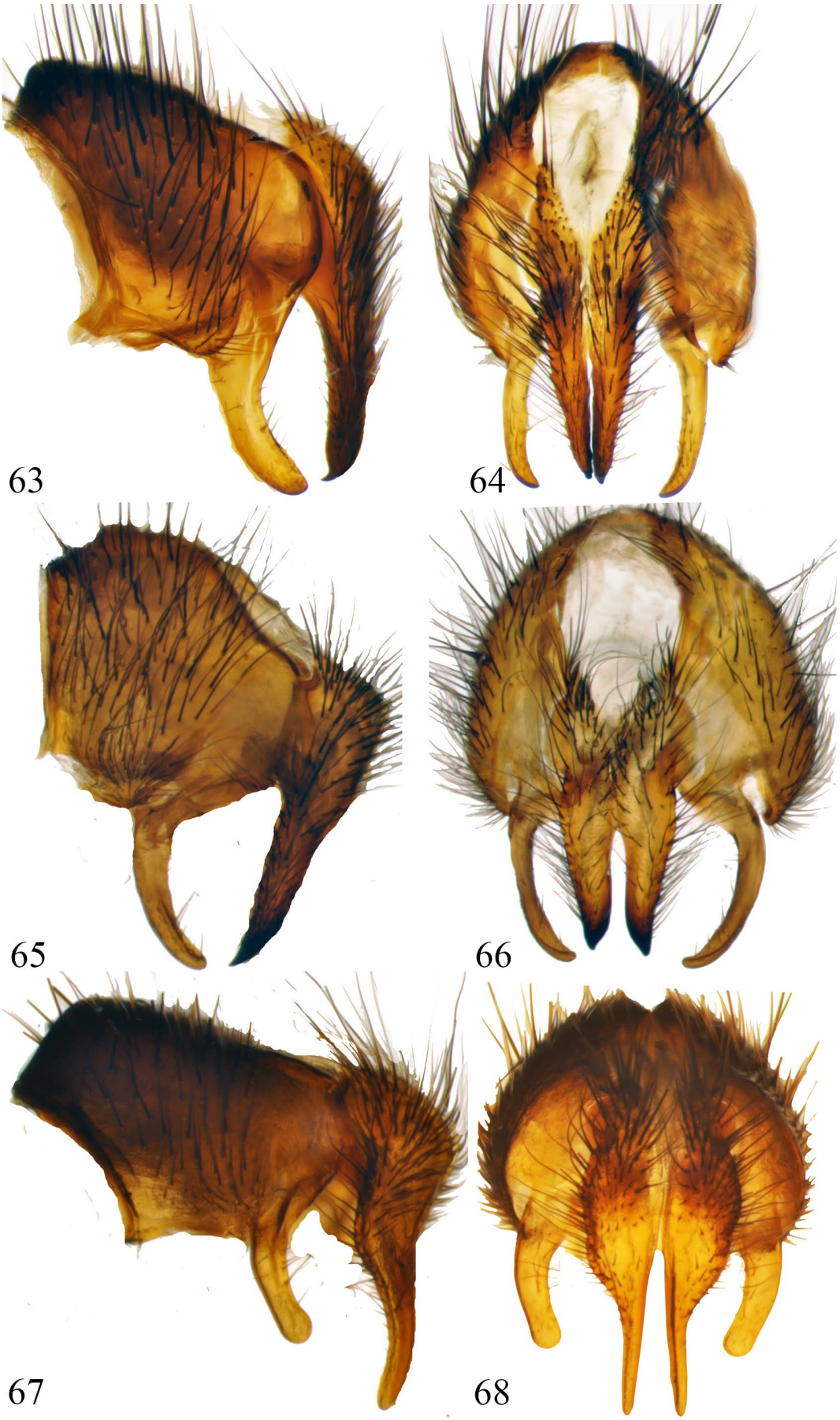
PARATYPES: Mexico, **Mexico.** 1 ♀, Chapingo, 17.viii.1957, Wm. W. Gibson (WSUP); 1 ♀, Cantera Oriente, Ciudad Universitaria, D.F., CPL493, C. Pedraza (UNAM). Chiapas, Union Juárez Municipality: 1 ♂*, 2 ♂♂, Tacana Chiquihuite, Pico de Gallo, 1.xii.2017, T. pitfall, T3, Luis López & Jorge León Cortéz (ECOSC-E); 2 ♀♀, same data except Rio Malá, 9.viii.2018 (ECOSC-E). Guatemala, **Guatemala.** 1 ♀*, Puerta Parada, 14°55′66″N 90°46′33″S, 1850 m, summer 2016, Malaise trap, Jack Schuster (UVGC).

Distribution. Guatemala, Mexico.

Remarks. This species is superficially similar to some species of the blow fly genus *Calliphora* Robineau-Desvoidy (Diptera: Calliphoridae).



FIGURES 57–62. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **57–58.** *M. batesi* Aldrich. **59–60.** *M. bellardiana* Aldrich. **61–62.** *M. benoisti* (Séguy).



FIGURES 63–68. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **63–64.** *M. bicolor* (Fabricius). **65–66.** *M. brunnipes* Surcouf. **67–68.** *M. bullata* **sp. nov.**

The description of the egg is based on a subsample out of ca. 75 eggs extracted from the dissected abdomen of a female paratype of *L. fuscosquamata* **sp. nov.** from Chiapas, Mexico (Fig. 9). To our knowledge, this is the first record of a mesembrinellid with eggs. Another female of this species was dissected, but no eggs or larvae were found in the abdomen. Out of several hundred dissections of females of many species of mesembrinellids, this was the first in which we encountered eggs, though early instar larvae were often encountered in other species. A female of *L. purpurea* **sp. nov.**, which clustered near *L. fuscosquamata* in the NJ tree (Fig. 488), was dissected and an early instar larva was found in the abdomen, but no eggs.

Guimarães (1977) suggested that *Laneella* is the most primitive genus of this family, which may explain the egg-laying habit of one of its species. Compared to other *Laneella*, the ovipositor in *L. fuscosquamata* has T7 divided (vs. T7 is continuous in other *Laneella*), which may reflect an egg-laying vs. larviparous habit.

Two specimens (TLW444–445) were barcoded and formed a distinct cluster near *L. purpurea* in our NJ tree (Fig. 488).

Etymology. The species name *fuscosquamata* is a combination of the Latin *fusco* (dusky) and *squama* (scale), which reflects the dark brown upper and lower calypters of both sexes.

Laneella nigripes Guimarães, 1977

(Figs 19–20, 109–110, 197, 241, 284, 328, 372, 413, 488)

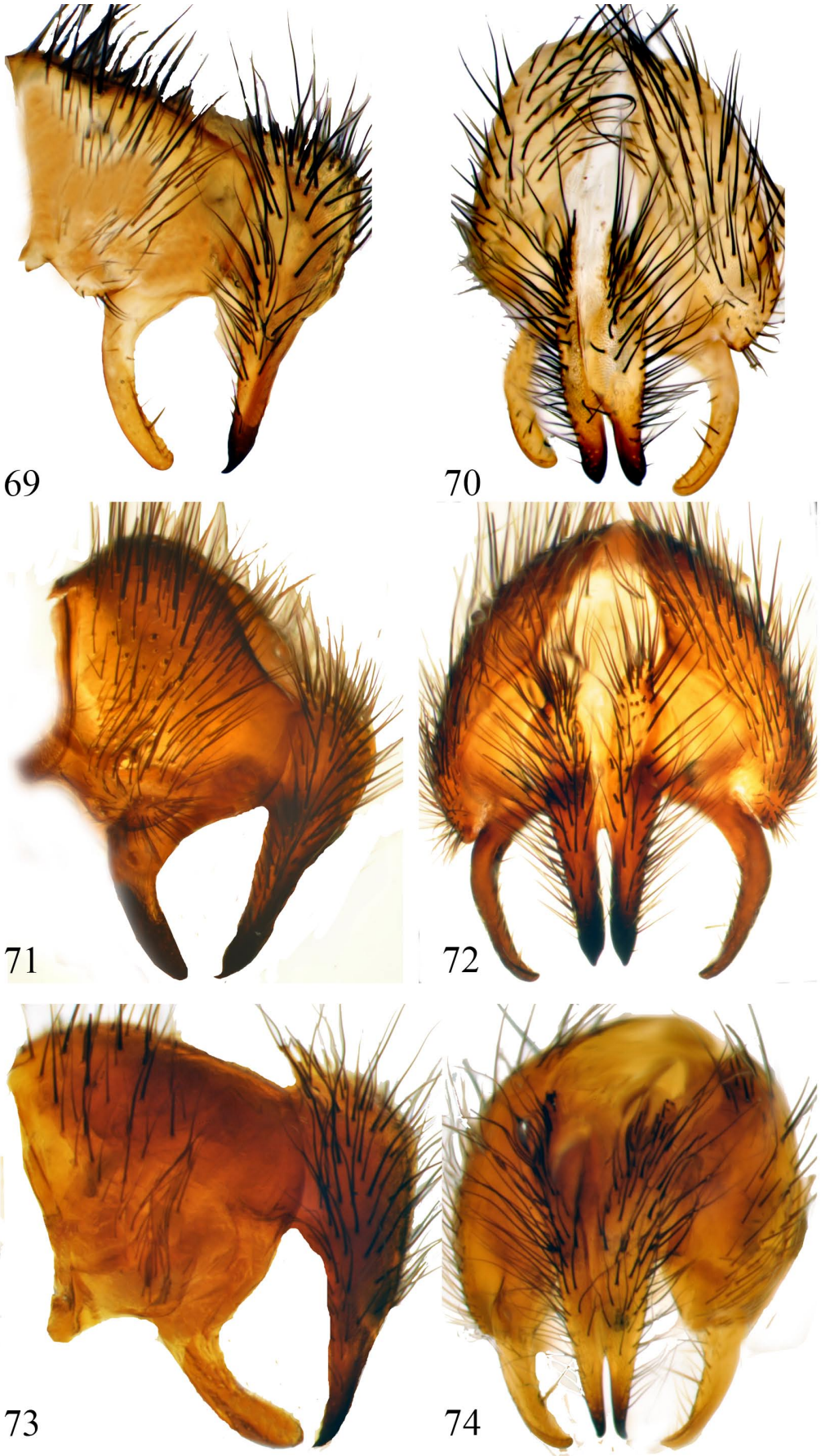
Laneella nigripes Guimarães, 1977: 57. Holotype male (MZSP), not examined. Type locality: Salesópolis, São Paulo, Brazil.
Laneella nigripes: Vargas & Wood (2009: 1301); Wolff *et al.* (2013a: 59); Kosmann *et al.* (2013); Marinho *et al.* (2017: tab. 1).
Mesembrinella nigripes: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized shiny dark brown fly averaging 10.7 mm (10–11/3) in length. Black postocular setae only extending 2/3 of way to gena vs. black postocular setae extending all the way to gena in *L. perisi*; palpus slender, dark brown to black vs. orange in *L. perisi*; fore and mid trochanters and femora dark brown (hind ones sometimes yellow) vs. trochanter and femora yellow in *L. perisi*; basal half of tarsal claw white in both *L. nigripes* and *L. perisi* (Fig. 10), darkened orange, brown or black in other *Laneella* (Fig. 11); wing with distinct infuscation along the length of the costa, vs. only distal end of wing infuscated in *L. perisi*; T4 with whitish tomentum on anterior half vs. with four large spots of whitish tomentum midsegment in *L. perisi*.

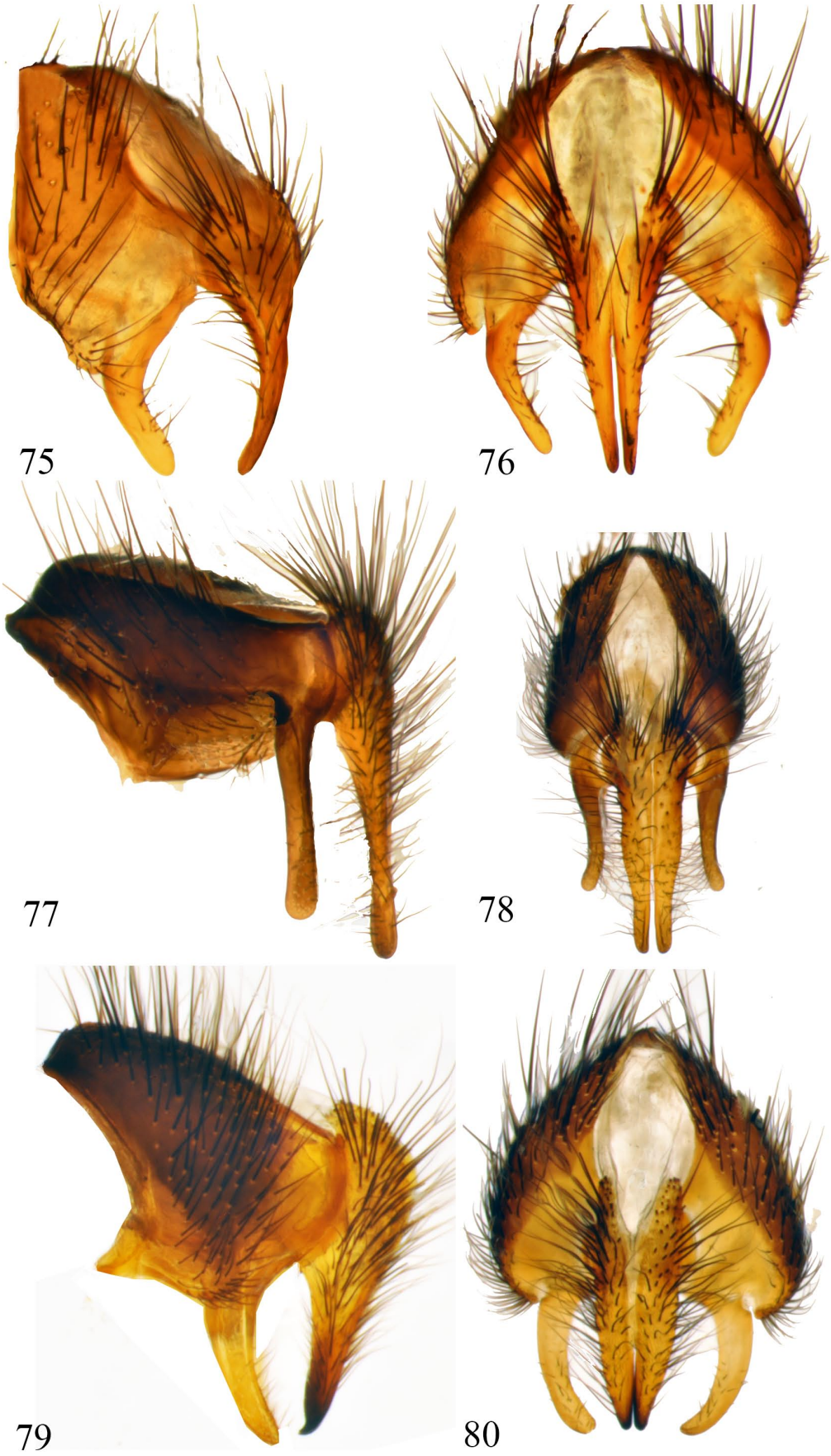
Redescription. *Male*. Head. Frons narrow, 0.015/1 of head width at narrowest; fronto-orbital and parafacial pale orange with heavy silvery tomentum; frontal setae ascending about halfway to vertex; frontal vitta dull orange with pale tomentum, obliterated about midway; gena yellowish, anterior half with dark setae, rear half with pale setae; postgena yellowish with pale setae; occiput with pale tomentum and yellow-gold setae, median occipital sclerite shiny dark orange; antenna: pedicel, first flagellomere, and arista dark orange; eye with median facets about 4x size of lateral facets; ocellar triangle tiny, anterior ocellus about 1.5x size of posterior ocelli; supravibrissal setae brown, in cluster at base of facial ridge, like in *L. perisi*.

Thorax with dorsum and pleural areas orange-brown; dorsum with four whitish tomentose stripes. Chaetotaxy: ac 2:3, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae long, slender and tan; 1 pair converging ap, sa absent, 1 lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum weakly developed; spiracles pale yellow, medium in size. Legs. Trochanters and femora dark brown (sometimes yellowish on hind leg), vs. yellow in *L. perisi*. Wing infuscated along anterior edge of costa, from subcosta-costa junction posteriorly to R_{4+5} and distally to wing tip; subcostal sclerite bare, basicosta orange, tegula brown; section IV 0.26 of section III; discs of calypters tan; rim of upper calypter brown with short dark setae, rim of lower calypter pale with long pale setae.

Abdomen. T1+2 with anterior half yellow-orange, posterior half brown; T3 with anterior half yellow, posterior half brown; T4 with solid band of pale tomentum along anterior half; T4 and T5 dark brown, each with row of stout marginal setae; disc of T5 without row of stout setae, whole segment with short fine setae. *Terminalia* in lateral view with small epandrium, long slender surstylus and cercus curving slightly posteriorly (Fig. 19); in posterior view, cerci broad at base, gradually tapering to tip (Fig. 20); phallus in lateral view with long, slender epiphallus curving posteriorly (Fig. 109); in dorsal view, hypophallic lobes broad and somewhat circular with coarse serrations (Fig. 110); T6, STS7+8, pre- and postgonite, ST6 and hypandrium as in Fig. 197; ST1–5 as in Fig. 241.

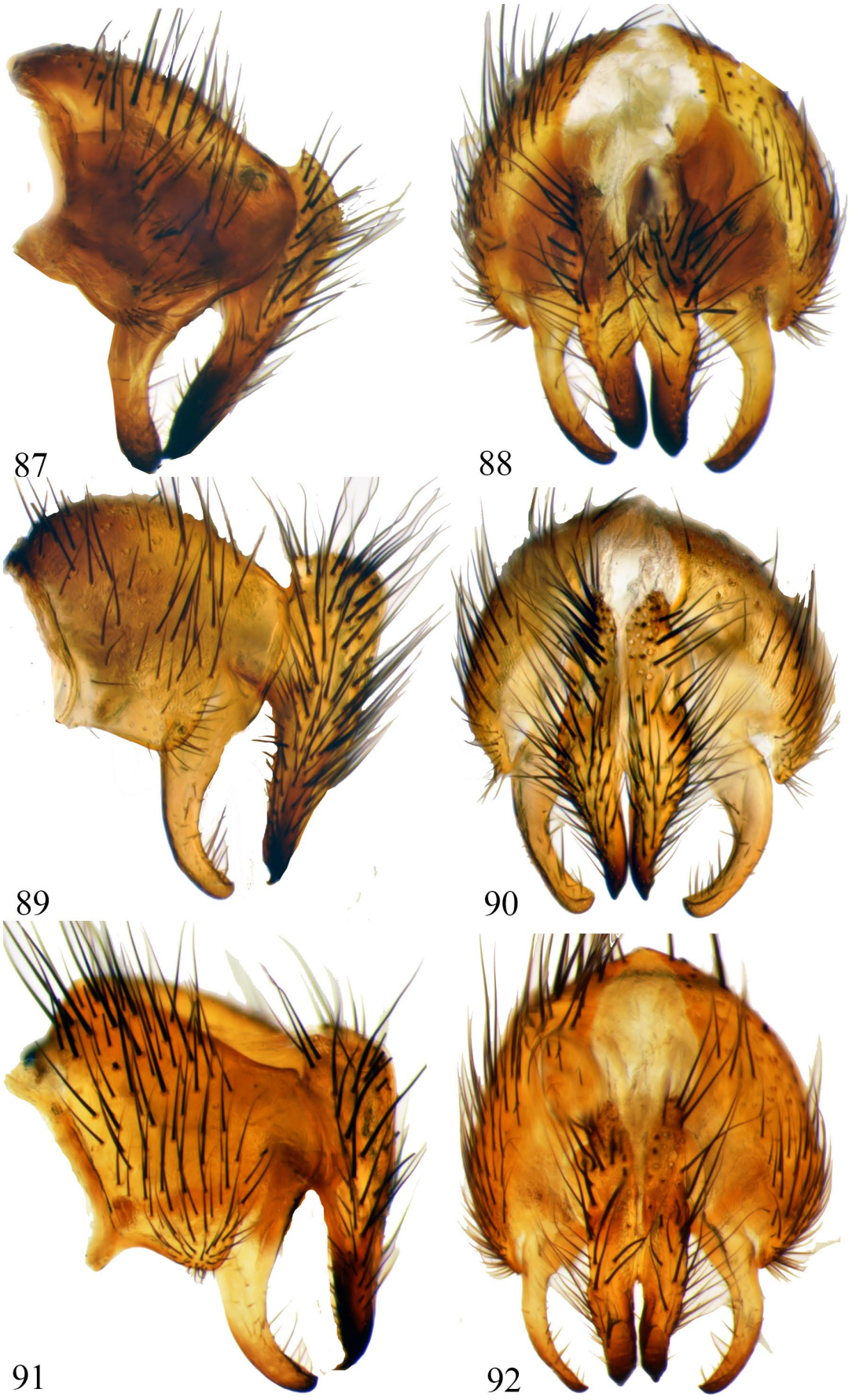


FIGURES 69–74. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **69–70.** *M. chantryi* **sp. nov. 71–72.** *M. currani* Guimarães. **73–74.** *M. cyaneicincta* (Surcouf).

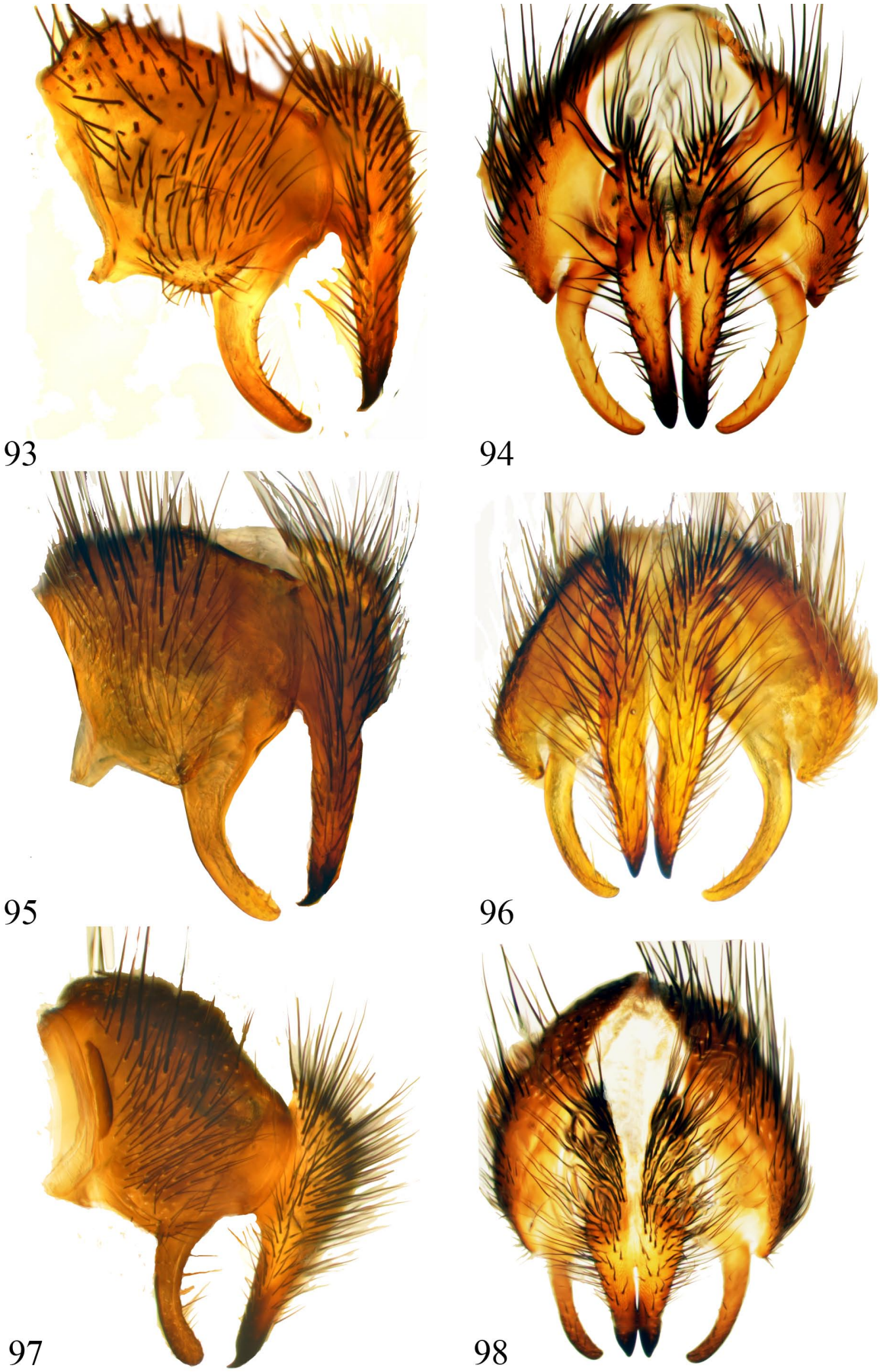


FIGURES 75–80. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **75–76.** *M. flavicrura* Aldrich. **77–78.** *M. longicercus* **sp. nov. 79–80.** *M. peregrina* Aldrich.

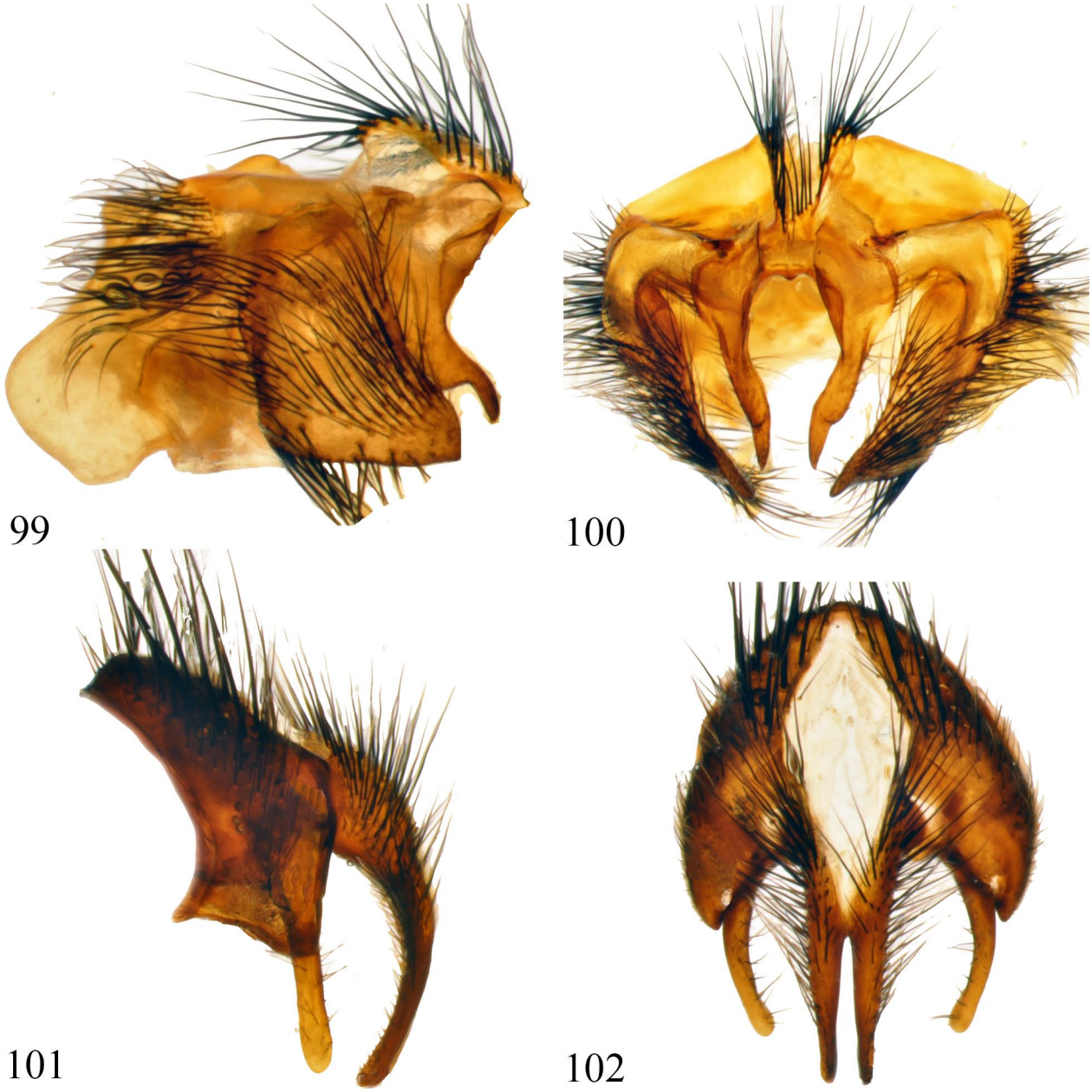
FIGURES 81–86. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **81–82.** *M. pictipennis* Aldrich. **83–84.** *M. quadrilineata* (Fabricius). **85–86.** *M. randa* (Walker).



FIGURES 87–92. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **87–88.** *M. semihyalina* Mello. **89–90.** *M. serrata* **sp. nov. 91–92.** *M. socors* (Walker).



FIGURES 93–98. Left lateral and posterior views of epandrium, cerci and surstyli of *Mesembrinella* spp. **93–94.** *M. townsendi* Guimarães. **95–96.** *M. umbrosa* Aldrich. **97–98.** *M. velasquezae* **sp. nov.**



FIGURES 99–102. Left lateral and posterior views of epandrium, cerci and surstyli of Mesembrinellidae. **99–100.** *Mesembrinella anomala* (Guimarães). **101–102.** *Souzalopesiella facialis* (Aldrich).

Female. Similar to male except frons 0.26/2 of head width at narrowest, eye with median facets about 2x size of lateral facets. Terminalia with T6 of FU shape; T7 anterior edge with semicircular depressed area midway; T8 as separate sclerites (Fig. 284); ST6–8 and hypoproct as in Fig. 328; spermathecae tuberform (Fig. 372); ST1–5 as in Fig. 413.

Material examined. Brazil, **Federal.** 1 ♂*, 1 ♀*, Rio de Janeiro, ix.1938, M.E.S. Bras. (USNM). **São Paulo.** 1 ♀, Boraceia, Salesopolis, 15.iii.1972 (NHMUK); 1 ♀♦ (TLW385), Santo Andre, R.B.A. da Sierra de Paranapiacaba, 23°46′46″S 46°18′29″W, 21.xii.2010, Malaise 3, M. Sato, S. Nihei (MZSP); 1 ♂, same data except 19.iv–23.v.2011, Malaise 1, P. Moll, F. Gudin. (MZSP).

Distribution. Brazil. Bonatto (2001) also listed it from Paraguay.

Remarks. A single specimen was barcoded during this study (TLW385) and two additional sequences were taken from GenBank (KR820705, KR820706). All sequences clustered together close to *L. fusconitida* and *L. patriciae* (Fig. 488). The genetic distance between *L. nigripes* and *L. fusconitida* is 11%, as is the distance between *L. nigripes* and *L. patriciae*.

FIGURES 103–104. *Mesembrinella* spp., abdomens in posterior view. **103.** *Mesembrinella batesi* Aldrich, showing heavy whitish tomentum with dark "pits" around setal sockets. **104.** *Mesembrinella spicata* Aldrich, showing unusual shape of T6, STS7+8 and epandrium.

Laneella patriciae (Wolff, 2013)

Mesembrinella patriciae Wolff, 2013: 121. Holotype male (CEUA), not examined. Type locality: Filandia, Quindio, Colombia.
[NB: originally placed under *Mesembrinella*, later moved to *Laneella* based on DNA analysis and the examination of spermathecae which revealed they are tuberform like other *Laneella* (Marinho *et al.* 2017).]
Laneella patriciae: Wolff & Kosmann (2016: 870); Marinho *et al*. (2017: tab. 1).
Mesembrinella patriciae: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized fly averaging 9.4 mm (9–10/5) in length. Abdomen bluish to purple-green vs. shiny brown in *L. fusconitida* **sp. nov.**; mid and hind femora with apices dark brown in *L. patriciae* vs. entirely orange in *L. fusconitida*; male with surstylus straight in *L. patriciae* vs. curved forward in *L. fusconitida*. This species is very similar to *L. fusconitida*, both sharing the distinctive tuberform spermathecae and brown spot around crossvein r-m.

Redescription. [Summarized from Wolff (2013).] *Male*. Head. Frons narrow (holoptic); fronto-orbital, parafacial and gena yellow with silvery tomentum; frontal vitta reddish-brown, obliterated above; postgena and occiput with white tomentum and fine long pale setae; antenna orange and palpus typical; postocular setae extending to gena. Dorsum of thorax reddish-brown with white tomentum and testaceous stripes; ppn and pleura orange with fine white tomentum; spiracles pale yellow. Coxae, trochanters and femora orange; mid and hind femora with dark reddish-brown apices; chaetotaxy: ac 2:3, dc 2:3, ia 1:2, kat 2:1, ppn 3x3, meral setae in form of inverted L; ap scutellar setae 1:1. Wing hyaline with brown spot around crossvein r-m; subcosta bare; section IV about 0.30 of III (estimated from Wolff 2013: fig. 1); calypters with dark rims. Abdomen with dorsum bluish to greenish-purple except T1+2 yellow; T1+2 and T3 with lateral marginal setae; T4 and T5 with rows of marginal setae; disc of T5 without row of stout setae, whole segment with short fine setae. T6 partially fused with T7+8; pregonite apically truncated; tip of paraphallus with dorsal line of denticles; hypophallus shorter than paraphallus; epiphallus long and thin; cercus and surstylus slightly curved backward in lateral view (see Wolff 2013: fig. 2).

Female. Dichoptic, frons broad and reddish-brown.

Material examined. None (no specimens could be obtained for examination).

Distribution. Colombia.

Remarks. A single sequence of this species from GenBank (KR820718) was added to our molecular analysis. It was distinct from other species and was recovered close to *L. fusconitida* **sp. nov.** (Fig. 488) with a genetic divergence of 3.84%, which supports them as two separate species; this is supported also by the several morphological differences as listed above.

***Laneella perisi* (Mariluis, 1987)**
(Figs 10, 21–22, 111–112, 198a–d, 242, 285, 329, 373, 414, 488)

Mesembrinella perisi Mariluis, 1987: 107. Holotype male [depository not given], not examined. Type locality: Ecuador.
Laneella perisi: Kosmann *et al.* (2013: 77); Wolff *et al. (*2013a: 59) (new combination); Wolff & Kosmann (2016: 867); Marinho *et al.* (2017: tab. 1).
Mesembrinella perisi: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized reddish-brown fly similar to *L. nigripes* and averaging 11.4 mm (11–12/5) in length. Black postocular setae extending all the way to gena; palpus typical, orange and robust, whereas in *L. nigripes* it is slender and dark brown. Wing with distinctive faint darkened area on distal 1/3, also with faint darkened area near distal end of CuA2; base of tarsal claw white, as in *L. nigripes* (Fig. 10). T4 with 4 large spots of silver tomentum vs. solid silvery tomentum on anterior half in *L. nigripes*.

Redescription. *Male*. Head. Frons 0.012 (0.010–0.015/5) of head width at narrowest. Fronto-orbital with silvery tomentum over orange cuticle, fronto-orbitals touching midway; frontal setae ascending about halfway to vertex; frontal vitta dark orange, obliterated about midway; parafacial bright silvery; gena dull orange with irregular silvery tomentum, horizontal row of stout setae along ventral ridge, and scattered small dark setae; postgena pale orange with few dark setae anteriorly, otherwise with long golden setae; occiput with silvery tomentum and golden setae; postocular row of short, dark setae; median occipital sclerite shiny dark orange; antenna orange, first flagellomere and arista dull orange-brown; palpus typical; eye with median facets about 4x size of lateral facets; ocellar triangle tiny, ocelli about equal in size; supravibrissal setae in cluster at base of frontal ridge, ascending only about 1/8 of distance to antennal base.

Thorax with dorsum and pleural areas orange-brown; dorsum with four whitish tomentose stripes alternating with three dark orange areas. Chaetotaxy: ac 2:3, dc 2:3. ia 1, ph 1, ppn 3x3, kat 2:1, meral setae long, tan and slender, 1 pair converging ap, 1 sa, 1 weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum weakly developed; spiracles medium-sized, pale yellow. Legs: femora orange, tibiae and tarsi dark brown with black setae. Wing with distal third infuscated, darker near costa, with another dark area near distal end of CuA2; subcostal sclerite bare, with tan tomentum; basicosta golden, tegula tan; section IV 0.25 of section III; discs of upper and lower calypters tan; rim of upper calypter dark with short reddish setae, rim of lower calypter pale with long reddish setae.

Abdomen. T1+2 with anterior 2/3 yellow, posterior 1/3 dark brown with small yellow section midway; anterior half of T3 with pale tomentum, posterior half dark brown; T4 dark brown with four pale spots of whitish tomentum midway; T5 dark brown with irregular pale setae; T3 with 2–3 stout lateral marginal setae; T4–5 with row of stout marginal setae; disc of T5 without row of stout setae, whole segment with short fine setae. *Terminalia* in lateral and posterior views with surstyli and cerci very similar to those of *L. nigripes* (Figs 21–22); phallus in lateral view with epiphallus slightly broader than in *L. nigripes*; in dorsal view hypophallic lobe rounded, with coarse serrations (Figs 111–112); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 198; ST2–5 broader than in *L. nigripes* (Fig. 242).

Female. Similar to male except frons 0.268 (0.26–0.27/5) of head width at narrowest, eye with median facets about 2x size of lateral facets, ocellar triangle large, anterior ocellus larger than posterior. T6 of FU shape, almost flat; T7 continuous with semicircular posterior depression midway; T8 as two separate sclerites, epiproct bilobed (Fig. 285); ST6–7 and hypoproct as in Fig. 329; spermathecae distinctly tuberform (Fig. 373); ST1–5 slender compared to other *Laneella* spp. (Fig. 414).

Material examined. Colombia, **Meta.** 1 ♀, 23 km N.W. Villavicencio Qbda. Susanunco, 1000 m, 5.iii.1972, S. & J. Peck (CNC). Costa Rica, **Alajuela.** 1 ♂, R.B. San Ramón, 1100 m, 26–31.viii.1996, L_N_240100 470100 #6217, G. Carballo (INBIO); 1 ♀*, R.B. San Ramón, 800 m, 29.i–3.ii.1995, L_N_244100 470100 #5451, G. Carballo (INBIO); 5 ♀♀, R.B. San Ramón, 800 m, 28.xi–3.xii.1994, L_N_245100 472100 #3332, G. Carballo (INBIO); 1 ♀*, 1 ♀, Sector Colonia Palmarena, 9 km SO. De Bajo Rodriguez, 700 m, 2–23.vii.1997, Malaise, L_N_245900 475900 347903, G. Carballo (INBIO); 1 ♀, La Fortuna, Sector Catarata, 500 m, i.1998, L_N_268500 462500 #48836, G. Carballo (INBIO); 1 ♀♦ (TLW275), Upala P.N. volcau Teuorio, Albergue Helicouias, 700 m, 29.xii.2007, colecta Libre, L_N_299100 422600 #95882, M.A. Zumbado. (INBIO). **Cartago.** 1 ♂*, Pejibaye Estación, Biológica Copal Sendero Ron Ron 1090 m, 5–13.iv.2005, D. Gutierrez (INBIO); 1 ♀♦ (TLW272), 2 ♀♀, Turrialba M.N. Guayabo, Send. Monuculos, 1100–1200 m, 8–12.v.2007, Interseccion, L_N_217200 570300 #91254, Moraga, Azofeifa, Gonzalez, Navarro (INBIO); 1 ♀♦ (TLW271), same data except 7–8.v.2007, #91200. **Guanacaste.** 1 ♂, Est. Pittilla, 9

km S. Sta Cecilla, Sendero Nacho, 700 m, ii.1994, L_N_330200 380200 #2752, Malaise, E. Araya (INBIO). **Heredia.** 1 ♂, El Plastico 700 m, Las Horquetas de Sarapiqui, 17.iii.1993, L_N_253000 532000, H. Vargas (INBIO). **Puntarenas.** 1 ♂, Rancho Quemado, 200 m, Península de Osa, ix.1991, L_S_292500 511000, F. Quesada (INBIO). **San José.** 2 ♂♂, 1 ♀♦ (TLW273), Tarrazu. San Carlos, Camino a Rios Paraiso, 800 m, 3–4.v.2006, L_S_392748 448892 #86033, B. Gamboa, M. Moraga, J.A. Azofeifa (INBIO); 1 ♂, Zurquí de Moravia, North pasture, 1600 m, 16.xii.2012, bait trap with pig dung, #105697, ZADBI (INBIO). French Guiana. 1 ♀♦ (TLW274), 1 ♀, Kaw Mountain, N0433581 W05212428, 310 m bait trap, 8.ii.2008, T.L. Whitworth (TW).

Distribution. Colombia, Costa Rica, French Guiana. Bonatto (2001) listed Ecuador and Brazil.

Remarks. Five specimens (TLW271–275) were barcoded; they formed two distinct clusters: one including four specimens from Costa Rica, the other including one specimen from French Guiana (Fig. 488) with a genetic distance of 4.8%. This suggests that the French Guiana specimen belongs to a separate species. The morphology of this specimen was intermediate between the typical *L. perisi* and *L. nigripes*, but the latter was even more different with a 10% genetic divergence. No other specimens of this species were found between Costa Rica and French Guiana, and geographical separation likely explains this divergence. The French Guiana specimen is like *L. perisi* in wing infuscation and palpus color (except for the darkened tip, as in *L. nigripes*) and has T4 with pale spots. It is like *L. nigripes* in having mid and hind femora dark on distal half, not all black, and postocular setae orange; T6–8 of female also looks more like *L. nigripes*. Further studies are needed to determine whether this specimen belongs to a separate species.

Laneella purpurea Whitworth, sp. nov.

(Figs 23–24, 113–114, 199, 243, 286, 330, 374, 415, 457, 488)

Diagnosis. A medium-sized fly averaging 11.4 mm (10–12/5) in length. A distinctive fly, thorax and abdomen purple-blue; head with dark orange to reddish-brown parafacial and orange antenna; basal wing cells and veins darkened. Male surstylus and cercus as in Figs 23–24. Female with ends of T6 curving forward when flattened, unlike any other known species (Fig. 286).

Description. *Male*. Head. Frons narrow, 0.015 (0.01–0.02/5) of head width at narrowest, about half width of anterior ocellus. Fronto-orbital and frontal vitta orange-brown with silvery tomentum, frontal vitta obliterated midway, frontal setae ascending about halfway to vertex; parafacial orange, narrow, about equal to width of first flagellomere; gena with horizontal row of black setae, anterior edge orange, remaining 1/2 to 2/3 dark orange with silvery tomentum; postgenal vestiture dark with silvery tomentum, anterior half with dark setae, posterior half with pale setae; upper edge of occiput with short, dense, unarranged dark setae, remainder with pale silky setae; median occipital sclerite shiny black; pedicel and first flagellomere orange; palpus typical; eye with median facets only slightly larger than lateral facets; ocellar triangle small with small ocelli about equal in size; supravibrissal setae on facial ridge ascending halfway to antennal base.

Thorax with dorsum and pleural area purple-blue with weak whitish tomentum; chaetotaxy: ac 2:3, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae typical; 1 pair converging ap, sa 1, lat 1, stout bas 1, weak pb 1, 1 disc; subscutellum weakly developed; anterior spiracle large and tan; posterior spiracle large and darker brown; legs brown, tarsal claws brown with black tip. Wing hyaline, wing base with veins and cells darkened; subcostal sclerite without setae, with fine pubescence; basicosta and tegula dark brown; section IV 0.35 of section III; discs of upper and lower calypters and rims entirely black.

Abdomen subshining purple-blue with weak, whitish tomentum; posterior lateral margin of T3 with 4x4 stout setae; T4 with marginal row of stout, erect setae that wrap around lateral area of abdomen; T5 covered with dense, long, slender erect setae, which could be confused with the discal setae seen in the *aeneiventris* species-group but which are much denser, slenderer, and not in a distinct row. *Terminalia* distinctive; in lateral view epandrium small with large robust cercus arching backward then curving forward in apical half; surstylus smaller, curving only slightly forward (Fig. 23); in posterior view cerci with basal 2/3 broad, distal 1/3 narrowed to a rounded tip (Fig. 24); phallus in lateral view with long slender epiphallus with slight bend posteriorly (Fig. 113); in dorsal view hypophallic lobes rounded with fine serrations (Fig. 114); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 199; ST1–5 as in Fig. 243.

Female. Similar to male except frons 0.288 (0.28–0.30/5) of head width at narrowest, and frons black. T6 of FU

shape, slightly curved forward; T7 bilobed, with deep incision anteriorly; T8 as two separate sclerites (Fig. 286); ST6–8 and hypoproct as in Fig. 330; spermathecae tuberform (Fig. 374); ST1–5 as in Fig. 415. [NB: the FU shape of T6 is distinctive because it is not inverted, whereas it is inverted in all other known species of *Laneella*.]

Type material. HOLOTYPE ♂ (Costa Rica, **Cartago**; INBIO; Fig. 457), labeled: Rio Dos Amigos, P.N. Tapantí, Prov. Carta, [= Cartago Province] / COSTA RICA. 1450 m. Jul 1994, G. Mora, / L N 187600_560250 #3184; COSTA RICA INBIO / CRI002 / 038481; HOLOTYPE / Laneella / purpurea / T.L. Whitworth.

ALLOTYPE ♀: Costa Rica, **San José.** Zurquí de /Moravia, North Pasture, 1600 m, 28.ii.2013/ bait trap with fish, ZADBI-512/ #106177 (LACM).

PARATYPES: Bolivia, **La Paz.** 1 ♀, Botanical garden, 16.xi.1974, K.G. Parker (LACM). Costa Rica, **Cartago.** 1 ♀*, 1 ♀♦ (TLW295), Tapantí [P.N.], 01.vii.2005 (CEUA); **Heredia.** 1 ♀♦ (TLW297), 16 km SSE La Virgen, 10°16′N 84°05′W, 1150 m, 9–14.iii.2001, flight intercept trap, primary forest, E.G. Riley (TAMU). **Puntarenas.** 1 ♂*, Monteverde, 24–29.ii.1980, 1500 m, G. & M. Wood (CNC); 1 ♀, same data except 20–25.viii.1991, D.M. Wood (CNC); 1 ♀, same data except 18–24.viii.1987, G. & M. Wood (CNC); 1 ♀, same data except 20–24.vi.1986, W. Hanson, G. Bohart (LACM). **San José.** 1 ♂*, 1 ♀*, 2 ♀♀, Zurquí de Moravia, Tower path, 1600 m, 10.05°N 84.02°W, 1600 m, 19–26.viii.2013, fish bait trap, ZADBI-957 #107277 (LACM); 1 ♂*, 1 ♀*, 10 ♀♀, same data except 2–9.viii.2013, ZADBI-996 #107515 (LACM); 1 ♂, 6 ♀♀, same data except 16–23.vii.2013, ZADBI-1088 #107690 (LACM); 4 ♀♀, same data except 9–16.viii.2013, ZADBI-1022 #107541 (LACM); 2 ♀♀, Zurquí de Moravia, North pasture 1600 m, 28.ii.2013, bait trap with fish, ZADBI-512 #106177 (LACM); 1 ♀♦ (TLW296), Zurquí de Moravia, Tower path 1600 m, 21–29.vii.2012, 250 m, Emergence trap over twigs mushrooms, ZADBI-364 #105692 (LACM); 1 ♀, Zurquí de Moravia, creek 2, 21.x.2012, bait trap with chicken, ZADBI-129 #105233 (LACM).

Distribution. This species is known only from Bolivia, Costa Rica. It is found primarily in western, wetter areas of Costa Rica. It may also inhabit similar areas of northern Nicaragua and southern Panama.

Remarks. Three specimens (TLW295–297) were barcoded and formed a distinct cluster close to *L. fuscosquamata* **sp. nov.** (Fig. 488). *Laneella purpurea* **sp. nov.** is superficially very similar to *Lucilia purpurascens* (Walker, 1836) (Calliphoridae) and was found mixed with this species in collections from Costa Rica, though the reniform posterior spiracle of *L. purpurea* **sp. nov.** readily separates the two. The dense setae on the disc of T5 resemble those in the *aeneiventris* species-group; however, the setae are thinner and denser, forming no distinct row, which separates it from that group.

Etymology. The species name *purpurea* reflects the distinctive purple color of this fly, from the Latin *purpureus* (purple). This species superficially resembles the widespread and well-known Neotropical blow fly *Lucilia purpurascens*.

Subfamily Mesembrinellinae Shannon, 1926

Genus *Mesembrinella* Giglio-Tos, 1893

Mesembrinella Giglio-Tos, 1893: 4. Type species: *Musca quadrilineata* Fabricius, 1805 *sensu* Giglio-Tos, 1893, by original designation. Misidentification, = *Mesembrinella bellardiana* Aldrich, 1922; *teste* James (1970). Herewith fixed under Article 70.3 of the Code (I.C.Z.N 1999).

Mesembolia Aldrich, 1922: 10, as subgenus of *Mesembrinella* Giglio-Tos, 1893. Type species: *Mesembrinella bellardiana* Aldrich, 1922, by original designation.

Eumesembrinella Townsend, 1931: 69. Type species: *Musca quadrilineata* Fabricius, 1805, by monotypy.

Albuquerquea Mello, 1967: 10. Type species: *Albuquerquea latifrons* Mello, 1967, by original designation. **Syn. nov.**

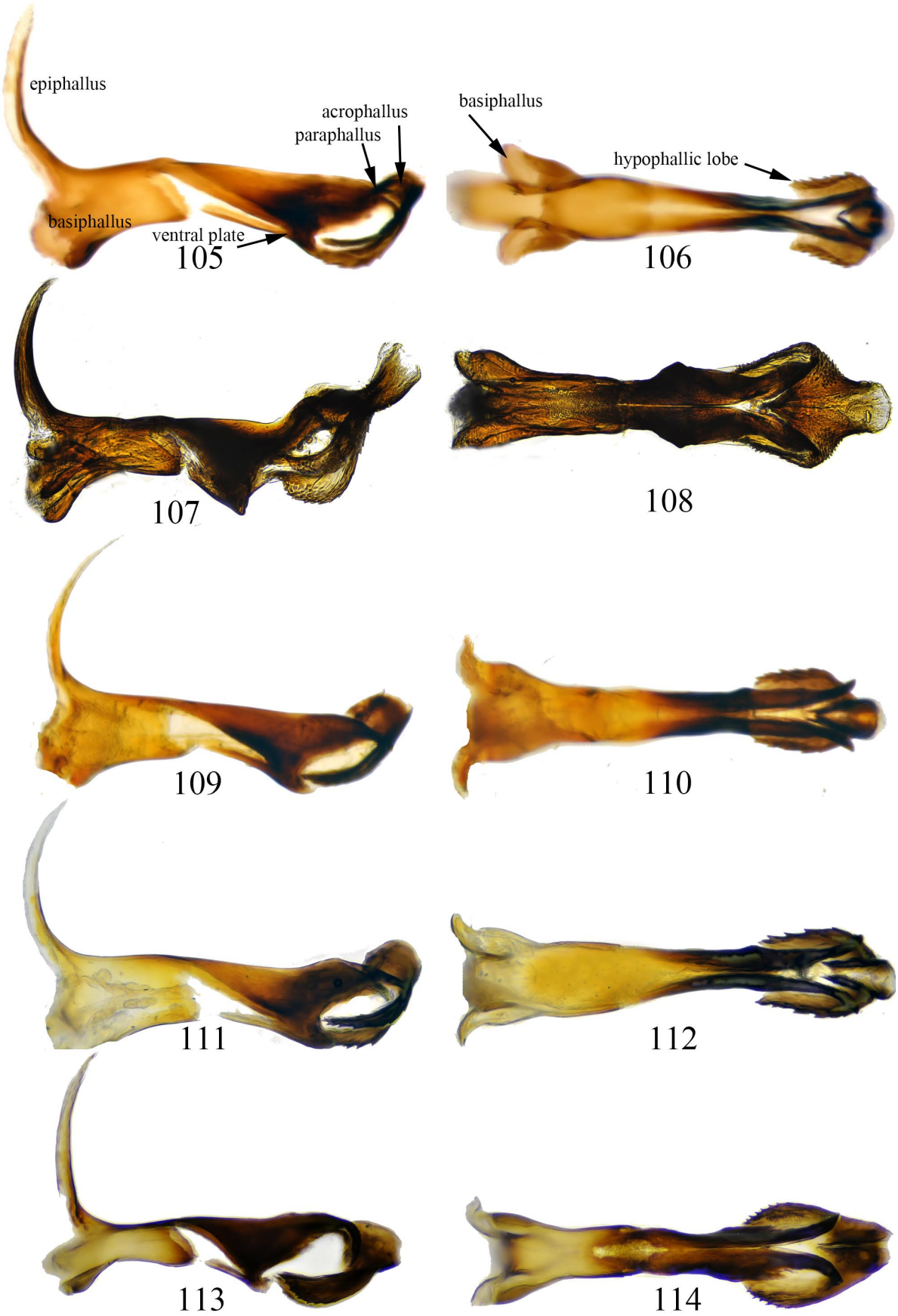
Henriquella Bonatto *in* Bonatto & Marinoni, 2005: 887. Type species: *Mesembrinella spicata* Aldrich, 1925, by original designation. **Syn. nov.**

Giovanella Bonatto *in* Bonatto & Marinoni, 2005: 884. Type species: *Giovanella bolivar* Bonatto *in* Bonatto & Marinoni, 2005: 884, by original designation. **Syn. nov.**

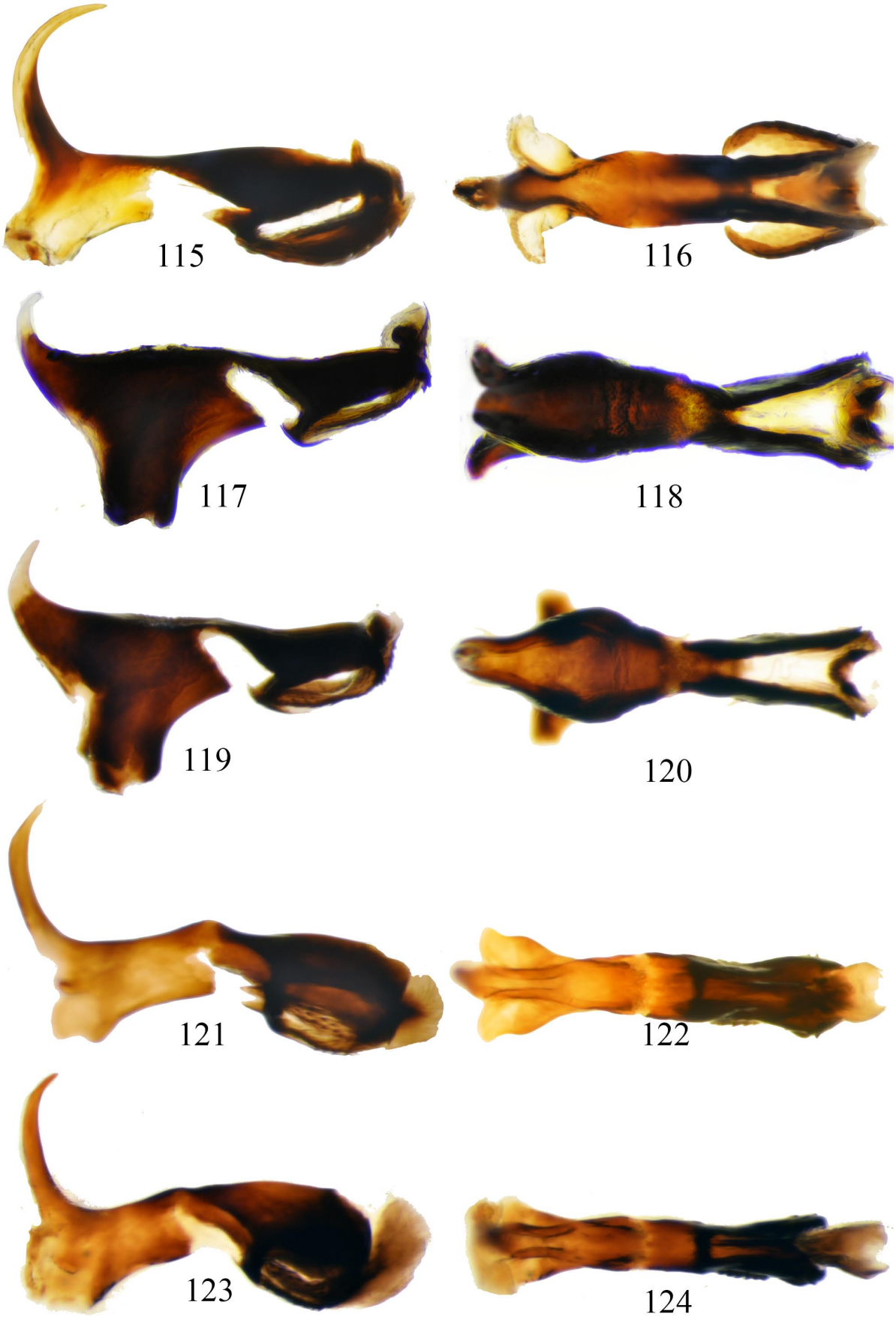
Huascaromusca Townsend, 1918: 155. Type species: *Huascaromusca cruciata* Townsend, 1918 [= *Dexia aeneiventris* Wiedemann, 1830; *teste* Guimarães (1977)], by original designation. **Syn. nov.**

Promesembrinella Hall, 1948: 65. Type species: *Mesembrinella semiflava* Aldrich, 1925: 14, by original designation.

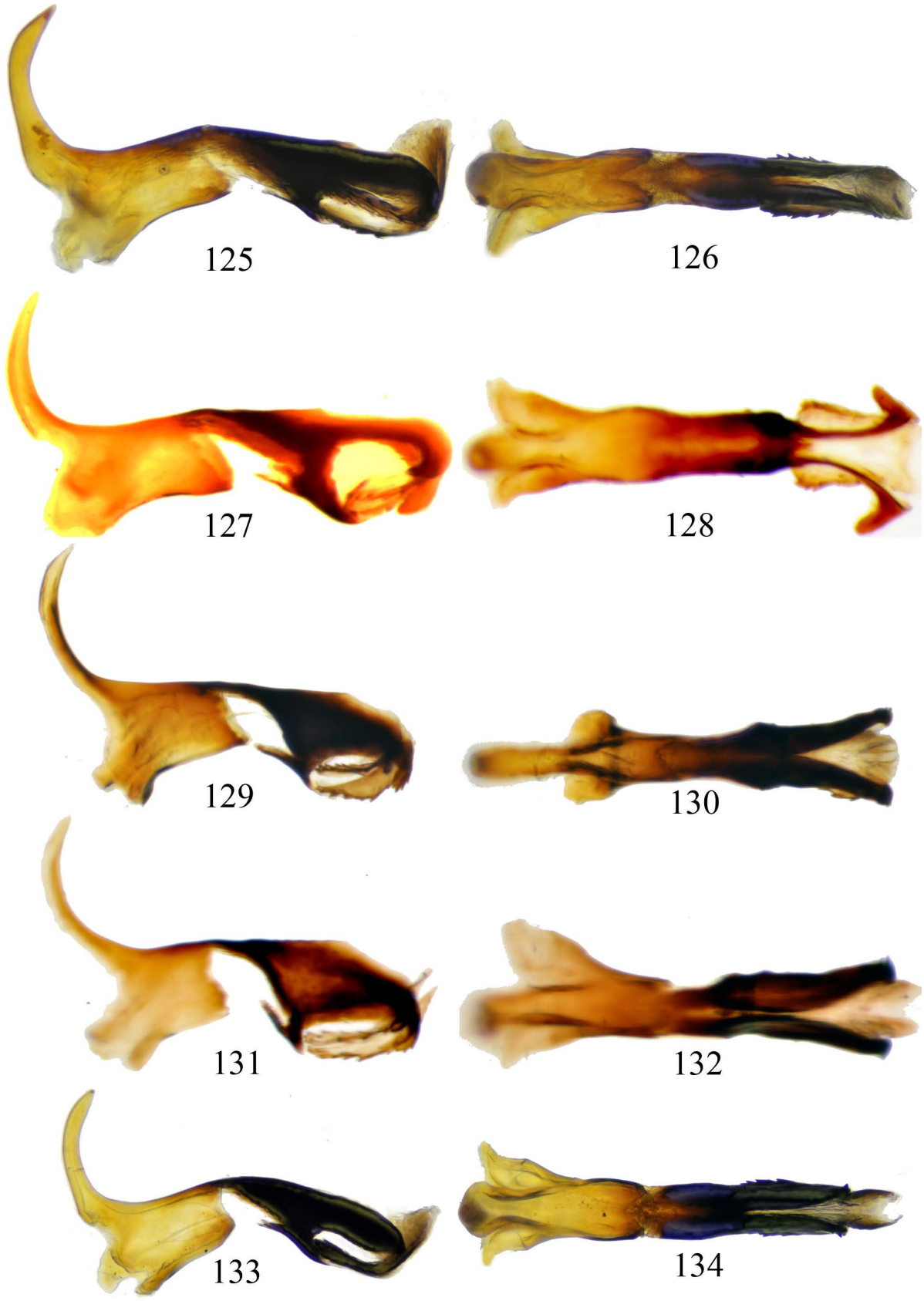
Thompsoniella Guimarães, 1977: 53. Type species: *Thompsoniella anomala* Guimarães, 1977: 54, by original designation. **Syn. nov.**



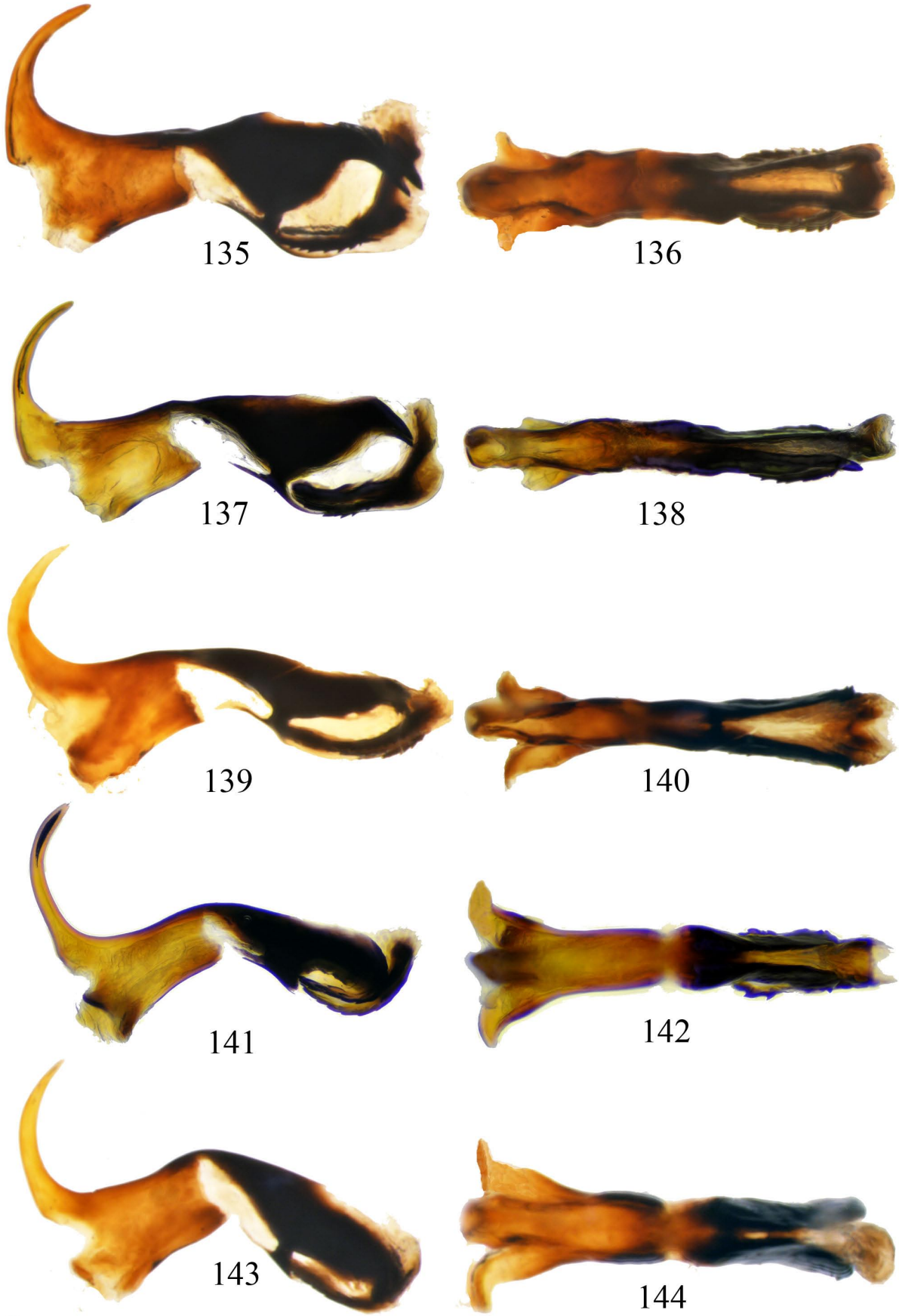
FIGURES 105–114. Left lateral and dorsal views of phallus of *Laneella* spp. **105–106.** *L. fusconitida* **sp. nov. 107–108.** *L. fuscosquamata* **sp. nov. 109–110.** *L. nigripes* Guimarães. **111–112.** *L. perisi* (Mariluis). **113–114.** *L. purpurea* **sp. nov.**



FIGURES 115–124. Left lateral and dorsal views of phallus of *Mesembrinella* spp. **115–116.** *M. latifrons* (Mello). **117–118.** *M. mexicana* **sp. nov. 119–120.** *M. spicata* Aldrich. **121–122.** *M. epandrioaurantia* **sp. nov. 123–124.** *M. woodorum* **sp. nov.**



FIGURES 125–134. Left lateral and dorsal views of phallus of *Mesembrinella* spp. **125–126.** *M. aeneiventris* (Wiedemann). **127–128.** *M. bolivar* (Bonatto). **129–130.** *M. decrepita* Séguy **131–132.** *M. lara* (Bonatto). **133–134.** *M. nigrocoerulea* **sp. nov.**



FIGURES 135–144. Left lateral and dorsal views of phallus of *Mesembrinella* spp. **135–136.** *M. purpurata* Aldrich. **137–138.** *M. semiflava* Aldrich. **139–140.** *M. uniseta* Aldrich. **141–142.** *M. violacea* **sp. nov. 143–144.** *M. vogelsangi* (Mello).

Key to species-groups of *Mesembrinella*

1 Anterior thoracic spiracle with a broad oval opening above (Fig. 5); discal scutellar setae usually present (as in Fig. 194); disc of T5 with or without a row of discal setae (Fig. 8 shows T5 with row of discal setae) (not to be confused with discal setae on the scutellum); most species with 3x3 postpronotal setae **2**

- Anterior thoracic spiracle with a long, narrow opening gradually widening above (Fig. 6); discal scutellar setae absent; disc of T5 without row of stout setae; with 2x2 postpronotal setae. . . . . ***M. bolivar* group** [four species; formerly *Giovanella*]

2 Male with epandrium large and elongate, broadly divided dorsally over its full length (as in Figs 104, 491), with surstyli and cerci tiny and at posterior end (Figs 27, 29); sternites much wider than long (ST4 about 4x wider than long), posterior edge of ST5 with pair of posteriorly-pointed projections midway [Fig 12 (see arrow), Figs. 245–246]; sternites shorter and partially hidden in *M. mexicana* **sp. nov.** (Fig. 245) [for lone females, terminalia should be dissected and examined; two species, *M. mexicana* **sp. nov.** and *M. spicata*, are similar (Figs 289–290), the other, *M. guaramacalensis* **sp. nov.**, is as in Fig. 288]. . . . . ***M. spicata* group** [three species; formerly *Henriquella*]

- Male with epandrium smaller, surstyli and cerci more typical, as in Figs 35–98, except *M. anomala* (Figs 99–100); sternites much narrower, often longer than wide, ST1–4 never more than 2x wider than long (Figs 247–279); posterior edge of ST5 without projections **3**

3 Disc of T5 with horizontal row of stout setae (Fig. 8), rest of T5 with fine setulae. Male: surstylus usually more or less straight, parallel-sided; cercus curved anteriorly (as in Fig. 39); phallus usually significantly narrowed just anterior to hypophallic lobe (as in Fig. 130) . . . . . ***M. aeneiventris* group** [13 species; formerly *Huascaromusca*]

- Disc of T5 without horizontal row of stout setae midway, with short- to medium-length fine setae and setulae over whole surface, dense in most species but sparser in a few species; surstylus and cercus usually curving toward each other in lateral view (as in Fig. 63); phallus usually not significantly narrowed anterior to hypophallic lobe (Fig. 148) **4**

4 Stem vein setose (Fig. 489); wing with dark infuscation along costa from subcosta-costa junction to R_{2+3}-costa junction, including all of r_1 cell; section IV of wing 0.30 (0.27–0.33/5) of section III; male frons broad, 0.20 of head width at narrowest; cerci in posterior view right-angled midway (Fig. 26); female terminalia as in Fig. 287; [known only from Brazil] . . . . . ***M. latifrons* group** [1 species; formerly *Albuquerquea*].

- Stem vein usually bare; if setose, then other combination of characters different. **5**

5 Male: T5 1.5–2x as long as T4 (as in Fig. 496); terminalia very unusual, with surstylus short and broad and cercus small and slender (Figs 99–100). Female T6 of FU shape with broad division midway (*M. anomala*, Fig. 324; condition unknown in *M. andina*) . . . . . ***M. anomala* group** [2 species; formerly *Thompsoniella*]

- Male: T4 and T5 of equal length; terminalia unlike those in Figs 99–100. Female T6 without a broad division (except in *M. decrepita*) . . . . . ***M. bicolor* group** [22 species].

Mesembrinella latifrons species-group

Mesembrinella latifrons (Mello, 1967)

(Figs 25–26, 115–116, 200, 244, 287, 331, 416)

Albuquerquea latifrons Mello, 1967: 10. Holotype male (FIOC), not examined. Type locality: Petrópolis, Rio de Janeiro, Brazil.

Albuquerquea latifrons: Toma & Carvalho (1995: 138); Kosmann *et al.* (2013: 77); Marinho *et al*. (2017: tab. 1).

Mesembrinella latifrons: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A small to medium-sized reddish-brown fly, averaging 9.4 mm (8–11/5) in length. T5 with faint bluish reflections; dorsum of stem vein setose, with sparse, dark setae; anterior edge of wing with dark infuscation; subcostal sclerite with long golden setae. This species resembles *M. bellardiana*, but in *M. latifrons* wing section IV 0.28 of section III, while in *M. bellardiana*, wing section IV 0.67 of section III. Male frons broad, 0.195 of head width, at narrowest, while it is much narrower in males of *M. bellardiana* (0.05 of head width at narrowest). Epandrium, cerci and surstyli in posterior view are distinctive, distal third of surstylus with 90° bend in posterior view (Fig. 26).

Redescription. *Male*. Head. Frons broad, 0.195 (0.19–0.20/2) of head width at narrowest; fronto-orbital orange with short row of weak frontal setae ascending about halfway to vertex; parafacial bare and pale gold; gena of pale orange ground color, covered with fine orange setae and with short horizontal row of dark, stouter setae; postgena like gena but with longer golden setae; occiput with silvery tomentum and pale orange setae; postocular with row of short, dark setae; median occipital sclerite shiny orange; palpus typical; eye facets uniformly small; ocellar triangle medium-sized, anterior ocellus slightly larger than posterior ocelli; supravibrissal setae orange, ascending about halfway up facial ridge.

Dorsum of thorax dark orange with faint narrow pale stripes of tomentum alternating with bare orange areas;

pleural area pale orange; ac, 2:1; dc, 2:3;ia, 2; ph, 1; ppn, 3x3; kat, 2:1, meral setae in straight line, without horizontal portion, the upper seta slightly anterior to line; 1 pair parallel ap; 0 sa,0 lat; 1 stout bas; weak pb; 1 disc; subscutellum weakly developed; spiracles small and pale orange; upper and lower calypters pale orange; rim of upper calypter sooty with reddish setae, rim of lower calypter white, also with reddish setae; legs entirely orange. Wing: anterior edge with long dark infuscation along costa; subcostal sclerite with long golden cilia; basicosta and tegula orange; dorsum of stem vein with a few dark setae; section IV 0.28 of section III.

Abdomen. T3 with pair of lateral marginal setae; T4–5 each with row of stout marginal setae; whole surface of T5 disc with medium length, sparse, weak setae. *Terminalia* in lateral view with surstylus sharply curved backward (Fig. 25); in posterior view surstyli with 90° bend in lower third, cerci ending in abrupt tip (Fig. 26); phallus in lateral view with epiphallus sharply curved posteriorly (Fig. 115); in dorsal view, hypophallic lobes bulging well beyond paraphallic hooks laterally (Fig. 116); T6, STS7+8, pre- and postgonite and ejaculatory sclerite as in Fig. 200; ST1–5 as in Fig. 244.

Female. Similar to male except frons fairly narrow, 0.256 (0.25–0.26/3) of head width at narrowest. T6 exceptionally thick, of RV shape; T7 continuous, narrowed midway below; T8 as separate sclerites (Fig. 287); ST6–8 and hypoproct as in Fig. 331; spermathecae filiform (not found in dissection, but Guimarães (1977) confirmed filiform); ST1–5 as in Fig. 416.

Material examined. Brazil, **Rio de Janeiro.** 1 ♂*, 1 ♀, Dist. Federal, iv.1938, [no collector] (NHMUK). **Sao Paulo.** 1 ♂*, Salesópolis, Estación Biológica Boracéia, 8.xi.1971, J.H. Guimarães (NHMUK); 1 ♀, same data except ii.1973, F.C. Vol (LACM); 1 ♂, Boracéia, 20.iii.1968, H.S. Lopes (CNC).

Distribution. Brazil.

Remarks. This species is uncommon and few specimens were available for study. The male terminalia are distinctive. No specimens were barcoded.

Mesembrinella spicata species-group

Recognition. The *M. spicata* species-group is represented by three species, *Mesembrinella spicata* and two new species, *M. guaramacalensis* **sp. nov.** and *M. mexicana* **sp. nov.** These species share anterior spiracle of normal shape, with a broad oval opening above (Fig. 5) and males with exceptionally broad rectangular sternites and ST5 with two prominent posterior projections [Fig 12 (see arrow), Figs. 245–246]; male with large epandrium (as in Fig. 29), T6 and STS 7+8 fused and base of epandrium prominent with small cerci and surstyli at the posterior end (Figs 27–30). Males of the known species have epandrium with broad division mid-dorsally (as in Fig. 491). The male of *M. guaramacalensis* **sp. nov.** is unknown, but we believe its terminalia will be similar, since barcodes place this species very close to the other two species (Fig. 488). The *anomala* species-group has similar epandrium, cerci and surstyli, but the shape is much different (Figs 99–100). The few examined females of *M. mexicana* **sp. nov.** and *M. spicata* have one to four stout discal setae on T5 like in the *aeneiventris* species-group. The holotype and paratype (both female) of *M. guaramacalensis* **sp. nov.** do not have stout discal setae on T5.

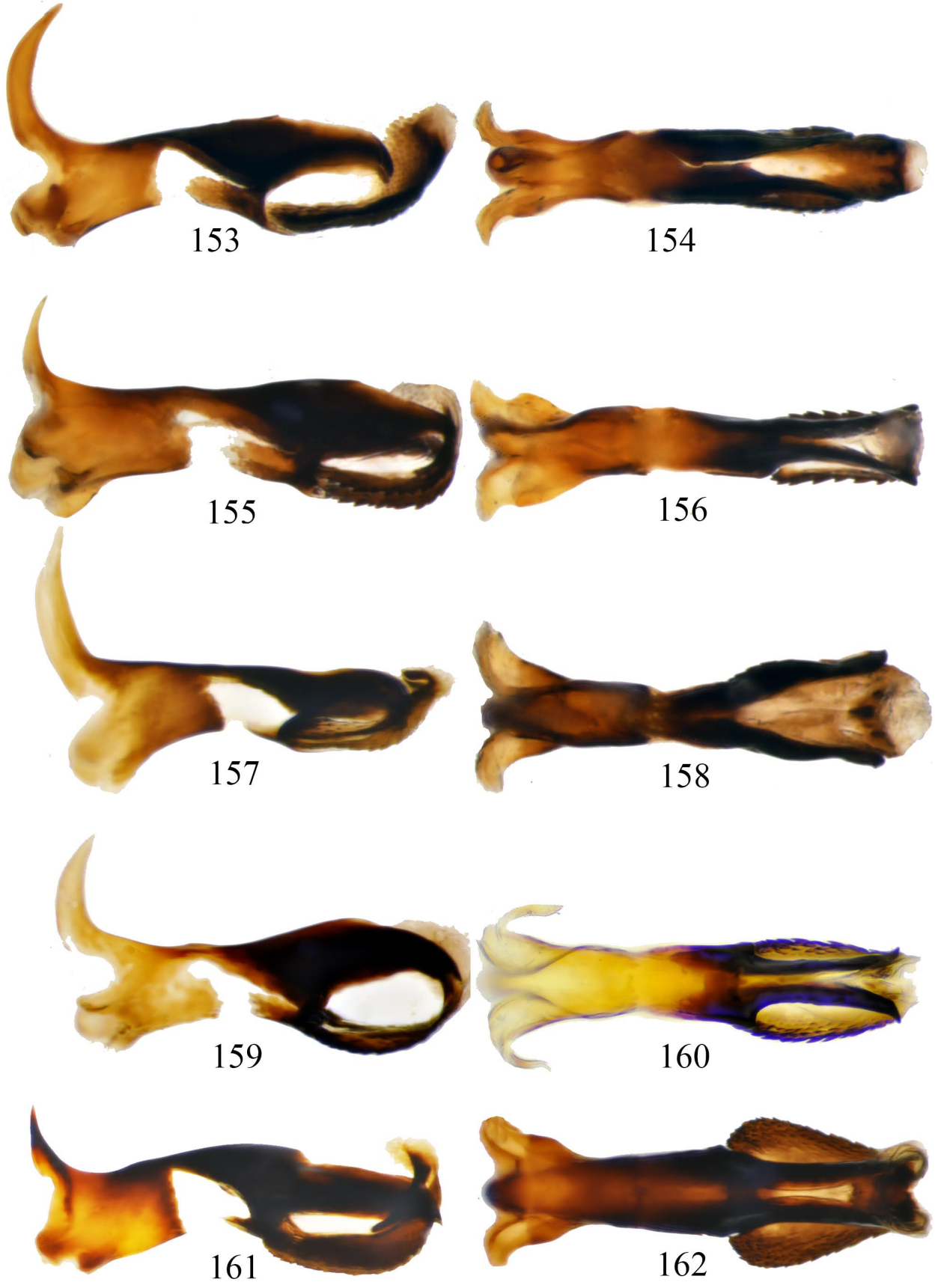
Key to species of the *M. spicata* species-group

1. Disc, rim and fringe of setae of upper and lower calypters white; anterior spiracle yellowish. Male with short posterior projections medially on ST5 (Fig. 245); epandrium, cerci and surstyli distinctive, as in Figs 27–28; female terminalia distinctive, as in Fig. 289. . . . . ***M. mexicana* sp. nov.**
- Discs of upper and lower calypters light tan to brown with dark rim and brown fringe; anterior spiracle brown [*M. spicata*] or yellow [*M. guaramacalensis*]. Male with long projections medially on ST5 [*M. spicata*], [condition unknown in *M. guaramacalensis*]; female terminalia distinctive, Figs. 288, 290 . . . . . **2**
2. Anterior thoracic spiracle brown; T4 without marginal row of stout setae in both sexes; male with the rear margin of ST5 with pair of long projections midway (Figs. 12, 246); female T6 of RV shape . . . . . ***M. spicata***
- Anterior thoracic spiracle yellow; T4 with marginal row of stout setae; [condition of ST 5 in male unknown]; female terminalia distinctive; T6 of WU shape (Fig. 288). . . . . ***M. guaramacalensis* sp. nov.**

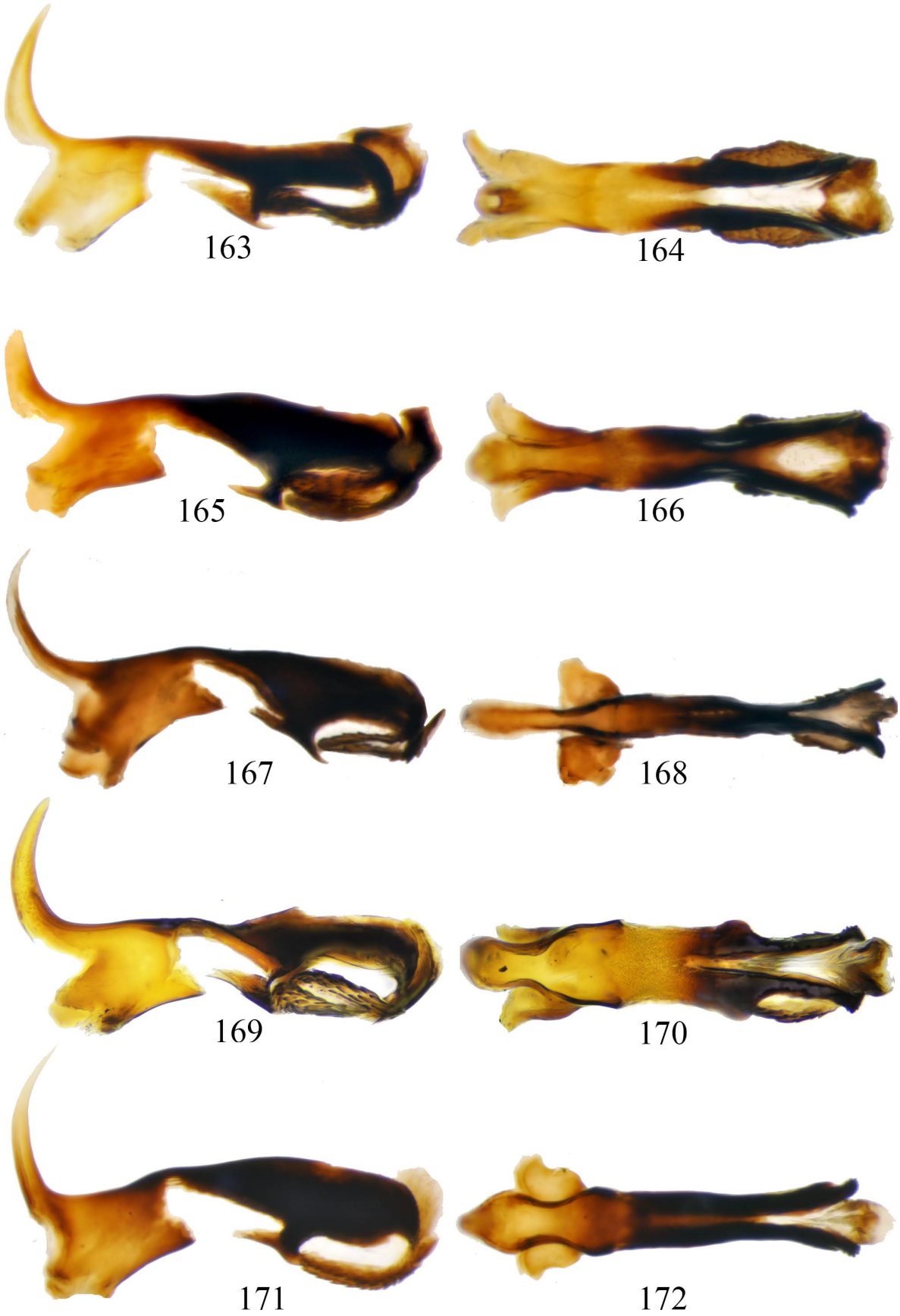
FIGURES 145–152. Left lateral and dorsal views of phallus of *Mesembrinella* spp. **145–146.** *M. zurquiensis* **sp. nov. 147–148.** *M. batesi* Aldrich. **149–150.** *M. bellardiana* Aldrich. **151–152.** *M. benoisti* (Séguy).

***Mesembrinella guaramacalensis* Whitworth, sp. nov.**
(Figs 288, 332, 375, 417, 487–488)

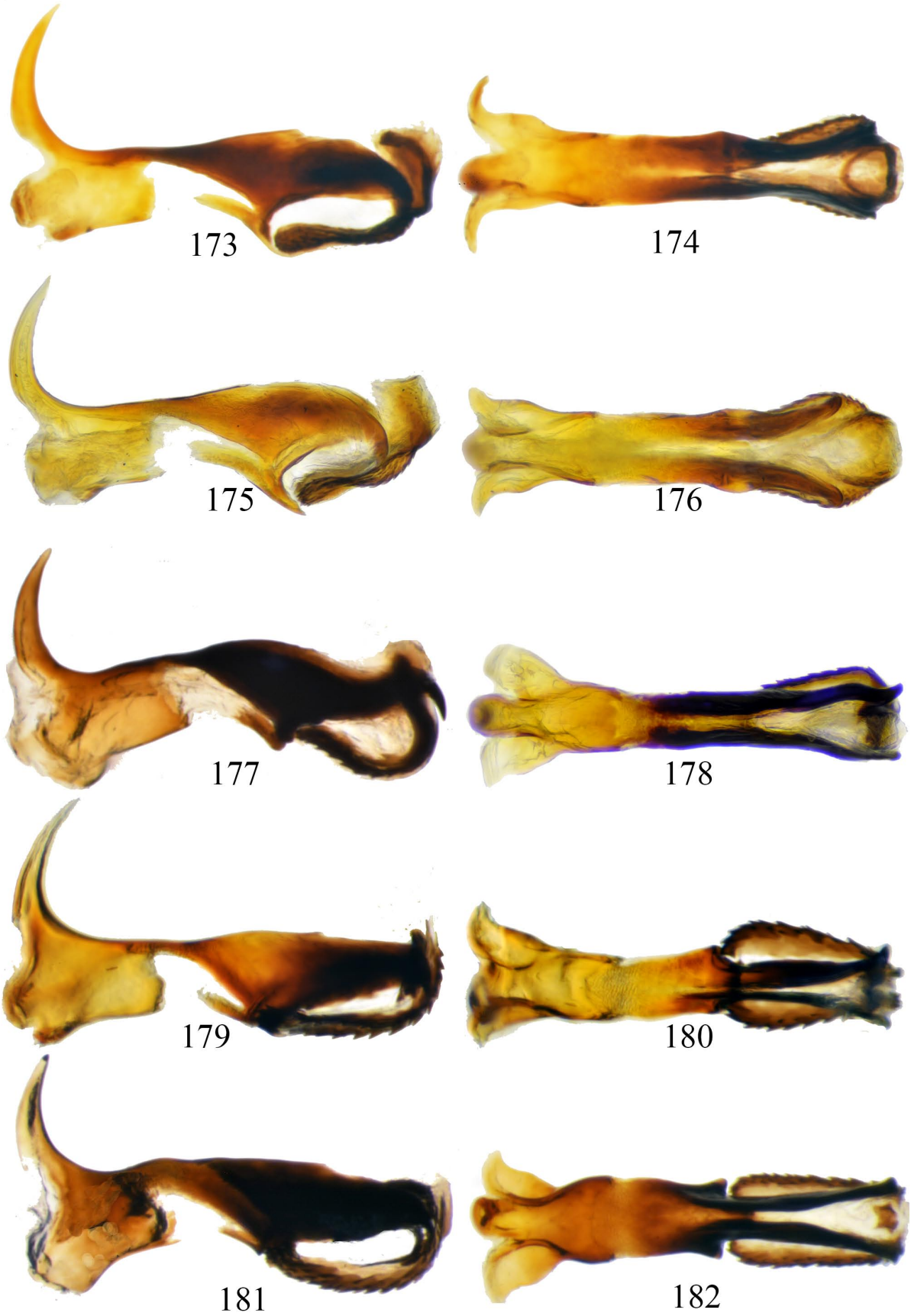
Diagnosis. A medium-sized fly averaging 10 mm (9–11/2) in length. Discs of upper and lower calypters light tan to brown, with brown fringe; anterior spiracle yellow vs. brown in *M. spicata*; T4 with marginal row of setae vs. without marginal row of setae in *M. spicata*; male unknown, female terminalia as in Fig. 288.



FIGURES 153–162. Left lateral and dorsal views of phallus of *Mesembrinella* spp. **153–154.** *M. bicolor* (Fabricius). **155–156.** *M. brunnipes* Surcouf. **157–158.** *M. bullata* **sp. nov. 159–160.** *M. chantryi* **sp. nov. 161–162.** *M. currani* Guimarães.



FIGURES 163–172. Left lateral and dorsal views of phallus of *Mesembrinella* spp. **163–164.** *M. cyaneicincta* (Surcouf). **165–166.** *M. flavicrura* Aldrich. **167–168.** *M. longicercus* **sp. nov. 169–170.** *M. peregrina* Aldrich. **171–172.** *M. pictipennis* Aldrich.



FIGURES 173–182. Left lateral and dorsal views of phallus of *Mesembrinella* spp. **173–174.** *M. quadrilineata* (Fabricius). **175–176.** *M. randa* (Walker). **177–178.** *M. semihyalina* Mello. **179–180.** *M. serrata* **sp. nov. 181–182.** *M. socors* (Walker).

Description. *Female*. Frons 0.245 0.24–0.25/2 of head width at narrowest. Fronto-orbital yellow with pale yellow tomentum; frontal vitta dark orange below, brown above; parafacial mostly orange with yellow tomentum, posterior 1/4 dark with pale tomentum; gena with short horizontal row of 4 stout setae midway and scattering of fine dark setae overall; postgena dark silvery with fine yellow setae; occiput dark, like postgena, with silvery tomentum and fine yellow setae, median occipital sclerite shiny dark brown; antenna bright orange, arista orange at base, remainder tan; palpus typical; eye with median facets 2x size of lateral facets; ocellar triangle medium-sized, ocelli of equal size; facial ridge with only two dark supravibrissal setae and some small brown setae clustered at base.

Thorax without stripes on dorsum, bluish with heavy, irregular pale tomentum; pleura blue with pale tomentum; chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 1, ppn 3x3, kat 1:1, meral setae typical, 1 pair converging ap, sa absent, 1 lat, 1 stout bas, 1 pb, 1 disc; subscutellum moderately developed; anterior spiracle medium-sized, yellow, posterior spiracle medium-sized, brown; legs entirely brown. Wing hyaline; subcostal sclerite bare; basicosta tan, tegula brown; section IV 0.16 of section III; discs of upper and lower calypters brown; rim of upper calypter with short dark brown setae, rim of lower calypter with long dark brown setae.

Abdomen entirely purple with whitish tomentum; T4–5 with marginal rows of stout setae; T5 without discal setae, with only short fine setae. *Terminalia*. T6 of WU shape, T7 short and broad, recessed along rear edge midway, T8 as separate sclerites (Fig. 288); ST6–8 and hypoproct as in Fig. 332; spermathecae filiform (Fig. 375); ST1–5 as in Fig. 417.

Male. Unknown.

Type material. HOLOTYPE ♀♦* (TLW294) (Venezuela, **Trujillo**; MJMO; Fig. 487), labeled: VENEZUELA Trujillo / P.N. Guaramacal 1480 m / 11–16 /VI/2002 / 9°19′021 N– 70°15′480 W; T. Amarilla / R. Briceño; J. Clavijo; R. Paz, F. Díaz; L. Joly; A. / Chacón / Proyecto S1-2000000479; HOLOTYPE / Mesembrinella / guaramacalensis / T.L. Whitworth.

ALLOTYPE ♀♦ (TLW293): same data as holotype except 14–20.ii.2002 (MJMO).

Distribution. Venezuela.

Remarks. Known only from two females from Venezuela. The two female specimens (TLW293–294) were barcoded and the sequence data place them in the *spicata* group, in a distinct cluster near *M. mexicana* **sp. nov.** (Fig. 488). Barcodes show that this species has a 4% genetic distance from *M. mexicana* and an 8% genetic distance from *M. spicata*.

Etymology. The name *guaramacalensis* refers to the type locality of the new species, Guaramacal National Park in Venezuela.

Mesembrinella mexicana Whitworth, sp. nov.

(Figs 27–28, 117–118, 201, 245, 289, 333, 376, 418, 458, 488)

Diagnosis. A small bluish fly averaging 9.2mm (8–10/5) in length. Calypters white, including discs, rims and setal fringe vs. discs light tan, rims and setal fringe dark in *M. spicata*; anterior spiracle yellowish vs. anterior spiracle brown in *M. spicata*; male with short projections from rear of ST5 (Fig. 245) vs. male with long projections in *M. spicata* (Figs. 12, 246); epandrium, cerci and surstyli distinctive (Figs 27–28) vs. epandrium, cerci and surstyli in *M. spicata* as in Figs 29, 30; females sometimes with disc of T5 with three or four stout setae (suggesting the *aeneiventris* species-group); female, T4 with at least a partial row of marginal setae dorsally.

Description. *Male*. Frons broad, 0.126 (0.120–0.130/5) of head width at narrowest; about twice the width of parafacial at level of lunule. Fronto-orbital from faint grayish to faint yellowish, frontal setae ascending about 25% of distance to vertex; frontal vitta with lower 1/3 yellow and upper 2/3 black; parafacial and gena bright yellow-gold, setae on gena typical; postgena with silvery tomentum and fine yellow-gold setae; occiput with silvery tomentum and fine yellow setae, median occipital sclerite with pale tomentum; pedicel and first flagellomere bright yellow, arista with brown base and black tip; palpus typical; eye with median facets not larger than lateral facets; ocellar triangle large, ocelli small and similar in size; supravibrissal setae short and in double row ascending about 1/4 of distance to antennal base.

Thorax. Dorsum with faint, pale tomentum and tomentose stripes; chaetotaxy: ac 2:1, dc 2:3, ph 1, ia 0, ppn 3x3, kat 1:1, meral setae with horizonal portion of inverted L consisting of only one seta, 1 pair converging ap, 1 lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum prominently developed; anterior spiracle yellow, posterior spiracle light brown; legs entirely brown except joint between femora and tibiae yellowish. Wing hyaline; subcostal sclerite

with pubescence only; basicosta orange, tegula brown; section IV 0.165 of section III; calypters pale; rim of upper calypter sometimes faintly darkened.

Abdomen entirely blue with pale tomentum; T1+2–4 with a pair of lateral seta on each segment; no row of stout setae on the posterior margin of T4 or T5 or on disc of T5, disc with only fine setae. *Terminalia* in lateral view with a tiny surstylus and cercus at the posterior end of a large epandrium (Fig. 27), in posterior view as in Fig. 28; phallus in lateral view with short stout epiphallus and large basiphallus extending ventrally (Fig. 117); in dorsal view anterior half very broad (Fig 118); pre- and postgonite, ejaculatory sclerites, and hypandrium as in Fig. 201; ST2–5 very broad (Fig. 245), progressively wider to the rear like in *M. spicata*, ST5 exceptionally large with pair of pointed posterior projections, about half the length of those in *M. spicata.*

Female [only two known]. Similar to male except frons 0.255 (0.25–0.26/2) of head width at narrowest, rows of stout setae on posterior margin of T4 and T5, and several (3 or 4) stout discal setae in horizontal row on T5, which would suggest placement in the *aeneiventris* species-group. T6 of RV shape; T7 with two well separated sclerites (Fig. 289); ST6–8 and hypoproct as in Fig. 333; spermathecae filiform, as in Fig. 376; ST1–5 as in Fig. 418.

Type material. HOLOTYPE ♂ (Mexico, **Oaxaca**; CNC; Fig. 458), labeled: MEXICO Oax [= Oaxaca] 1 km N / Portillo del Rayon / ca Km 188 1400m / 25.VII.92 D.M.Wood; HOLOTYPE / Mesembrinella / mexicana / T.L. Whitworth.

ALLOTYPE ♀♦ (TLW407): Mexico, **Oaxaca.** 1 km N Portillo del Rayon, ca km 188, 1400 m, 25.vii.1992, D.M. Wood (CNC).

PARATYPES: Mexico, **Oaxaca.** 1 ♂♦* (TLW395), 2 ♂♂♦ (TLW346, 397), 8 ♂♂, 1 ♀♦* (TLW406), 1 km N Portillo del Rayon, ca km 188, 1400 m, 25.vii.1992, D.M. Wood (CNC).

Distribution. Mexico.

Remarks. Six specimens (TLW377, TLW395–397, TLW406–407) were barcoded, and all sequences clustered together near *M. guaramacalensis* **sp. nov.** (Fig. 488). All type specimens were collected in the same location on the same day.

Etymology. The species is named after its country of origin, Mexico.

Mesembrinella spicata Aldrich, 1925

(Figs 12, 29–30, 104, 119–120, 202, 246, 290, 334, 377, 419, 459, 488)

Mesembrinella spicata Aldrich, 1925: 13. Holotype male (USNM), examined photographically. Type locality: La Suiza de Turrialba, Costa Rica.
Henriquella spicata: Bonatto & Marinoni (2005: 888); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 109).
Mesembrinella spicata: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized shiny blue fly, averaging 9.6 mm (8–11/5) in length. Similar to *M. mexicana* **sp. nov.** (see under that species for comparison). Face and antenna bright yellow-orange; T5 without discal setae in both sexes; T4 without marginal setae in both sexes; T5 without marginal setae in male, with marginal setae in females. Male with long, slender posterior projections on ST5 (Fig. 246); cercus and surstylus small and slender (Figs 29–30).

Redescription. *Male*. Head. Frons broad, 0.128 (0.11–0.14/5) of head width at narrowest; slightly narrower than width of first flagellomere; fronto-orbital, parafacial and gena bright yellow-gold; frontal vitta with upper 2/3 black, lower 1/3 orange; gena with typical horizontal row of stout setae, rest of the gena with small fine dark setae; postgena orange with long pale setae and small strip of dark setae along anterior edge; occiput dark, covered with silvery tomentum and fine pale setae; median occipital sclerite shiny black; antenna bright orange, pedicel with short brown setae; palpus typical; eye facets uniform in size; frontal setae ascending about 80% of distance to vertex; anterior ocellus about twice the size of posterior ocelli; supravibrissal setae ascending along frontal ridge to about 1/4 of distance to antennal base.

Thorax. Dorsal and pleural areas purple-blue with whitish tomentum, dorsum without tomentose stripes. Chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 1, ppn 3x3, kat 1:1, meral setae typical, 1 pair stout converging ap, sa absent, 1 lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles of moderate size, brown; legs: femora shiny blue, tibiae and tarsi brown, tarsal claws black. Wing hyaline with crossvein r-m slightly darkened and some veins with faint yellowing; subcostal sclerite with brown pubescence; tegula black, basicosta light tan; section IV 0.20 of section III; discs of upper and lower calypters light tan; rim of upper calypter with short dark setae, rim of lower calypter with long brown setae.

Abdomen blue with whitish tomentum, all segments lacking marginal; no discal setae on T5. *Terminalia* in lateral and posterior views with surstylus and cercus unusually small and slender, epandrium very large and divided midway (Figs 29–30); phallus in lateral and dorsal views with short, stout epiphallus curving slightly backward (Figs 119–120); T6, STS7+8, pre- and postgonite, ST6 and hypandrium as in Fig. 202; ST2–5 very broad, progressively wider to the rear; ST5 exceptionally large with pair of pointed posterior projections midway (Fig. 246).

Female. Similar to male except frons 0.226 (0.21–0.24/5) of head width at narrowest, T5 with marginal setae, disc of T5 sometimes with one or more discal setae and with medium-length fine setae. T6 of RV shape with suture midway; T7 reduced to pair of round sclerites; T8 continuous, narrowed and with median suture (Fig. 290); ST6–8 and hypoproct as in Fig. 334; spermathecae filiform (Fig. 377); ST1–5 as in Fig. 419.

Type material examined. HOLOTYPE ♂ (Costa Rica, **Cartago**; USNM; examined photographically: Fig. 459), labeled: La Suiza / Costa Rica; Pablo Schild / Coll 11-2-23 / ♂; Type / 26797 / No. / U.S.N.M. [orange label]; Mesembrinella / spicata / Ald.; USNMENT / 01295433.

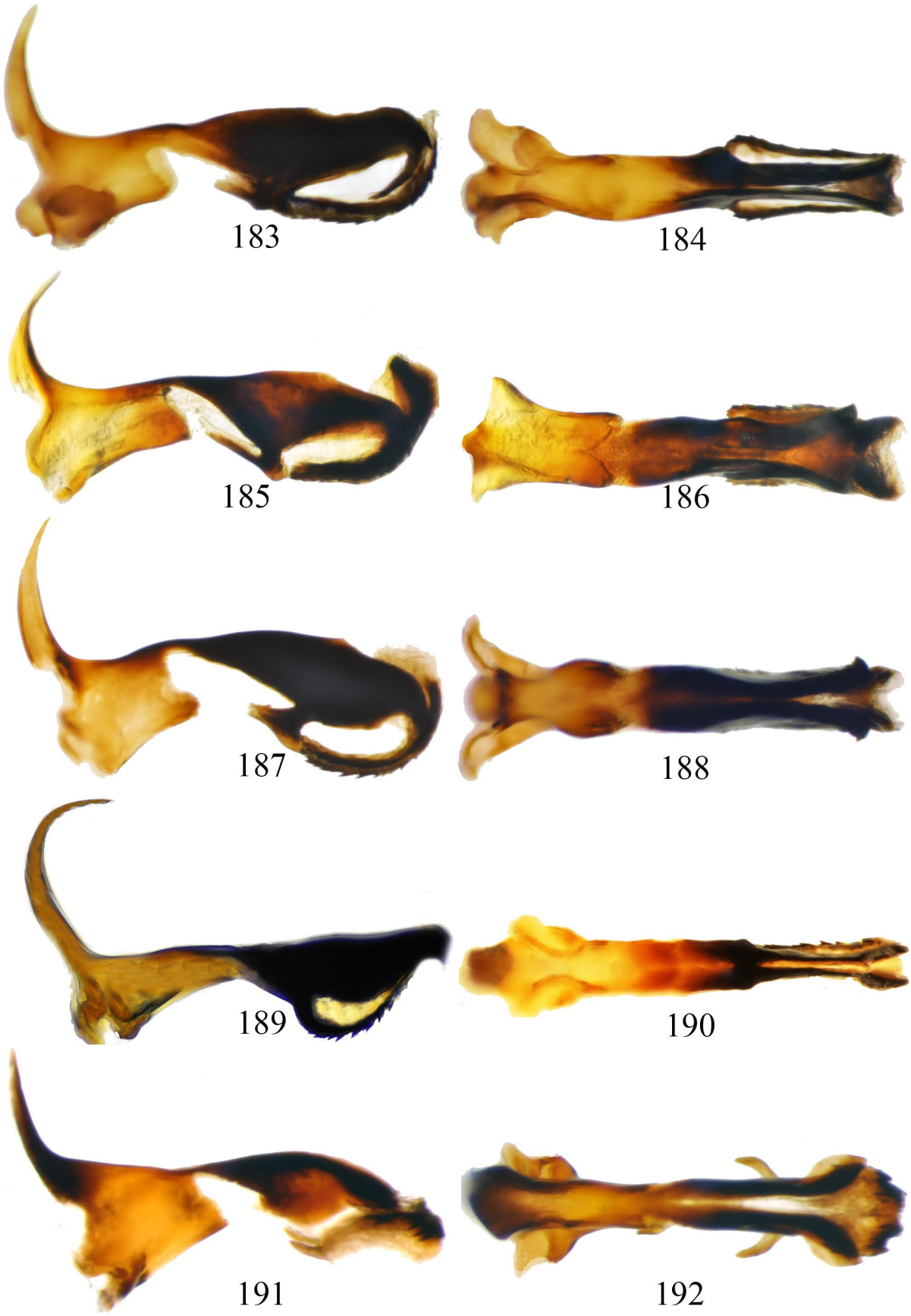
Additional material examined. Costa Rica, **Cartago.** 1 ♂♦* (TLW290), Turrialba, M.N. Guayabo, Send. Monticulos, 1100–1200 m, 8–12.v.2007, L_N_217200 570300 #91254, Moraga, Azofeifa, Gonzalez, Navarro (INBIO); 1 ♀, nr. Tuis 3000 ft, 16–22.vii.1993, W.J. Hanson (CNC). Heredia: 2 ♀♀♦ (TLW345–TLW346), 16 km SSE La Virgen, 10°16′N 84°05′W, 1150 m, 9–14.iii.2001, flight intercept trap, primary forest, E.G. Riley (TAMU). **Puntarenas.** 1 ♂*, 1 ♂, Coto Bus, Z.P. Las Tablas, Est. Biol. Coton, S El. Tajo, 1700 m, 26.viii.1999, L_S_324150 590000 #56966, M. Alfaro (INBIO); 1 ♂, Coto Brus, Z.P. Las Tablas, E.B. Las Alturas, S Acueducto, Orilla R. Cotito, 1400 m, 12.i.2001, L_S_593300 321900 #61816, M. Alfaro, Manual (INBIO); 1 ♂, 1 ♀♦ (TLW352), same data except 1500–1600 m, 13–14.x.2012, Malaise trap, ZADBI (INBIO); 1 ♂*, 1♂, 1 ♀*, ♀, Coton, Las Alturas, 1400 m, 5.ix.1991, P. DeVries & M. Wood (CNC); 3 ♀♀, same data except 1500 m, 28.ix.1994, D.M. Wood (LACM); 1 ♂♦ (TLW291), Coto Brus, Z.P. Las Tablas, E.B. Las Alturas, 1500–1600 m, 13–14.x.2012, Malaise trap, Proyecto ZADBI (INBIO); 2 ♂♂♦ (TLW292, TLW374), Coto Brus, Z.P. Las Tablas, E.B. Las Alturas, Acueducto, Orilla, R. Cotito, 1400 m, 12.iv.2001, M. Alfaro Manual (INBIO); 1 ♀, Estación Altmira, 1 km S del Cerro Biolley, Sendero a la Fila, 1300–1450 m, 20–23.xi.1995, L_S331700_572100 #7056, M. Moraga (INBIO); 1 ♀, Est. Biol. Las Alturas, 1500 m, Coto Brus, 23.iii–2.v.1992, L_S_322500 591300, F. Arays (INBIO); 1 ♀, 1 km S.O. del Cerro Bioley, Sector Altamira, Buenos Aires, 1150–1350 m, x.1994, L S 331500_571700 #3300, Z. Fuentes (INBIO); 1 ♀♦ (TLW353), 1♀, Las Alturas Biol. Stat., 20 air km NE of San Vito, quarry, 1 km N of Rio Bella Vista, 14.viii.1995, C.R. Nelson (BYU); 1 ♀♦ (TLW373), San Vito de Coto Brus, Est. Biol Las Alturas, 1500 m, v.1992, P. Hanson (CNC). Mexico, **Chiapas.** 1 ♂, Chis [Chiapas] 6.0 km SW Ocosingo, 1400 m, 22.ix.1992, D.M. Wood (CNC); 3 ♀♀, Chis 6 km S.W. Ocosingo, 1400 m, 20.ix.1991, D.M. Wood (CNC). Nicaragua, **Jinotega.** 1 ♀*, Selva Negro, ca. 12 km N Matagalpa, Jinotega, 15.viii.1995 (FSCA).

Distribution. Costa Rica, Mexico, Nicaragua.

Remarks. Eleven specimens (TLW290–292, TLW345–346, TLW352–353, TLW373–374, TLW376 and TLW459) were barcoded; they grouped together close to *M. mexicana* **sp. nov.** and *M. guaramacalensis* **sp. nov.** (Fig. 488). A female later identified morphologically as *M. spicata* had a complete row of discal setae on T5, which initially caused it to key to the *aeneiventris* species-group where it did not fit any of the known species. The terminalia were dissected and it was a perfect match with other *M. spicata.*

Mesembrinella bolivar species-group

Recognition. The *bolivar* species-group contains two species, *M. bolivar* and *M. carvalhoi*, originally described in the genus *Giovanella* then moved to *Huascaromusca* (Marinho *et al.* 2017), the two new species *M. epandrioaurantia* **sp. nov.** and *M. woodorum* **sp. nov.** These four species share anterior spiracle with a long, narrow opening gradually widening above (Fig. 6), rather than a broad oval opening above; discal scutellar setae absent; and 2x2 postpronotal setae. The epandrium, cerci and surstyli of *M. bolivar* (Figs 37–38) and *M. carvalhoi* (Wolff *et al*. 2017: figs 10–11) are very similar, but they are very different from those of *M. epandrioaurantia* **sp. nov.** and *M. woodorum* **sp. nov.** (Figs 31–34). As more species are described this group may be split, but for now they are placed together based on the shared morphological characters listed above. Barcodes were obtained only for *M. epandrioaurantia* **sp. nov.**, which formed a distinct group (see discussion under that species).



FIGURES 183–192. Left lateral and dorsal views of phallus of *Mesembrinella*. **183–184.** *M. townsendi* Guimarães. **185–186.** *M. umbrosa* Aldrich. **187–188.** *M. velasquezae* **sp. nov. 189–190.** *M. anomala* (Guimarães). **191–192.** *Souzalopesiella facialis* (Aldrich).

FIGURES 193–194. Chaetotaxy of *Mesembrinella* spp. **193.** Detail of head of *M. bellardiana* Aldrich, showing supravibrissal setae. **194.** Posterolateral view of scutellum of *M. bicolor* (Fabricius), showing scutellar setae. Abbreviations: ap, apical; bas, basal; disc, discal; lat, lateral; pb, prebasal.

Key to species of the *M. bolivar* species-group

1 Male with cercus and surstylus in lateral view not widely separated in lateral view (Bonatto & Marinoni, fig. 11); base of cercus not enlarged, without dense comb of setae (as in Fig. 37); ST5 of typical shape (Bonatto & Marinoni 2005: fig. 13) **2**

- Male with cercus and surstylus widely separated in lateral view (Figs. 31, 33); base of cercus enlarged, with dense comb of setae posteriorly (Figs 31–34); ST5 of unusual shape (Figs 247–248) **3**

2 Legs mostly brown, except femora orange with apical 1/4 reddish-brown; spiracles orange; wing infuscated along anterior edge of costa up to R_{2+3}; surstylus and cercus broader (Bonatto & Marinoni 2005: figs 13–14) . . . . . ***M. bolivar***

- Legs, including femora dark brown; anterior spiracle yellow-orange, posterior spiracle dark brown; wing hyaline; cells near base of wing darkened, veins with faint darkening; epandrium with surstylus and cercus narrower (Wolff *et al*. 2017: figs 10–11) . . . . . ***M. carvalhoi***

3 Tip of T5 orange in both sexes, larger in male. Male: epandrium orange (Fig. 492); terminalia as in Figs 31–32; female terminalia as in Fig. 291 . . . . . ***M. epandrioaurantia* sp. nov.**

- Tip of T5 and epandrium shining blue, concolorous with rest of abdomen (Fig. 461); epandrium, cerci and surstyli as in Figs 33–34; [female unknown] . . . . . ***M. woodorum* sp. nov.**

Mesembrinella bolivar (Bonatto, 2005)

(Figs 6, 37–38, 127–128, 206, 462)

Giovanella bolivar Bonatto *in* Bonatto & Marinoni, 2005: 886. Holotype male (USNM), examined. Type locality: Kavanayen, Bolivar, Venezuela.

Giovanella bolivar: Kosmann *et al.* (2013: 77); Wolff *et al*. (2013b: 132); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 108).

Mesembrinella bolivar: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized blue-brown fly, the single specimen available measured 11 mm in length. Legs mostly brown, except femora orange with apical 1/4 reddish-brown vs. legs entirely brown *in M. carvalhoi*; spiracles orange vs. anterior spiracle yellow-orange and posterior spiracle dark brown in *M. carvalhoi*; wing infuscated along anterior edge of costa up to R_{2+3}. Male terminalia with cercus and surstylus not widely separated in lateral view; base of cercus not enlarged, without dense comb of setae (Fig. 37).

Redescription. *Male* [holotype]. Head. Frons narrow, 0.02/1 of head width at narrowest, narrower than width of anterior ocellus; fronto-orbital slender with silvery tomentum ventrally and orange tomentum dorsally; dorsal 2/3 of parafacial silvery, ventral third orange; gena orange with faint whitish tomentum, covered with fine tan setae and typical horizontal row of stout setae extending from postgena through to lower parafacial; postgena with silvery tomentum and few dark setae anteriorly, posteriorly with long orange setae; occiput with fine yellow setae, dorsal third dull black, remainder with whitish tomentum; antenna: pedicel pale orange with short brown setae, first flag-

ellomere brown with yellowish tomentum, arista with proximal 1/3 orange and distal 2/3 black; eye with median facets about 3x size of lateral facets; frontal setae ascending about 30% of distance to vertex; ocellar triangle small, anterior ocellus slightly larger than posterior ocelli; supravibrissal setae on facial ridge very sparse, forming a small cluster of 3 or 4 setae at base.

Thorax. Dorsum brown with pale tomentum appearing pale bluish on prescutum; scutellum brown without tomentum or stripes; pleura bluish-orange with pale tomentum; chaetotaxy: ac 0:0, dc 2:3; ia 0, ph 0, ppn 2x2, kat 1:1, meron with long, slender tan setae; 1 pair converging ap, 1 lat, 1 bas, 0 disc, no other setae; [subscutellum not visible on specimen]; spiracles yellow-orange, anterior spiracle with a long, narrow opening gradually widening above (Fig. 6), instead of the typical broad, oval opening seen in other species-groups (Fig. 5); legs: femora entirely orange except brown distally, tibiae and tarsi brown. Wing with distinct dark infuscation along anterior edge from costa to vein R_{2+3}; vein M, crossvein dm-cu and vein CuA dark shaded; rest of wing somewhat darkened; section IV 0.11 of section III; subcostal sclerite pale orange with pubescence; basicosta and tegula brown; discs of upper and lower calypters light tan; rims dark brown with long brown setae.

Abdomen. T1–3 yellow-orange, T4–5 brown with whitish tomentum. T1+2 with cluster of stout lateral marginal setae; T3–T5 each with pair of lateral marginal setae; T4 and T5 with row of stout setae on posterior margins; disc of T5 without mid-dorsal horizontal row of stout setae, with fine setae only. *Terminalia* [the holotype's terminalia were already dissected and in marginal condition, as shown in Figs 37–38]. In lateral view with surstylus curved slightly backward, epandrium of moderate size (Fig. 37); in posterior view base of cercus broad, tapered steadily to rounded tips (Fig. 38); phallus in lateral view with epiphallus of moderate size and gradually curved backward (Fig. 127); in dorsal view, hypophallic lobes narrow (Fig. 128); T6, STS7+8, pre- and postgonite and ejaculatory sclerites as in Fig. 206.

Female. [No female specimens were examined by us. Bonatto & Marinoni (2005) examined two females and described some characters, but they did not illustrate them. They stated that the spermathecae are filiform and the sternites oval.]

Type material examined. HOLOTYPE ♂* (Venezuela, **Bolivar**; USNM; Fig. 462), labeled: VENEZUELA: Bolivar / Kavanayen 1000m. / Aug. 8, 1970 / R. E. Dietz IV, leg.; HOLOTYPE / Giovanella bolivar / S.R. Bonatto det. [red label]; USNMENT01288292.

Remarks. Specimen in good condition, rear part of T4 and all of T5 removed and dissected by Bonatto; T5 and terminalia in small plastic vial under specimen on pin; portion of T4 missing.

Distribution. Venezuela.

Remarks. Only the holotype male was examined. Bonatto & Marinoni (2005) provided a brief description of the female but did not illustrate any characters. The sketch of the anterior thoracic spiracle of *M. bolivar* provided by Bonatto & Marinoni (2005) is misleading: it is shown as a narrow, uniform slit, but examination of the holotype showed that it is actually in the shape of a narrow V (Fig. 6). This unusual shape is also found in *M. epandrioaurantia* **sp. nov.** and *M. woodorum* **sp. nov.** However, the epandrium, cerci and surstyli are very different in these two species (Figs 31–34) compared to *M. bolivar* (Figs 37–38). No specimens were barcoded.

Mesembrinella carvalhoi (Wolff, Ramos-Pastrana & Pujol-Luz, 2013)

Giovanella carvalhoi Wolff *et al.*, 2013b: 130. Holotype male (CEUA), not examined. Type locality: Florencia, Caquetá, Colombia.
Giovanella carvalhoi: Wolff & Kosmann (2016: 866); Marinho *et al.* (2017: tab. 1).
Huascaromusca carvalhoi: Wolff *et al.* (2017: 253), new combination.
Mesembrinella carvalhoi: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized dark blue fly with pale tomentum, T1+2 and anterior portion of T3 yellowish. Anterior spiracle yellow-orange, posterior spiracle dark brown; legs including femora entirely dark brown; epandrium, cerci and surstyli as in Wolff *et al.* (2013b: figs 10–11).

Redescription. [Summarized from Wolff *et al.* (2013b: figs 1–11); this species is similar to *M. bolivar*, see comparison under that species.] Thorax with black [blue-black according to figs 1–3 in Wolff *et al.* (2013b)] mesonotum and white tomentum with well-defined stripes. Chaetotaxy: ac 0:0, dc 1:2, ia 0:1, ph 1, ppn 2x2, disc absent; anterior spiracle yellow-orange, posterior spiracle dark brown; T5 without discal setae; T4 with marginal

setae. Wing mostly hyaline, veins faintly infuscated. Epandrium, cerci and surstyli in left lateral view with surstylus curved backward, cercus with apical hook (Wolff *et al.* 2013b: fig. 10); in posterior view, cerci broad at base and tapering to a point, with sinuous curve midway (Wolff *et al.* 2013b: fig. 11). Phallus in lateral with moderate sized epiphallus curving backward (Wolff *et al.* 2013b: figs 8–9).

Material examined. None (no specimens could be obtained for examination).

Distribution. Colombia.

Remarks. Morphologically, this species appears to be closely related to *M. bolivar* (see Diagnosis of that species). No specimens were barcoded.

Mesembrinella epandrioaurantia Whitworth, sp. nov.

(Figs 31–32, 121–122, 203, 247, 291, 335, 420, 460, 488, 492)

Diagnosis. A small blue-black fly averaging 9.2 mm (8–11/5) in length. Abdomen with distinctive orange area on tip of T5 in both sexes (Fig. 492) vs. tip of T5 and epandrium shiny blue in *M. woodorum* **sp. nov.** Male with ST5 of distinctive shape (Fig. 247); epandrium, cerci and surstyli of distinctive shape (Figs 31–32).

Description. *Male*. Head. Frons 0.045 (0.04–0.05/5) of head width at narrowest, about equal to width of fronto-orbital; fronto-orbital narrow and silvery; frontal vitta brown, significantly narrowed midway; frontal setae ascending about 60% of distance to vertex; parafacial bluish with silvery tomentum; gena and postgena bluish with silvery tomentum, most of gena with black setae, lower edge with pale setae; postgena entirely with pale setae; occiput with silvery tomentum and pale silky setae; median occipital sclerite shiny orange; palpus typical; antenna: pedicel and first flagellomere brown with whitish tomentum, setae on pedicel dark brown; eye facets small, median facets slightly larger than lateral facets; ocellar triangle medium-sized, anterior ocellus slightly larger than posterior ocelli; frontal ridge with only 2–3 stout supravibrissal setae at base.

Thorax. Dorsum and pleura bluish with pale tomentum forming faint stripes; chaetotaxy: ac 0:0, dc 1:2, ia 0, ph 1, ppn 2x2, kat 1:1, meral setae typical, 1 crossed ap, 1 stout bas, 0 disc, usually no other setae on scutellum; subscutellum weakly developed; spiracles medium-sized and brown; anterior spiracular opening long and narrow, gradually widening above (Fig. 6); legs entirely brown except femora orange distally; tarsal claws brown with black tips, pads white. Wing hyaline with narrow yellowish area in costal cell near costa; basal cells and veins darkened; subcostal sclerite with pubescence only; basicosta and tegula brown; section IV 0.16 of section III; upper and lower calypters with rim and disc tan, small area of upper calypter whitish; rim of upper calypter with short reddish-brown setae, rim of lower calypter with long reddish-brown setae.

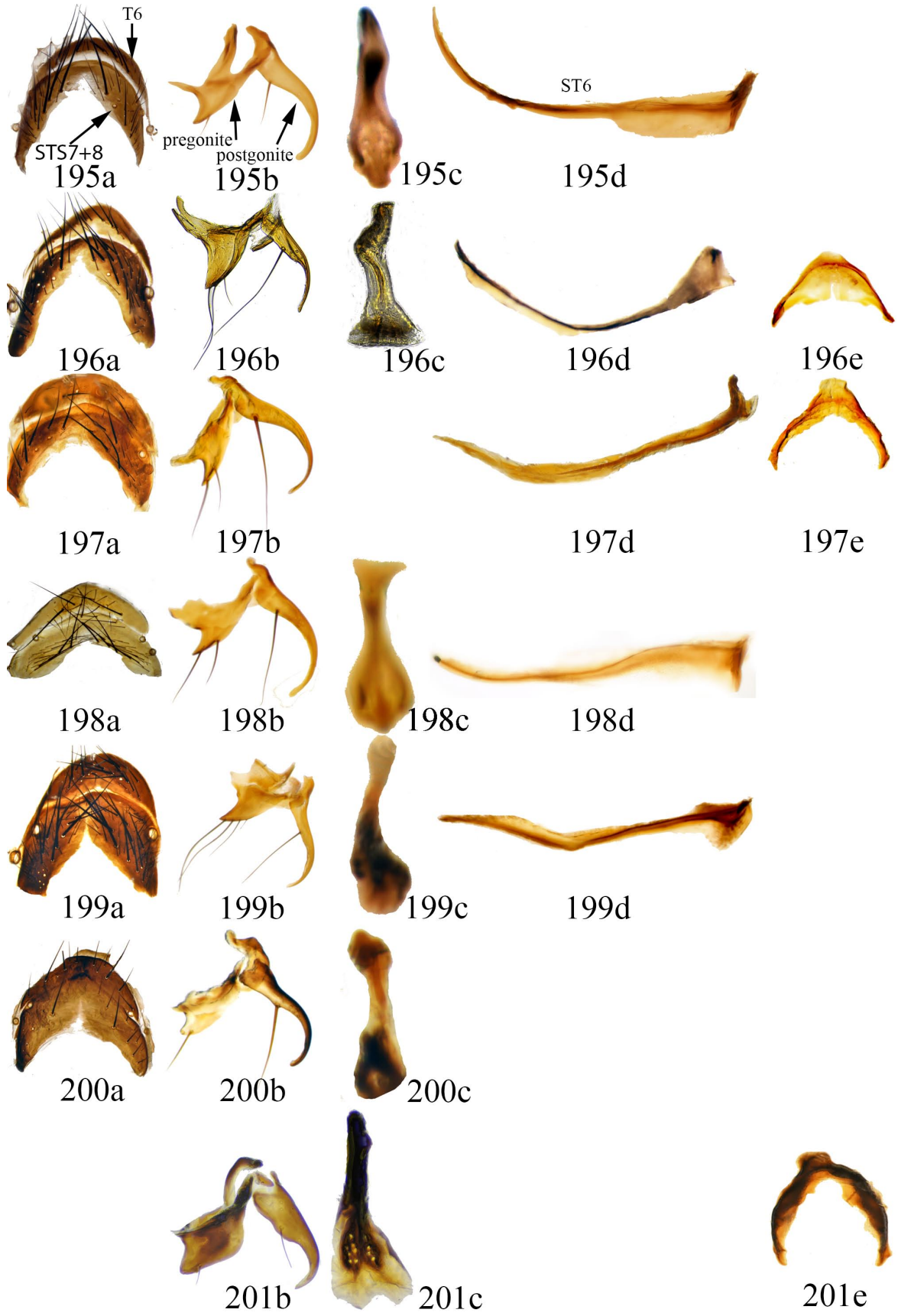
Abdomen bluish with white tomentum except tip of T5; disc of T5 with only weak, fine setae. *Terminalia* bright orange (Fig. 492); in posterior view, epandrium with broad suture midway (Fig. 32); epandrium, cerci and surstyli very unusual in shape; in lateral view surstylus long and slender, extending forward under epandrium and curving down and slightly backward; cercus short, slender and straight, widely separated from surstylus (Figs 31–32); phallus in lateral view with long, slender epiphallus gently curved backward (Fig. 121); in dorsal view with narrow hypophallic lobes (Fig. 122); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 203; sternites unusual: ST3–4 small, ST 5 of unusual shape (Fig. 247).

Female. Similar to male except frons 0.186 (0.18–0.20/3) of head width at narrowest. T6 of OU shape, recessed posteriorly midway; T7 unusually wide, weakened midway; T8 as separate sclerites (Fig. 291); ST6–8 and hypoproct as in Fig. 335; ST1–5 with ST2 large about 3x sclerite ST3 (Fig. 420).

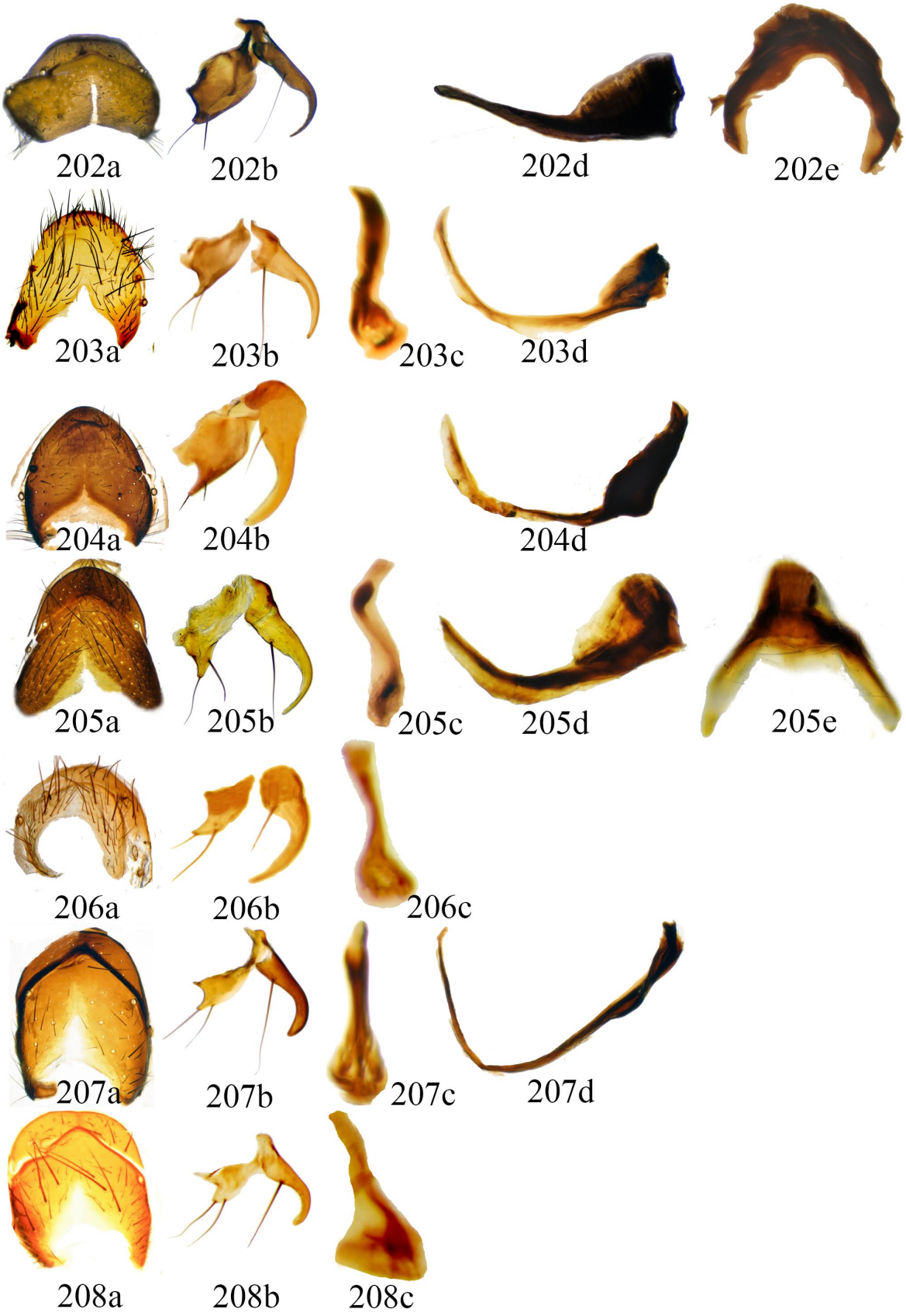
Type material. HOLOTYPE ♂* (Venezuela, **Yaracuy**; MJMO; Fig. 460), labeled: Venezuela. Yaracuy / Cocorote Sector El / Candelo. 1650 m / 4–10/XI/2002 / 10°36′886″N 68°82′628″W; Cols: R. Briceño; A. / Chacón; J. Clavijo; F. / Díaz; R. Paz.; E. Arcaya; / L. Joly / Proyecto S1-2000000479; HOLOTYPE / Mesembrinella / epandrioaurantia / T.L. Whitworth.

ALLOTYPE ♀♦* (TLW309): same data as holotype except 17–20.x.2001 (MJMO).

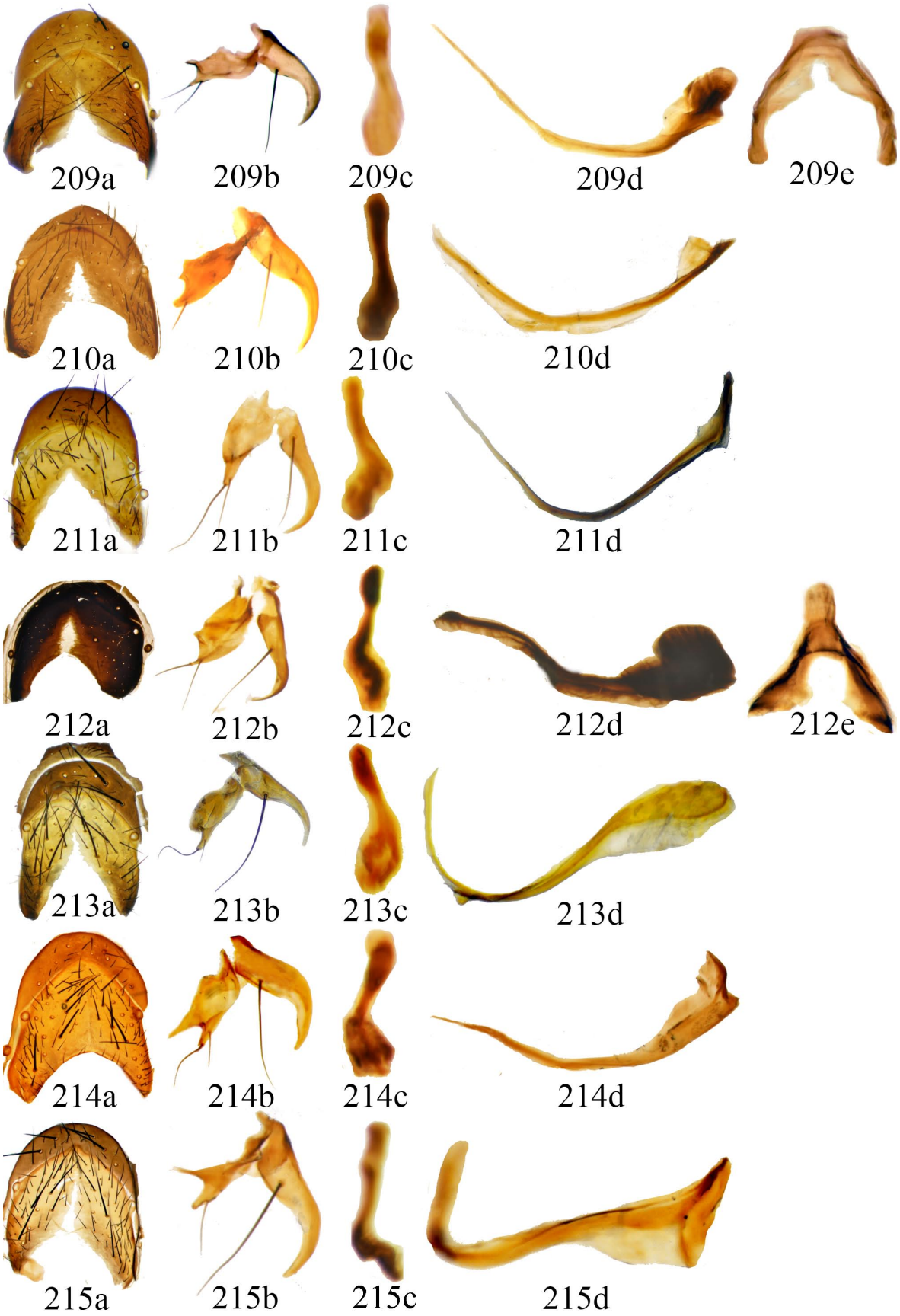
PARATYPES: Venezuela, **Yaracuy.** 1 ♂*, 2 ♂♂♦ (TLW307, 310), 1 ♀, Cocorote, Sector El Candelo, 10°36′886″N 66°82′628″W, 1600 m, 4–10.xi.2002, R. Briceño *et al.* (MJMO); 2 ♂♂, 1 ♀♦* (TLW308), same data except 17–20.x.2001 (MJMO); 1 ♂♦ (TLW306), same data except 15–21.x.2001 (MJMO); 2 ♂♂, 1 ♀*, Aragua, Colonia Tovar, 22.xii.1985, P. Kovarik (TAMU); 1 ♂, 2 ♀♀, same data except 2300 m, 10.iii.1996, sweep, steep forest trail, S.A. Marshall (UGG).



FIGURES 195–201. Male terminalia of *Mesembrinella* spp. (a = T6 and STS7+8; b = pre- and postgonite; c = ejaculatory sclerite; d = ST6; e = hypandrium). **195.** *Laneella fusconitida* **sp. nov. 196.** *L. fuscosquamata* **sp. nov. 197.** *L. nigripes* Guimarães. **198.** *L. perisi* (Mariluis). **199.** *L. purpurea* **sp. nov. 200.** *Mesembrinella latifrons* (Mello). **201.** *M. mexicana* **sp. nov.**



FIGURES 202–208. Male terminalia of *Mesembrinella* spp. (a = T6, STS7+8; b = pre- and postgonite; c = ejaculatory sclerite; d = ST6; e = hypandrium). **202.** *M. spicata* Aldrich. **203.** *M. epandrioaurantia* **sp. nov. 204.** *M. woodorum* **sp. nov. 205.** *M. aeneiventris* (Wiedemann). **206.** *M. bolivar* (Bonatto). **207.** *M. decrepita* Séguy. **208.** *M. lara* (Bonatto).



FIGURES 209–215. Male terminalia of *Mesembrinella* spp. (a = T6, STS7+8; b = pre- and postgonite; c = ejaculatory sclerite; d = ST6; e = hypandrium). **209.** *M. nigrocoerulea* **sp. nov. 210.** *M. purpurata* Aldrich. **211.** *M. semiflava* Aldrich. **212.** *M. uniseta* Aldrich. **213.** *M. violacea*. **214.** *M. vogelsangi* (Mello). **215.** *M. zurquiensis* **sp. nov.**

Distribution. Venezuela.

Remarks. Five specimens (TLW306–310) were barcoded, and they all grouped together in our analysis (Fig. 488).

Etymology. The species name *epandrioaurantia* refers to the bright orange tip of the abdomen in both sexes, especially distinctive in males, where the whole epandrium is orange. The name is a combination of the word epandrium and the Latin *aurantium* (orange).

Mesembrinella woodorum Whitworth, sp. nov.

(Figs 33–34, 123–124, 204, 248, 461)

Diagnosis. The single specimen examined measured 9 mm in length. The body is shining blue, similar in color and size to *M. epandriaurantia* **sp. nov.**, see comparison under that species; the tip of T5 and epandrium are shiny blue; ST5 (Fig. 248) and the terminalia (Figs. 33–34) are distinctive.

Description. *Male* (holotype). Head. Frons broad, 0.09 of head width at narrowest. Fronto-orbital and upper parafacial silvery gray, lower parafacial reddish; frontal vitta black, broader below, narrowed above; frontal setae ascending about halfway to vertex; gena silvery gray, with only few horizontally-arranged stout setae on anterior 1/3; postgena and occiput silvery gray with long pale setae; median occipital sclerite shiny black; antenna entirely brown, first flagellomere unusually broad, broader than parafacial at level of lunule; palpus typical; eye with median facets 4x size of lateral facets; ocellar triangle medium-sized, anterior ocellus about 1/3 larger than posterior ocelli; black cluster of supravibrissal setae ascending about 1/6 of distance to antennal base.

Thorax. Dorsum blue with pale tomentum forming irregular stripes in presutural area; in postsutural area dull blue with pale tomentum; pleura bluish with pale tomentum; chaetotaxy: ac 0:0, dc 2:2, ia 0, ph 1, ppn 2x2, kat 1:1, meral setae typical, 1 crossed ap, 1 stout bas, 0 disc, no other scutellar setae; subscutellum weakly developed; spiracles medium-sized, brown; anterior spiracle with long and narrow opening gradually widening above (Fig. 6); legs entirely brown. Wings faintly infuscated, yellowish along basal half of costa; basicosta and tegula dark brown; subcostal sclerite bare; section IV 0.13 of section III; discs of upper and lower calypters reddish brown; rim of upper calypter dark brown with short tan setae, rim of lower calypter tan with long tan setae.

Abdomen entirely bluish with pale tomentum; T4 with row of stout marginal setae; T5 with pair of lateral marginal setae; no setae midway. *Terminalia* in lateral view with short, slender surstylus, cercus sinuous with flared edges (Fig. 33), of unusual shape in posterior view (Fig. 34); phallus in lateral view with short slender epiphallus (Fig. 123); in dorsal view, hypophallic lobes narrow (Fig. 124); T6, STS7+8, pre- and postgonite and ST6 as in Fig. 204; ST1–5 as in Fig. 248, ST5 of unusual shape.

Female. Unknown.

Type material. HOLOTYPE ♂* (Ecuador, **Napo**; CNC; Fig. 461), labeled: ECUADOR, Napo / 30 km. s. Baeza / 20.II.79 2000m / G. & M. Wood; HOLOTYPE / Mesembrinella / woodorum / T.L. Whitworth.

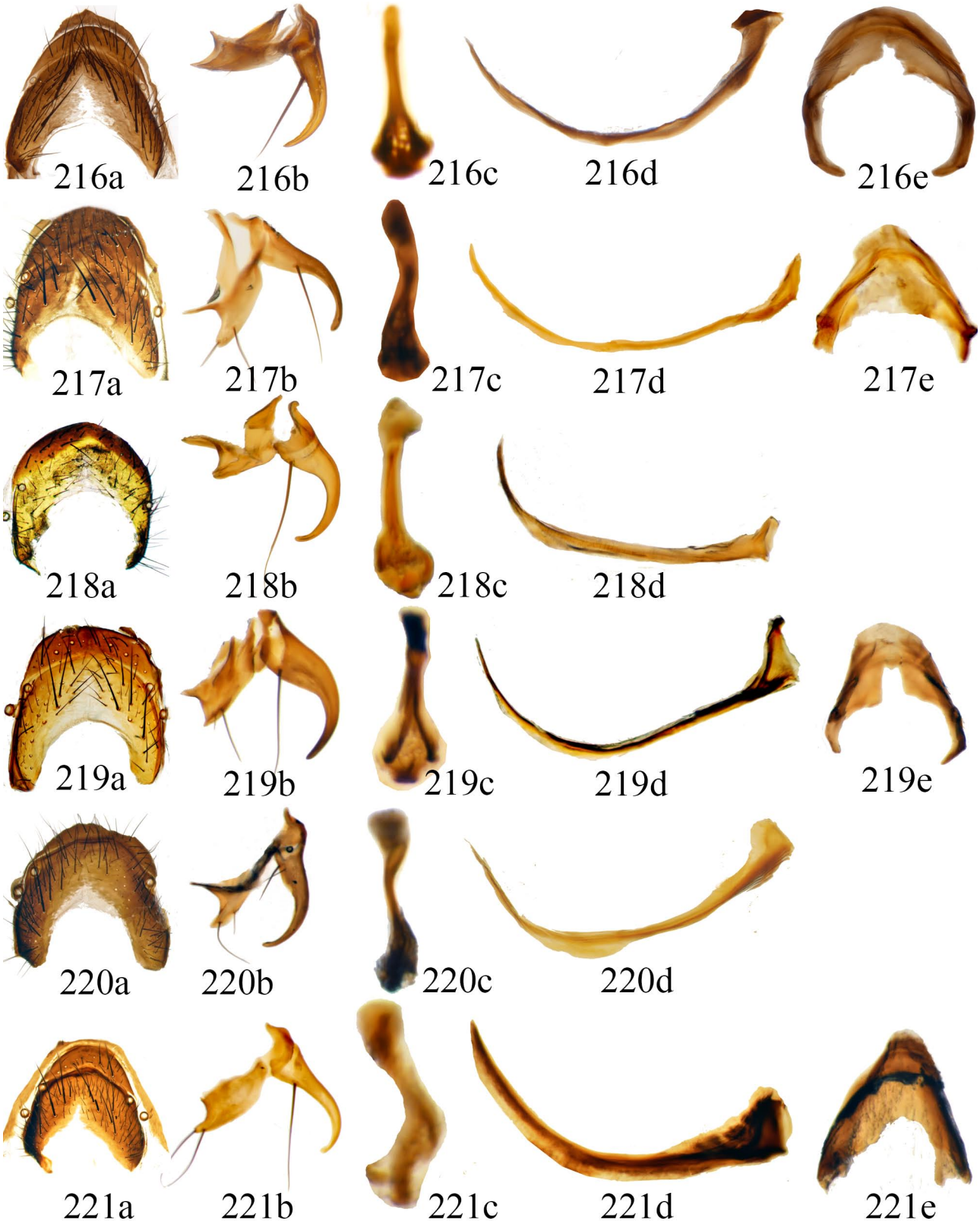
Distribution. Ecuador.

Remarks. This species is so distinctive that it merited being described even though only a single specimen was known. No specimens were barcoded.

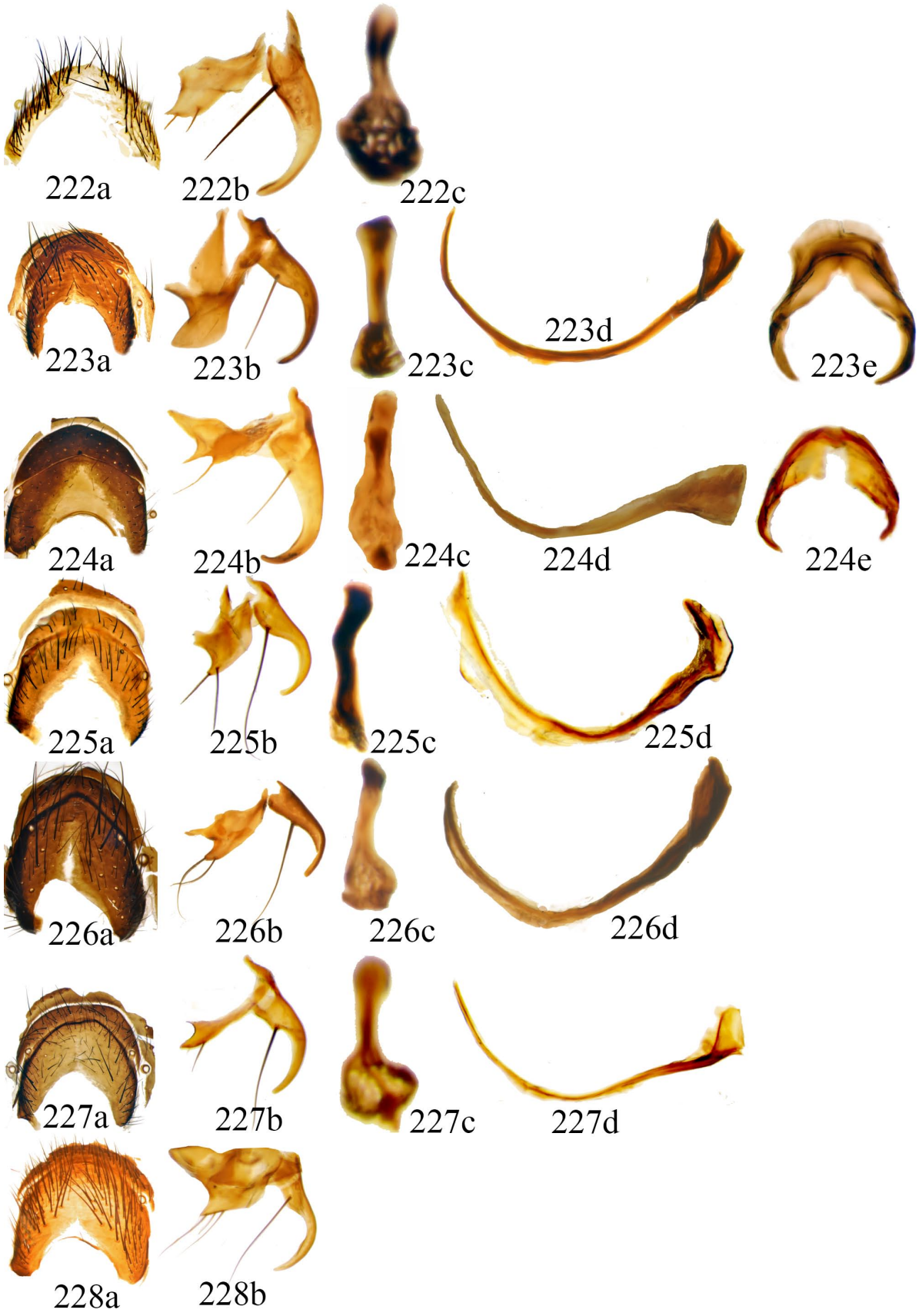
Etymology. This species *woodorum* is named in honor of Grace and Monty Wood, who collected many excellent specimens from the Neotropical Region, including this male.

Mesembrinella aeneiventris species-group

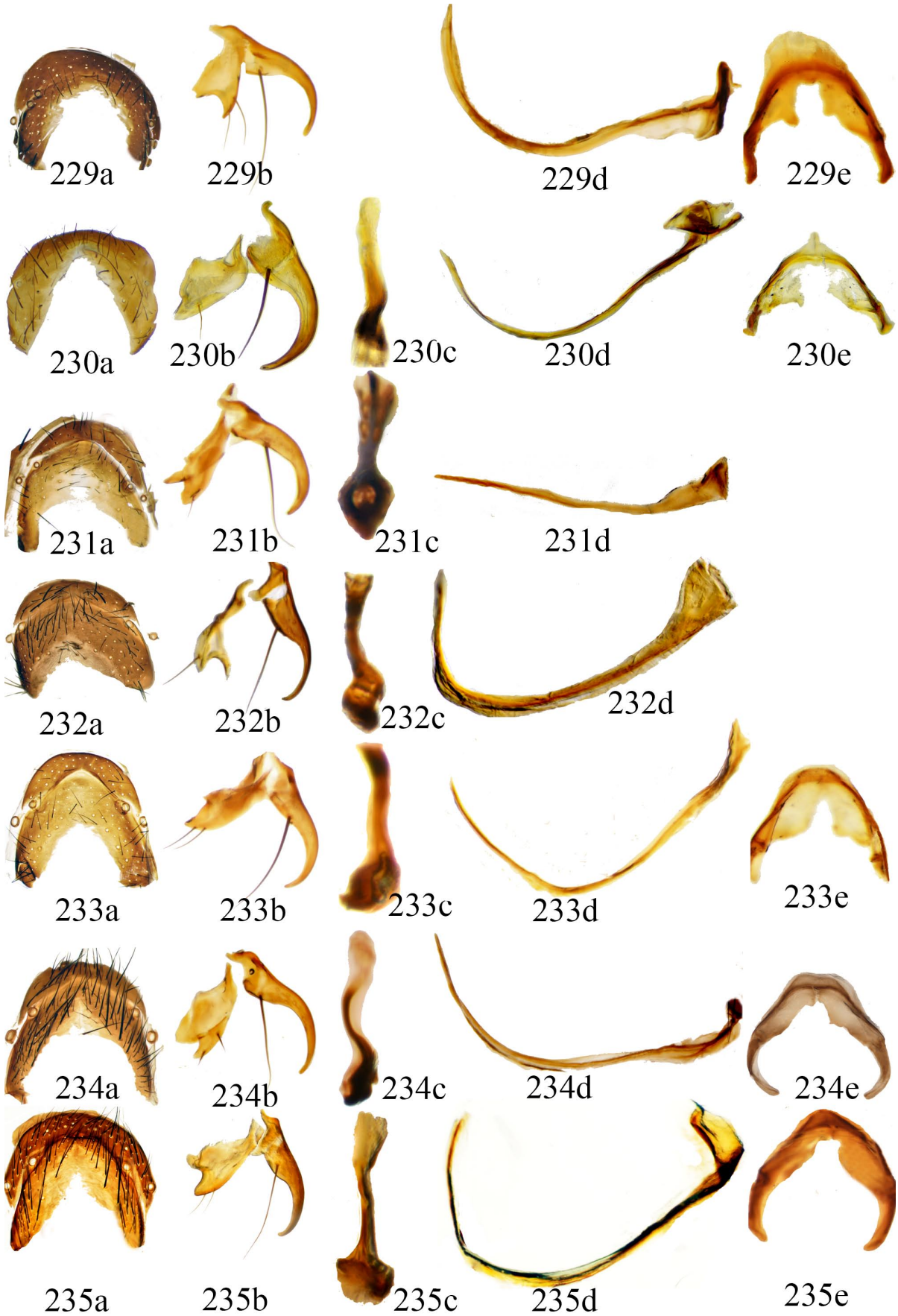
Recognition. The primary shared character state in the *M. aeneiventris* species-group is disc of T5 with a horizontal row of stout setae (Fig. 8); remainder of T5 usually with short, fine setae and setulae. In most species, the male has surstylus straight or only slightly curved posteriorly (as in Fig. 45), whereas in the *M. bicolor* species-group the surstylus typically has a distinctive curve posteriorly (*M. cordillera*, *M. vogelsangi* and *M. zurquiensis* in the *M. aeneiventris* species-group have surstylus with a more distinct curve directed posteriorly). The area of the phallus anterior to the hypophallic lobes tends to be narrowed (Fig. 146), similar to *Laneella.*



FIGURES 216–221. Male terminalia of *Mesembrinella* spp. (a = T6, STS7+8; b = pre- and postgonite; c = ejaculatory sclerite; d = ST6; e = hypandrium). **216.** *M. batesi* Aldrich. **217.** *M. bellardiana* Aldrich. **218.** *M. benoisti* (Séguy). **219.** *M. bicolor* (Fabricius). **220.** *M. brunnipes* Surcouf. **221.** *M. bullata* **sp. nov.**



FIGURES 222–228. Male terminalia of *Mesembrinella* spp. (a = T6, STS7+8; b = pre- and postgonite; c = ejaculatory sclerite; d = ST6; e = hypandrium). **222.** *M. chantryi* **sp. nov. 223.** *M. currani* Guimarães. **224.** *M. cyaneicincta* (Surcouf). **225.** *M. flavicrura* Aldrich. **226.** *M. longicercus* **sp. nov. 227.** *M. peregrina* Aldrich. **228.** *M. pictipennis* Aldrich.



FIGURES 229–235. Male terminalia of *Mesembrinella* spp. (a = T6, STS7+8; b = pre- and postgonite; c = ejaculatory sclerite; d = ST6; e = hypandrium). **229.** *M. quadrilineata* (Fabricius). **230.** *M. randa* (Walker). **231.** *M. semihyalina* Mello. **232.** *M. serrata* **sp. nov. 233.** *M. socors* (Walker). **234.** *M. townsendi* Guimarães. **235.** *M. umbrosa* Aldrich.

Key to the species of the *M. aeneiventris* species-group

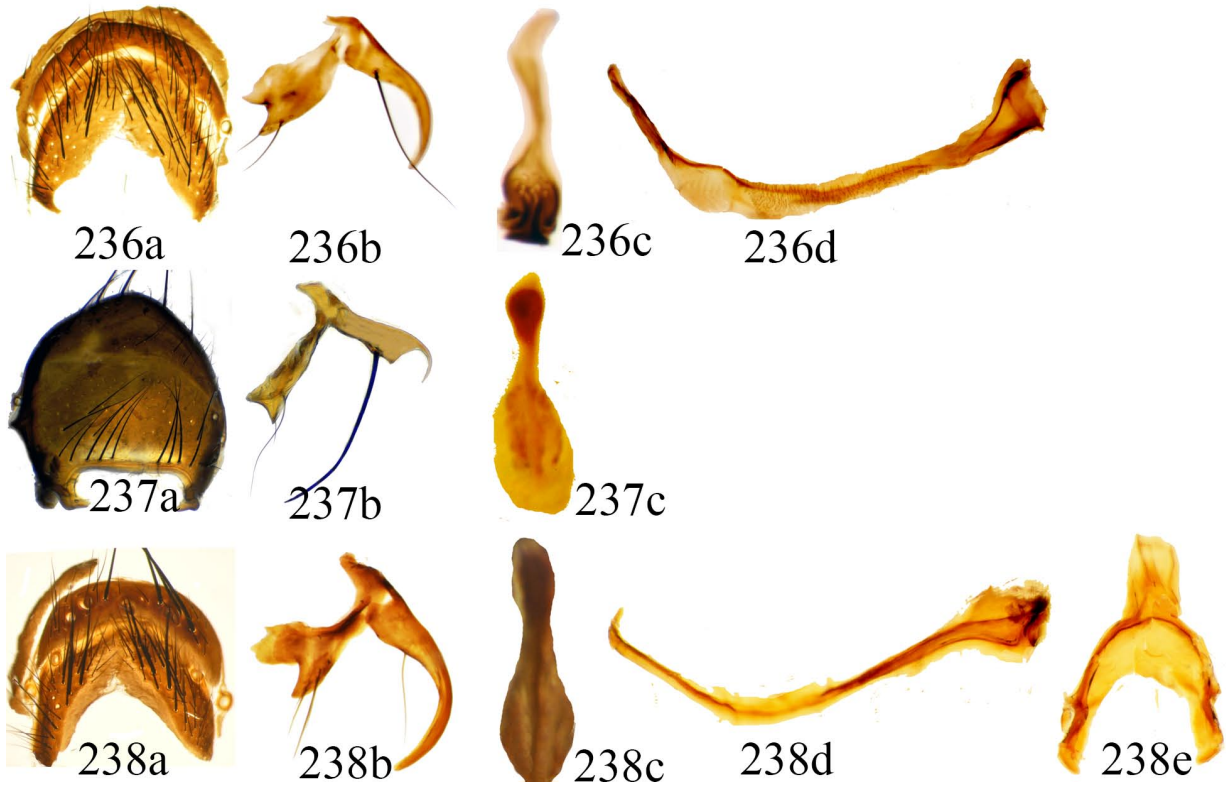
1 Postpronotal lobe with 3 setae **2**
- Postpronotal lobe with 2 setae **7**
2 Subcostal sclerite setose (Fig. 490); body color orange to reddish-brown; kat 1:1; T1+2 yellowish **3**
- Subcostal sclerite bare or pubescent; body color blue-black; kat usually 2:1; T1+2 black to blue-black **4**
3 Apices of mid and hind femora orange; ac 1:1; male frons narrow, about 0.02 of head width at narrowest; epandrium, cerci and surstyli as in Figs 53–54; female terminalia as in Fig. 300, T6 without median suture; [known only from Colombia and Venezuela] . . . . . ***M. vogelsangi***
- Apices of mid and hind femora black; ac 2:1; male frons much broader, 0.09 of head width at narrowest; epandrium, cerci and surstyli as in Figs 55–56; female terminalia as in Fig. 301, T6 with median suture; [known only from Costa Rica] . . . . . ***M. zurquiensis* sp. nov.**
4 Femora pale; male frons 0.07 of head width at narrowest; male surstylus long and slender, parallel-sided in lateral view (Fig. 39); cerci in posterior view long with a broad base (Fig. 40); female T6 broadly divided midway anteriorly (Fig. 293); [known only from Colombia and Venezuela] . . . . . ***M. decrepita***
- Femora dark; male frons width variable; male surstylus variable in lateral view; cerci in posterior view either broad at base and short, or narrow at base and longer; female T6 not divided midway **5**
5 Anterior and posterior thoracic spiracles pale yellow; male frons 0.14 of head width at narrowest; cercus exceptionally short and broad (Fig. 50); female T6 of OU shape; T7 narrowed midway (Fig. 298); [known only from Costa Rica and Mexico] . . . . . ***M. uniseta***
- Anterior thoracic spiracle yellow-brown to black, posterior thoracic spiracle brown to black; other characters variable **6**
6 Acrostichal setae 0:1, outer posthumeral seta present; anterior thoracic spiracle black; legs black; male frons 0.06 of head width at narrowest; cerci slender (Wolff *et al.* 2017: figs 9–10); [known only from Colombia] . . . . . ***M. obscura***
- Acrostichal setae 2:1, outer posthumeral seta absent; anterior thoracic spiracle yellow-brown; legs reddish-brown; [known only from Mexico; male unknown] . . . . . ***M. xanthorrhina***
7 Subcostal sclerite setose (as in Fig. 490); thoracic chaetotaxy with ac 0:1 and dc 2:2; coxae, trochanters and femora orange with reddish-brown apices; male frons narrow, 0.015 of head width; [for epandrium, cerci and surstyli and other characters, see Wolff *et al.* (2017: figs 12–18); known only from Colombia] . . . . . ***M. cordillera***
- Subcostal sclerite bare; other characters variable **8**
8 Outer posthumeral seta present **9**
- Outer posthumeral seta absent **11**
9 Pleural area of thorax and legs blue-black; ac 0:0; male frons 0.07 of head width at narrowest; epandrium, cerci and surstyli as in Figs 41–42; female terminalia as in Fig. 294 . . . . . ***M. lara***
- Pleural area of thorax and femora yellow-orange, tibiae and tarsi brown; usually ac 1:1 or 1:2 (in *M. aeneiventris* sometimes missing on one or both sides) **10**
10 Acrostichals 1:2 (but sometimes missing on one or both sides); male frons broad, 0.07–0.08 of head width at narrowest; male with ST5 very broad and wing-like (Fig. 249); epandrium, cerci and surstyli as in Figs 35–36; female terminalia as in Fig. 292; [known from Brazil, Colombia, Costa Rica, Ecuador, Panama and Peru] . . . . . ***M. aeneiventris***
- Acrostichals 1:1; male frons narrower, 0.03–0.05 of head width at narrowest; ST5 normal (Fig. 252); epandrium, cerci and surstyli as in Figs 43–44; female terminalia as in Fig. 295; [known only from Costa Rica] . . . . . ***M. nigrocoerulea* sp. nov.**
11 Wing with well-defined infuscation along costa; thorax reddish-brown to blackish; ac 0:1; male with surstylus long and slender in left lateral view, arching inward in posterior view (Figs 45–46); female terminalia as in Fig. 296; [known from Peru, Ecuador and Brazil] . . . . . ***M. purpurata***
- Wing hyaline or only faintly infuscated; surstylus not as long and slender; other characters variable **12**
12 T1+2 and anterior 1/3 or more of T3 yellow-orange, varying dorsally, always yellow laterally; ac 0:1; other characters variable **13**
- T1+2, T3 blue-black; ac 1:1; male frons 0.02 of head width at narrowest; epandrium, cerci and surstyli as in Figs 51–52; female terminalia as in Fig. 299; [known only from Costa Rica] . . . . . ***M. violacea* sp. nov.**
13 Femora brown to black; scutellum lacking discal setae [NB: discal setae present on T5]; [known only from Peru; male unknown] . . . . . ***M. bequaerti***
- Femora orange; scutellum with discal setae; male frons 0.05 of head width at narrowest; T3 of abdomen with dark, inverted V shape mid-dorsally in male; epandrium, cerci and surstyli as in Figs 47–48; female terminalia as in Fig. 297; [known only from Costa Rica] . . . . . ***M. semiflava***

Mesembrinella aeneiventris (Wiedemann, 1830)

(Figs 35–36, 125–126, 205, 249, 292, 336, 378, 421)

Dexia aeneiventris Wiedemann, 1830: 376. Holotype male (NMW), not examined. Type locality: Brazil.
Huascaromusca cruciata Townsend (1918: 112).
Huascaromusca aeneiventris: Peris & Mariluis (1984: 255); Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 867); Wolff *et al.* (2017: 253); Marinho *et al.* (2017: tab. 1).
Mesembrinella aeneiventris: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized fly, averaging 10 mm (9–11/5) in length. Postpronotal lobe 2x2; subcostal sclerite bare; outer posthumeral seta present; thorax brown with four whitish tomentose stripes; pleural area orange; abdomen bluish with whitish tomentum; thorax with ac 1:1 or 2:1. Male frons broad, 0.08 of head width at narrowest; ST5 very broad (Fig. 249); terminalia as in Figs. 35–36. Female frons 0.22 of head width at narrowest; T6 of RV shape, as in Fig. 292.

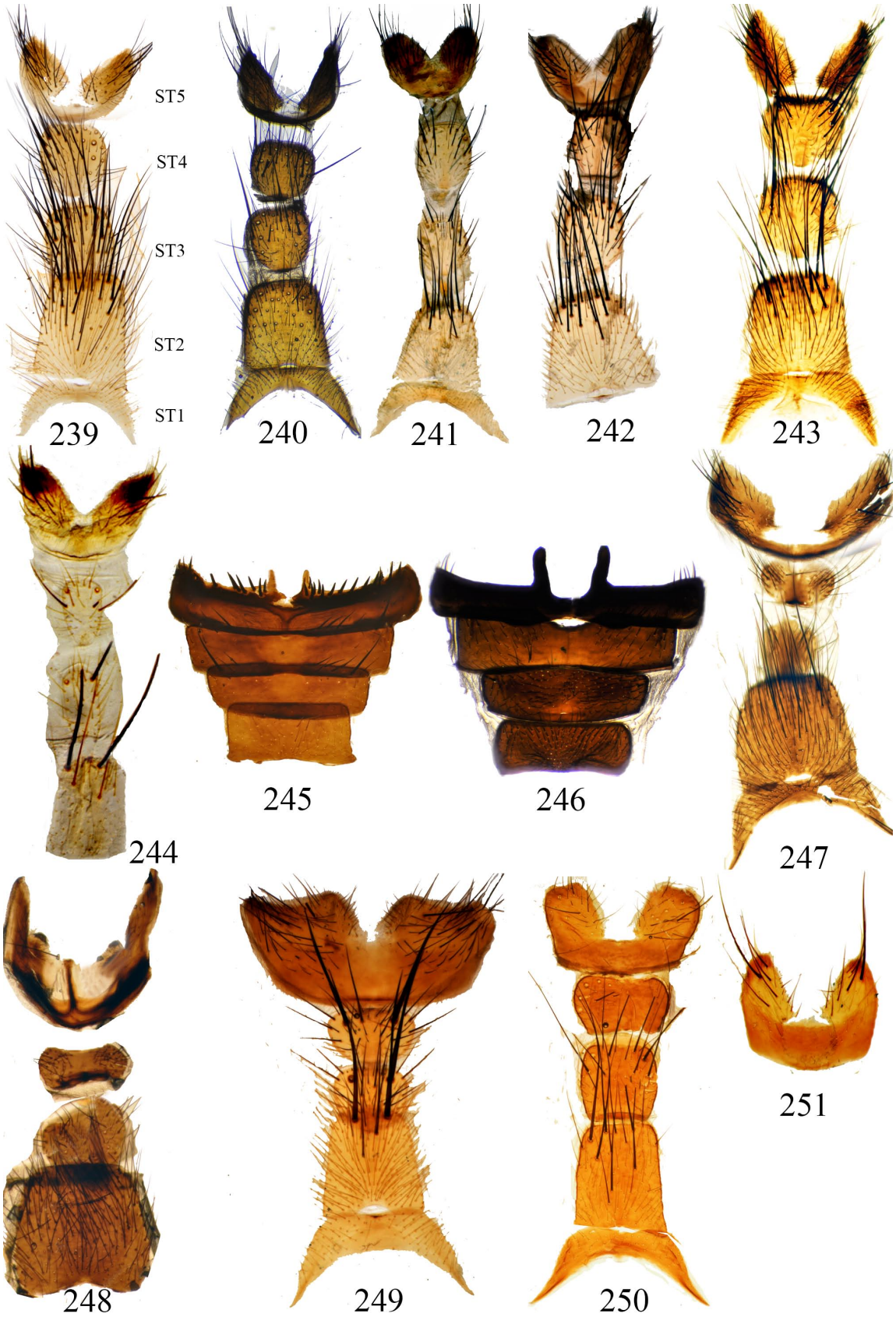


FIGURES 236–238. Male terminalia of *Mesembrinella* spp. (a = T6, STS7+8; b = pre- and postgonite; c = ejaculatory sclerite; d = ST6; e = hypandrium). **236.** *M. velasquezae* **sp. nov. 237.** *M. anomala* (Guimarães). **238.** *Souzalopesiella facialis* (Aldrich).

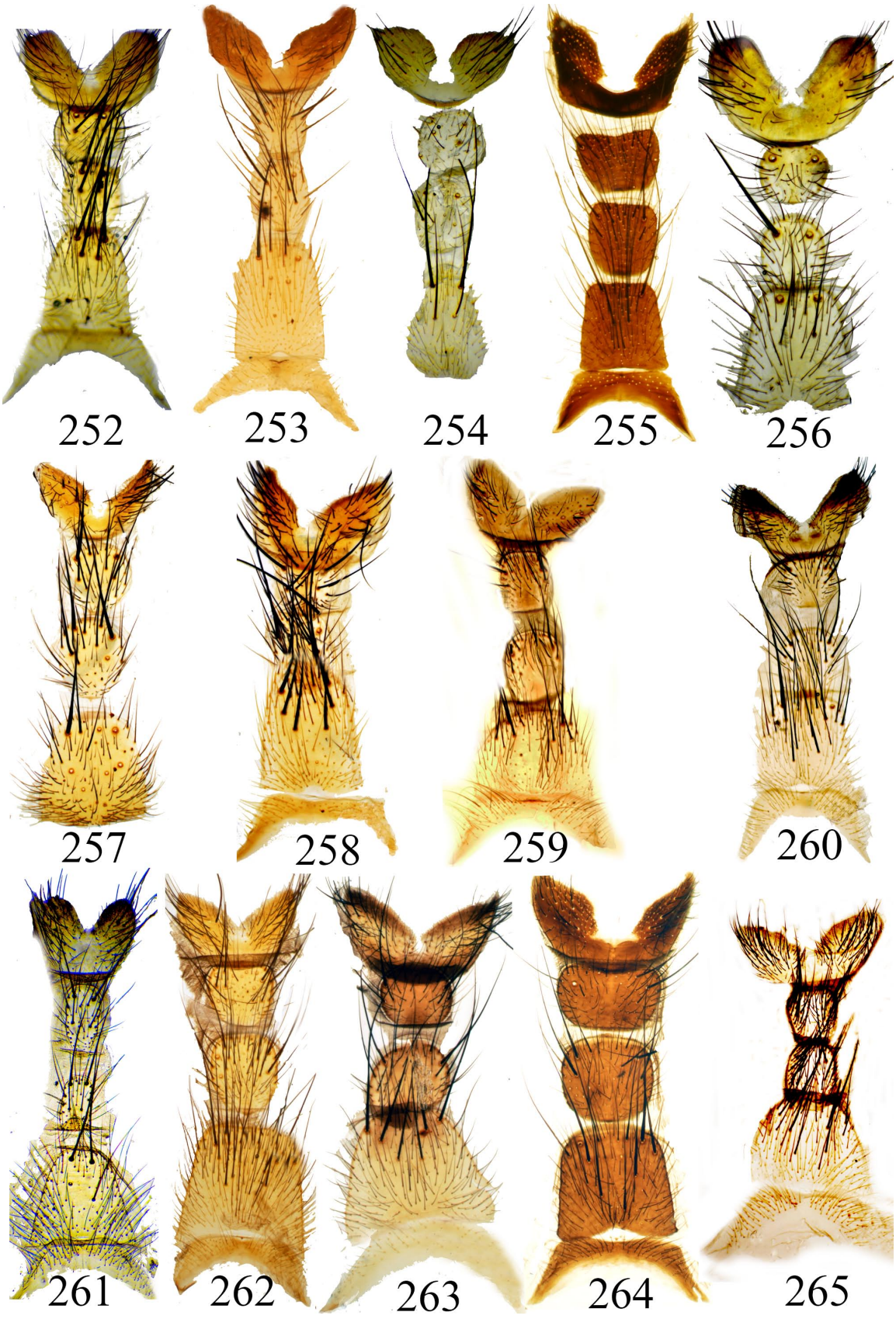
Redescription. *Male.* Head. Frons broad, 0.08/2 of head width at narrowest, as wide as fronto-orbital at level of lunule. Fronto-orbital slender with silvery tomentum; frontal setae ascending about 60% of distance to vertex; frontal vitta dark orange; upper parafacial silvery, lower parafacial orange; gena pale orange with silvery tomentum; postgena pale yellow with long yellow setae; occiput with pale tomentum and silky pale yellow setae; median occipital sclerite broad, shiny dark orange; pedicel and first flagellomere dull orange; eye with median facets about 2x size of lateral facets; ocellar triangle medium-sized, anterior ocellus slightly larger than posterior ocelli.

Thorax. Dorsum brown with four pale tomentose stripes; pleura orange with faint bluish reflections [good specimens]; chaetotaxy: ac 1:1 [sometimes 2:1 on one side], dc 2:3, ia 1, ph 1, ppn 2x2, kat 1:1, meron typical with long, slender tan setae, 1 pair converging ap, sa absent, 1 weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum weakly developed; spiracles pale yellow, medium-sized; legs: femora orange with brown apices, tibiae and tarsi brown. Wing yellowish along costa, faintly yellow throughout; subcostal sclerite bare; basicosta pale yellow; tegula pale orange; section IV 0.11 of section III; disc of upper calypter light tan; rim of upper calypter with short dark setae; lower calypter pale yellow with long white setae on rim.

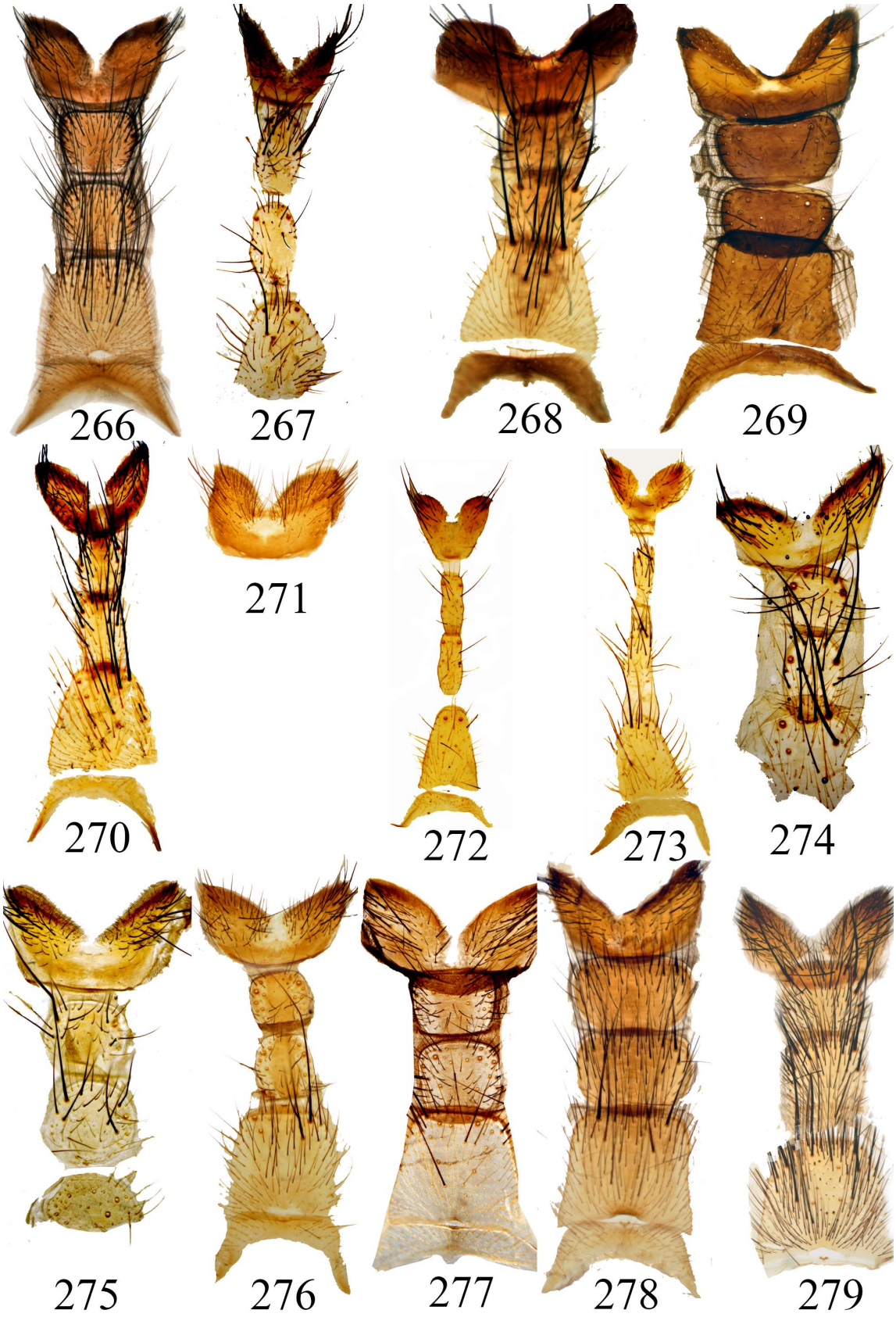
Abdomen with T1+2 pale orange midway, dull orange laterally; T3 dull orange; T4–5 dull orange, often with faint bluish reflections; disc of T5 with horizontal row of stout setae, rest of disc with sparse, fine setae. *Terminalia* in left lateral view with surstylus short and slender, apical end curved slightly backward, cercus with apical hook (Fig. 35); in posterior view, cerci with broad bases gradually tapering to slender tips (Fig. 36); phallus in lateral view with moderate-sized epiphallus curving backward (Fig. 125); phallus in dorsal view with narrow hypophallic lobes with coarse serrations (Fig. 126); pre- and postgonite and ejaculatory sclerite as in Fig. 205; ST1–5 (Fig. 249) with ST5 exceptionally broad and wing-like.



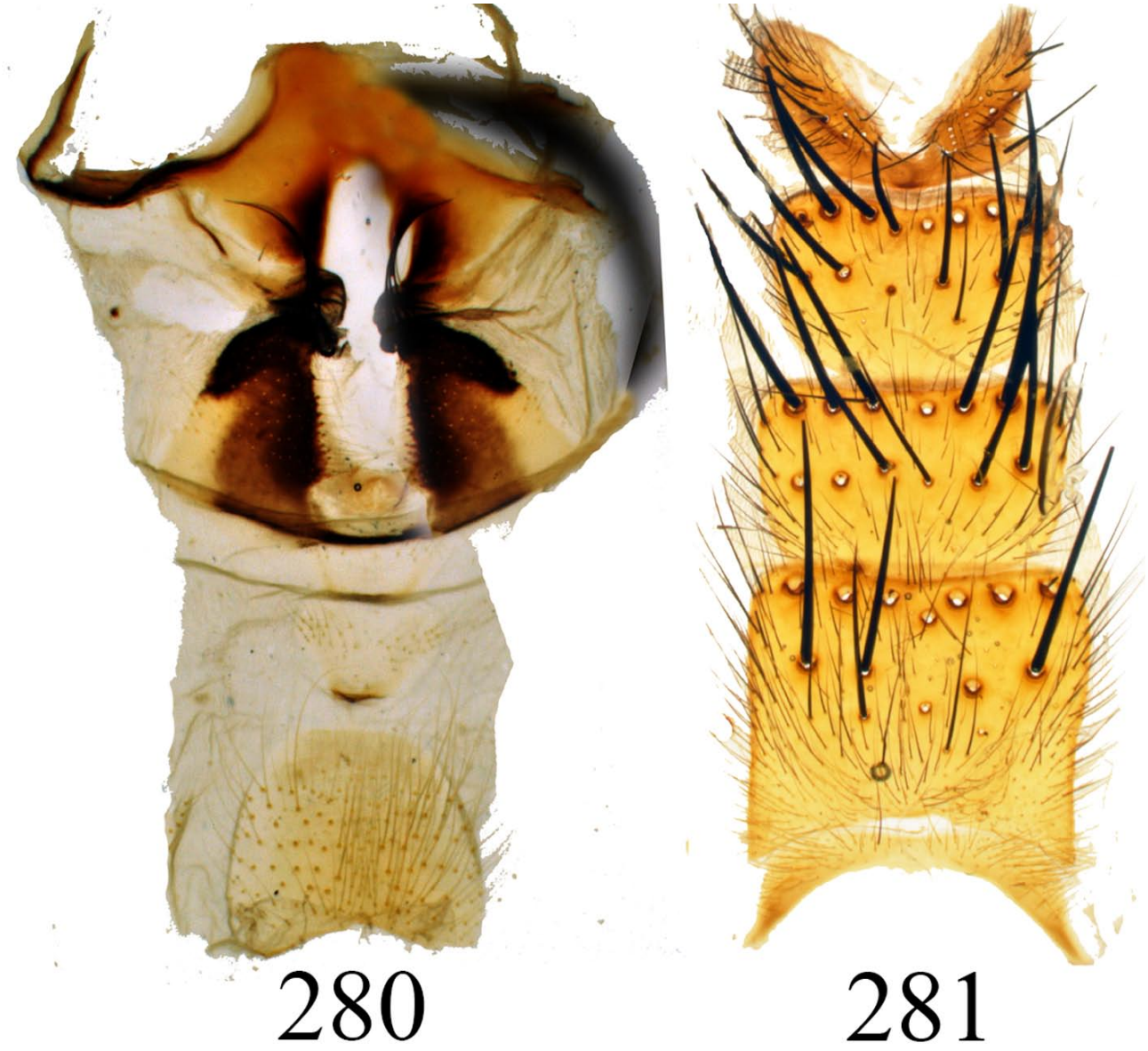
FIGURES 239–251. Male sternites of *Lanella* spp. **239.** *L. fusconitida* **sp. nov. 240.** *L. fuscosquamata* **sp. nov. 241.** *L. nigripes* Guimarães **242.** *L. perisi* (Mariluis). **243.** *L. purpurea* **sp. nov. 244.** *M. latifrons* (Mello). **245.** *M. mexicana* **sp. nov. 246.** *M. spicata* Aldrich. **247.** *M. epandrioaurantia* **sp. nov. 248.** *M. woodorum* **sp. nov. 249.** *M. aeneiventris* (Wiedemann). **250.** *M. decrepita* Séguy. **251.** *M. lara* (Bonatto) (ST5 only).



FIGURES 252–265. Male sternites of *Mesembrinella* spp. **252.** *M. nigrocoerulea* **sp. nov. 253.** *M. purpurata* Aldrich. **254.** *M. semiflava* Aldrich. **255.** *M. uniseta* Aldrich. **256.** *M. violacea* **sp. nov. 257.** *M. vogelsangi* (Mello). **258.** *M. zurquiensis* **sp. nov. 259.** *M. batesi* Aldrich. **260.** *M. bellardiana* Aldrich. **261.** *M. benoisti* (Séguy). **262.** *M. bicolor* (Fabricius). **263.** *M. brunnipes* Surcouf. **264.** *M. bullata* **sp. nov. 265.** *M. chantryi* **sp. nov.**



FIGURES 266–279. Male sternites of *Mesembrinella* spp. **266.** *M. currani* Guimarães. **267.** *M. cyaneicincta* (Surcouf). **268.** *M. flavicrura* Aldrich. **269.** *M. longicercus* **sp. nov. 270.** *M. peregrina* Aldrich. **271.** *M. pictipennis* Aldrich (ST5 only). **272.** *M. quadrilineata* (Fabricius). **273.** *M. randa* (Walker). **274.** *M. semihyalina* Mello. **275.** *M. serrata* **sp. nov. 276.** *M. socors* (Walker). **277.** *M. townsendi* Guimarães. **278.** *M. umbrosa* Aldrich. **279.** *M. velasquezae* **sp. nov.**



FIGURES 280–281. Male sternites of Mesembrinellidae. **280.** *Mesembrinella anomala* (Guimarães). **281.** *Souzalopesiella facialis* (Aldrich).

Female. Similar to male except frons 0.22/2 of head width at narrowest; T6 of RV shape, T7 of inverted V-shaped incision on rear, T8 as two sclerites (Fig. 292); ST6, 7 and hypoproct as in Fig. 336, ST8 with stout setae; spermathecae filiform as in Fig. 378; ST2–5 as in Fig. 421.

Material examined. Brazil, **Rio de Janeiro.** 1 ♀*, Servico Febre Amarela, M.E.S., Bras, ix.1938 (USNM). **Sao Paulo.** 1 ♂*, Estação Biológica de Boracéia, Salesópolis, 16.iii.1972, J.H. Guimarães (USNM); 1 ♂*, "Rio", 8.viii.1923, L.G. Saunders (NHMUK).

Distribution. Brazil. Guimarães (1977) also listed it from Ecuador, Colombia, Costa Rica, Panama and Peru.

Remarks. This species was rare in our search for specimens. Records of it from Panama and Costa Rica need to be verified; numerous mesembrinellids were examined from these countries, but none belonged to this species. No specimens were barcoded.

Mesembrinella bequaerti Séguy, 1925

Mesembrinella bequaerti Séguy, 1925: 195. Holotype female (MNHN), not examined. Type locality: Peru

Huascaromusca bequaerti: Hall (1948: 86, as synonym of *Huascaromusca xanthorrhina*); Peris & Mariluis (1984: 254); Kosmann *et al.* (2013: 77); Wolff *et al.* (2017: 253); Marinho *et al.* (2017: tab. 1).
Mesembrinella bequaerti: Cerretti *et al.* (2017: tab. 2).

Diagnosis. Postpronotal lobe 2x2; subcostal sclerite bare; outer posthumeral seta absent; wing hyaline; femora brown to black; scutellum lacking discal setae; T1+2 orange; femora all brown or black.

Redescription. [Based on information in Séguy (1925), Guimarães (1977) and Bonatto (2001); Guimarães (1977) and Bonatto (2001) examined the holotype female from MNHN.] Head with frontal vitta reddish-brown, darker above; fronto-orbital dark with pale tomentum; parafacial yellow-orange with silvery tomentum; gena yellow; palpus typical; occiput black, covered with yellow-orange tomentum; antenna yellow, arista darkened in distal half. Thorax with dorsum and pleura shiny black with black and yellow setae; mesonotum with four conspicuous pale tomentose stripes; ppn yellow-orange; chaetotaxy: ac 0:1 [Guimarães (1977) recorded ac 2:1, whereas Bonatto (2001) recorded ac 0:1; we believe 0:1 is most likely the correct formula], dc 2:3, ia 0, ph 0, ppn 2x2, kat 1:1, scutellum with no sa, pb or disc setae; wing hyaline with faint infuscation along costal border beyond vein R_1; fore leg reddish-brown, mid and hind legs dark brown; all coxae yellow. Abdomen with anterior half of T1+2 yellowish; remainder of T1+2 and T3–5 shiny black; T1+2–3 with lateral marginal setae; T4–T5 with rows of marginal setae; disc of T5 with horizontal row of stout setae.

Material examined. None (no specimens could be obtained for examination).

Distribution. Peru.

Remarks. This species was not found in collections, even though numerous specimens of this family were examined from Peru. Séguy's description of this species was brief, with little detail. He states (roughly translated from French): "Related to *M. decrepita*, like *decrepita* it has a single presutural seta [it is unclear which seta he is talking about], with discal setae on tergite VI [likely what we now call T5]. Stem vein bare; body blue with slight reddish tint on anterior portion of pleura; wings clear, slightly infuscate along costa; legs entirely black. Length 9.5 mm. Peru". No specimens were barcoded.

Mesembrinella cordillera (Wolff & Ramos-Pastrana, 2017)

Huascaromusca cordillera Wolff & Ramos-Pastrana *in* Wolff *et al*., 2017: 256. Holotype male (CEUA), not examined. Type locality: Caquetá, Florencia, Colombia.
Mesembrinella cordillera: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized reddish-brown and black fly; ppn 2x2; subcostal sclerite setose; ac 0:1, dc 2:2; with coxae, trochanters and femora orange, apices of femora reddish-brown; wing mostly hyaline with brown area on distal end of vein R_1 and cells c, sc and r.

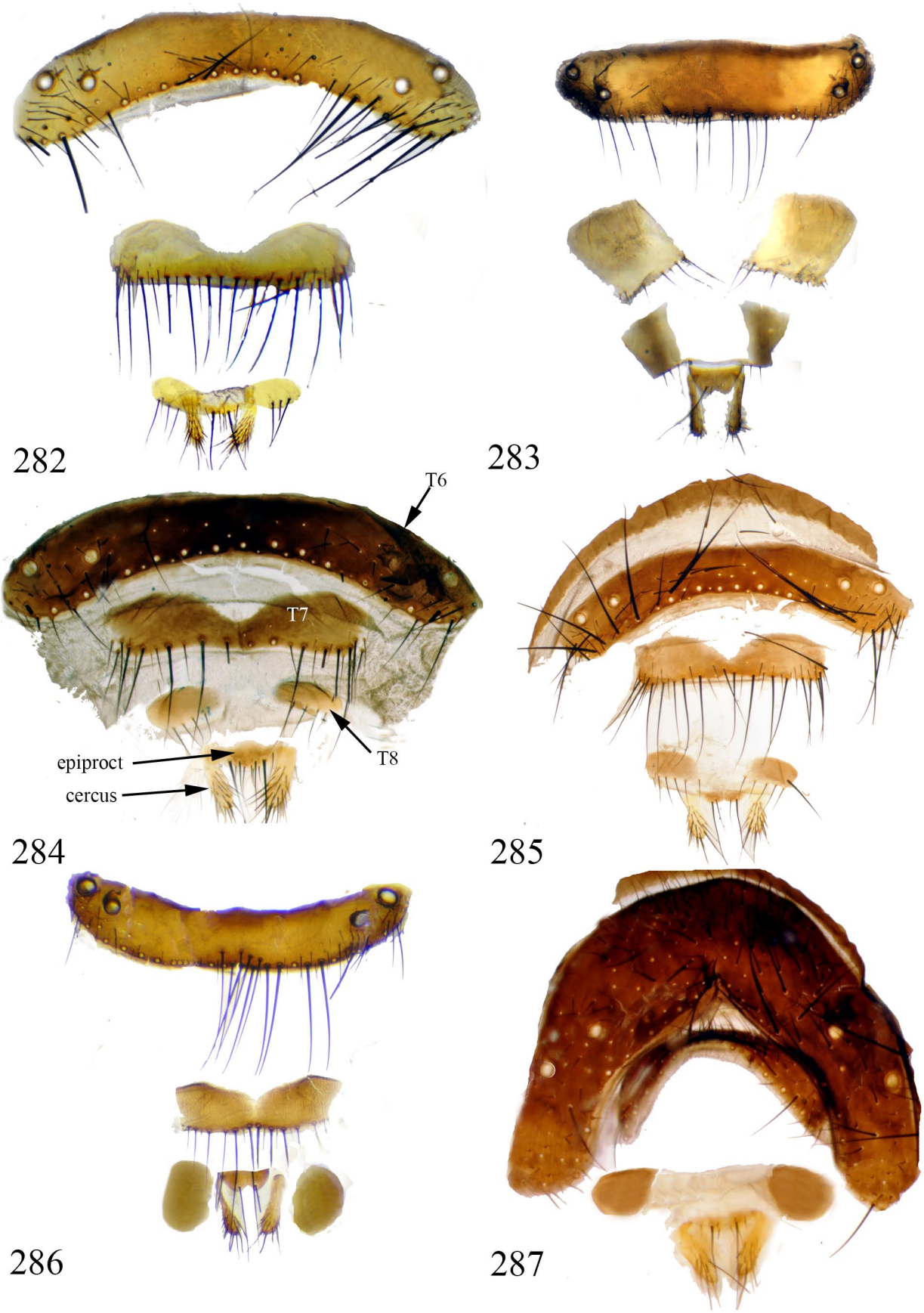
Redescription. [Summarized from Wolff *et al.* (2017).] *Male*. A medium-sized, reddish-brown and black fly; frons 0.0145 (0.011–0.023/4) of head width at narrowest. Dorsum of thorax black, pleura reddish-brown; scutellum with 1 ap, 1 bas, 1 pb and 1 disc; coxae, trochanters and femora orange, apices of femora reddish-brown. Wing mostly hyaline except infuscated from distal end of vein R_1 to cells c, sc and r, and with darkening around veins; abdomen black with light purple reflections. [For terminalia and other characters, see Wolff *et al.* (2017: figs 12–18).]

Female. Frons 0.215 (0.204–0.237/8) of head width at narrowest. Terminalia not illustrated or described in detail by Wolff *et al.* (2017).

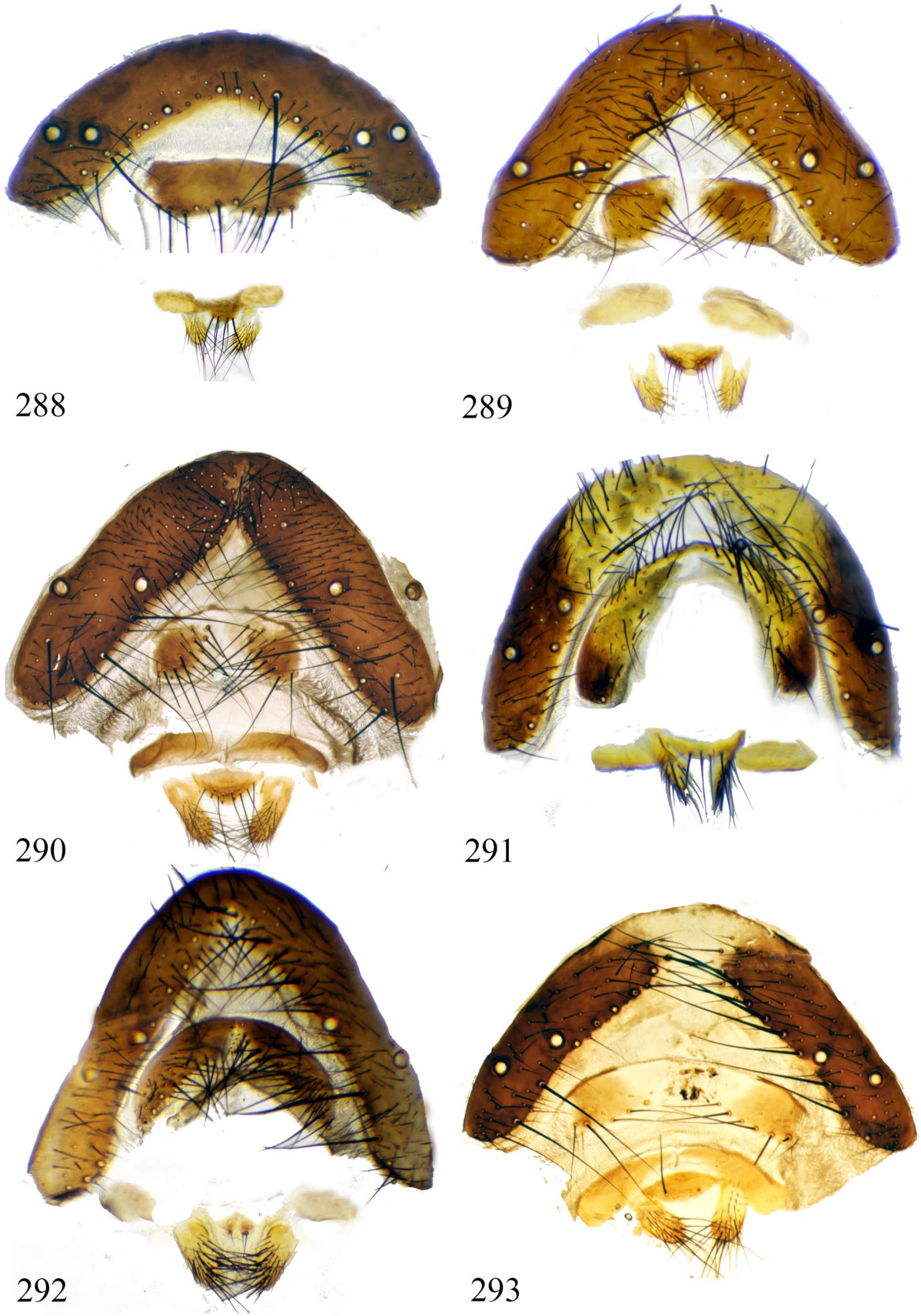
Material examined. None (no specimens could be obtained for examination).

Distribution. Colombia.

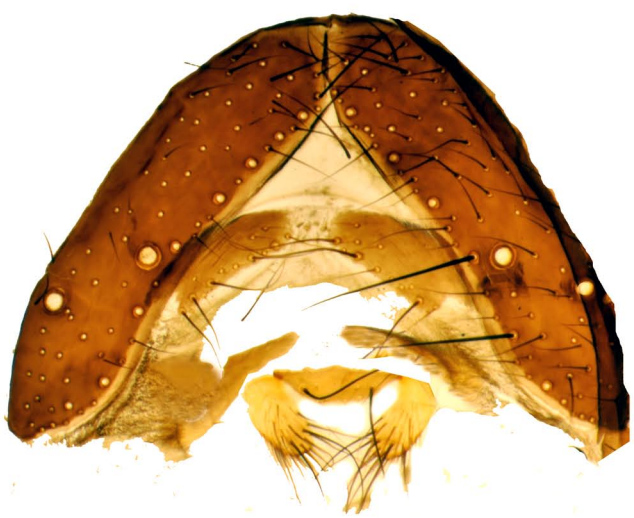
Remarks. Wolff *et al.* (2017) listed *M. cordillera* and *M. obscura* as medium-sized, but they give the average length for males as 7 mm (n = 2) and 6.6 mm (n = 8), respectively. Compared to other species in the *M. aeneiventris* group, or other mesembrinellids in general, these would be very small flies. It is always possible to get an undersized individual, but since this is an average length based on several specimens measured from the head to the tip of the abdomen, the question arises as to whether these are unusually small species or whether there was an error in measuring. We recommend that the specimens be re-measured. No specimens were barcoded.



FIGURES 282–287. Female terminalia (T6–T8, epiproct, cerci) of Mesembrinellidae, dorsal view. **282.** *Laneella fusconitida* **sp. nov. 283.** *L. fuscosquamata* **sp. nov. 284.** *L. nigripes* Guimarães. **285.** *L. perisi* (Mariluis). **286.** *L. purpurea* **sp. nov. 287.** *M. latifrons* (Mello).



FIGURES 288–293. Female terminalia (T6–T8, epiproct, cerci) of *Mesembrinella* spp., dorsal view. **288.** *M. guaramacalensis* **sp. nov. 289.** *M. mexicana* **sp. nov. 290.** *M. spicata* Aldrich. **291.** *M. epandrioaurantia* **sp. nov. 292.** *M. aeneiventris* (Wiedemann). **293.** *M. decrepita* Séguy.



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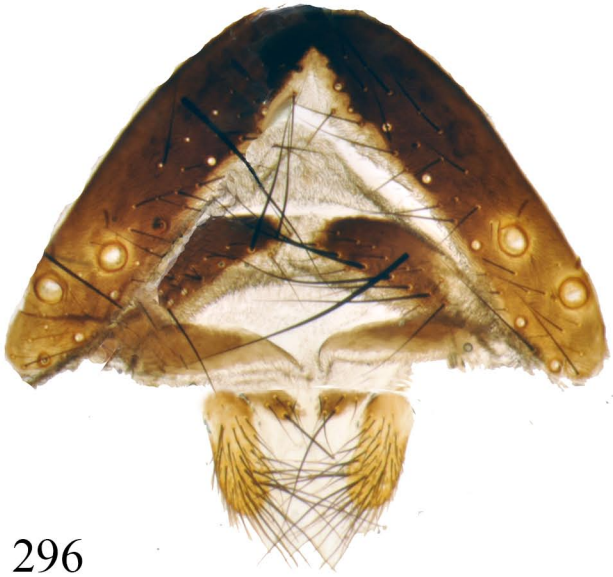

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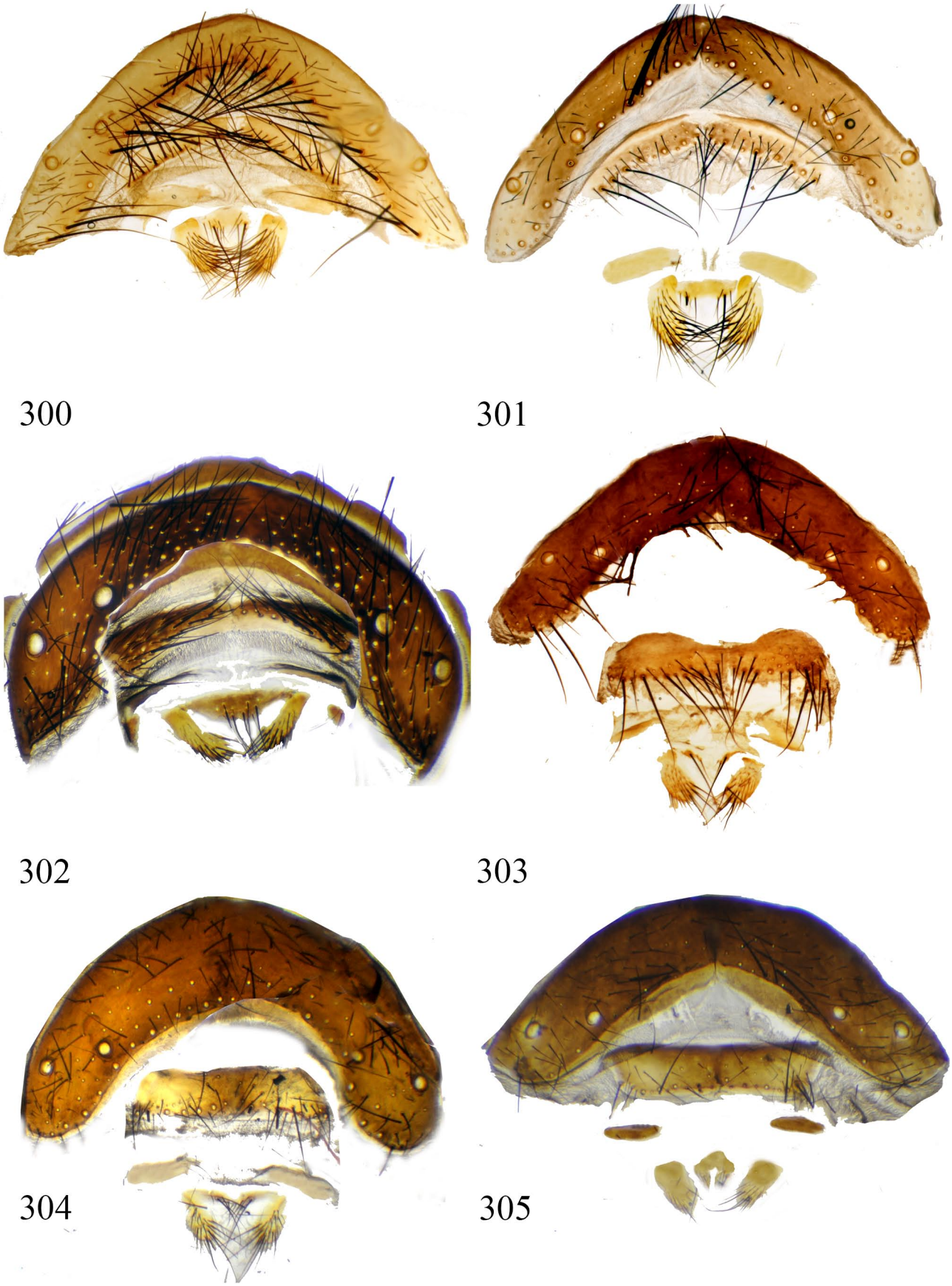
FIGURES 294–299. Female terminalia (T6–T8, epiproct, cerci) of *Mesembrinella* spp., dorsal view. **294.** *M. lara* (Bonatto). **295.** *M. nigrocoerulea* **sp. nov. 296.** *M. purpurata* Aldrich. **297.** *M. semiflava* Aldrich. **298.** *M. uniseta* Aldrich. **299.** *M. violacea* **sp. nov.**



FIGURES 300–305. Female terminalia (T6–T8, epiproct, cerci) of *Mesembrinella* spp., dorsal view. **300.** *M. vogelsangi* (Mello). **301.** *M. zurquiensis* **sp. nov. 302.** *M. apollinaris* Séguy. **303.** *M. batesi* Aldrich. **304.** *M. bellardiana* Aldrich**. 305**. *M. benoisti* (Séguy).

Mesembrinella decrepita Séguy, 1925

(Figs 39–40, 129–130, 207, 250, 293, 337, 379, 422, 488)

Mesembrinella decrepita Séguy, 1925: 195. Holotype male (MNHN), not examined. Type locality: Colombia.
Huascaromusca decrepita: Peris & Mariluis (1984: 255); Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 867); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 108).
Mesembrinella decrepita: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized blue-black fly averaging 9.6 mm (9–10/5) in length. Postpronotal lobe with 3x3 setae; subcostal sclerite bare; femora pale orange. Male frons about 0.074 of head width at narrowest; terminalia distinctive, with broad cerci in posterior view (Fig. 39). Female T6 distinctive, with broad division midway and of OV shape; T7 and T8 narrowed midway (Fig. 293).

Redescription. *Male*. Frons broad, 0.074 (0.07–0.08/5) of head width at narrowest, almost as broad as width of first flagellomere; fronto-orbital dark with silvery tomentum; frontal setae ascending about 60% of distance to vertex; frontal vitta: upper 2/3 black, lower 1/3 orange; parafacial orange with pale tomentum; gena orange with horizontal row of stout dark setae and scattered smaller dark setae; postgena orange with long pale setae; occiput dark with pale tomentum and pale setae; median occipital sclerite shiny black; antenna orange; arista tan; palpus typical; eye with median facets slightly larger than lateral facets; ocellar triangle medium-sized, anterior ocellus about 2x size of posterior ocelli; supravibrissal setae on facial ridge ascending about 1/5 of distance to antennal base.

Thorax. Dorsum and pleural areas blue-black with whitish tomentum; chaetotaxy: ac variable, most commonly 1:1, then 2:1, then 0:1, sometimes a seta missing on one side, dc 2:3, ia 0, ph 1, ppn 3x3, kat 2:1, meral setae typical, 1 pair crossed ap, 0 sa or lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles orange, medium-sized. Wing hyaline, with section IV 0.17 of section III; subcostal sclerite bare; basicosta and tegula orange; calypters brown with brown rims; rim of upper calypter with short dark setae, rim of lower calypter with long pale setae.

Abdomen. T1+2–T3 shiny blue with whitish tomentum, T4–5 shiny blue with little tomentum; T1+2–3 with pair of lateral marginal setae; T4–5 each with row of marginal setae, the row on T5 weaker; disc of T5 with mid-dorsal horizontal row of stout setae, rest of disc with sparse, fine setae. *Terminalia*. In lateral view surstylus slender, curving slightly forward, cercus with apical hook (Fig. 39); in posterior view, base of cerci broad, tapering to divergent tips (Fig. 40); phallus in lateral view with epiphallus curved backward, basiphallus extended anteroventrally (Fig. 129); in dorsal view, hypophallic lobes very narrow (Fig. 130); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 207; sternites as in Fig. 250.

Female. Similar to male except frons 0.245 (0.23–0.25/4) of head width at narrowest. T6 of RV shape, broadly divided midway, T7 continuous, weakened and translucent midway, T8 broad with suture midway (Fig. 293). ST6–8 and hypoproct as in Fig. 337; spermathecae filiform (Fig. 379); ST1–5 as in Fig. 422.

Material examined. Venezuela, **Distrito Federal.** 1 ♂*, 1 ♀♦* (TLW378), 7 ♂♂, Parque Nac. Avila, 1800 m, 28.ii.1971, G. & M. Wood (CNC). **Lara.** 1 ♂♦ (TLW258), 1 ♀♦ (TLW257), 8 km. S Sanare, Yacambu Natl. Park 1600 m, 27.xii.1985, P. Kovarik & R. Jones (TAMU). **Merida.** 1 ♂*, 10 km E. Tobay, 2000 m, 28.iv.1981, H. Townes (CNC). **Yaracuy.** 1 ♂, Corceorote Sector El Candelo, 1650 m, 10°36′888″N–68°82′628″W, 17–20.x.2001, T. Interceptacion, R. Briceño, A. Chacán, J. Clavijo, F. Díaz, R. Paz, E. Arcaya & L. Joly (MJMO); 1 ♂♦ (TLW259), 1 ♀, Edo. Lara, P.N. Yacambu, "El Blanquito", 9°63N, 69°53W, 29.i.2007, A. Martínez (MJMO).

Distribution. Venezuela. Bonatto (2001) also listed it from Colombia. The listing of this species from Mexico in Marinho *et al.* (2017: tab. 1) was an error (M. Marinho, pers. comm.).

Remarks. The only specimens examined during this study were from Venezuela. Four specimens (TLW252–259, TLW378) were barcoded, and they clustered together (Fig. 488).

Mesembrinella lara (Bonatto, 2005)

(Figs 41–42, 131–132, 208, 251, 294, 338, 380, 423, 463, 488)

Huascaromusca lara Bonatto *in* Bonatto & Marinoni, 2005: 888. Holotype male (USNM), examined. Type locality: Yacambu National Park, Lara, Venezuela.
Huascaromusca lara: Kosmann *et al.* (2013: 77); Wolff *et al.* (2017: 253); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 108).
Mesembrinella lara: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A small fly, averaging 8.75 mm (8–9/4) in length; thorax subshining blue with heavy whitish tomentum; abdomen brighter, shiny blue with faint whitish tomentum. Postpronotal lobe 2x2; subcostal sclerite bare; outer posthumeral present; acrostichal setae 0:0; pleural area of thorax blue-black.

Redescription. *Male.* Head. Frons broad, 0.06/1 of head width at narrowest [only holotype male was available to measure]; fronto-orbital and parafacial golden when viewed from above, orange when viewed from below; frontal vitta orange, obliterated by broad fronto-orbitals about 1/3 of way up frons; gena orange with faint whitish tomentum and single row of stout setae from postgena through to bottom of parafacial; postgena orange with white tomentum and fine yellow setae; occiput with pale tomentum and weak yellow setae; median occipital sclerite shiny dark orange; palpus typical; pedicel and first flagellomere orange with pale tomentum, arista dark brown; eye with median facets about 2x size of lateral facets; frontal setae ascending about halfway to vertex; ocellar triangle medium-sized; facial ridge with just a few black supravibrissal setae in short row below.

Thorax. Dorsum with pale bluish tomentum and a pair of narrow tomentose stripes aligned with dorsocentral setae; pleural area like dorsum; chaetotaxy: ac 0:0, dc 2:2, ia 0, ph 1, ppn 2x2, kat 2:1, meral setae long and slender, as an inverted L with horizontal portion very short, composed of one or two setae, 1 pair converging ap, 1 stout bas, 1 disc, no other setae; subscutellum weakly developed; spiracles yellow-orange; legs: femora orange, tibiae mostly brown, tarsi darker brown. Wings hyaline; disc of upper calypter pale with brown rim and fringe of brown setae; disc and rim of lower calypter pale, rim with long pale setae; subcostal sclerite orange and bare; basicosta and tegula orange; section IV 0.15 of section III.

Abdomen bright shiny blue with faint whitish tomentum. T1–5 each with a pair of stout lateral marginal setae, T4 and T5 with rows of stout setae on posterior margins; disc of T5 with mid-dorsal horizontal row of stout setae, rest of disc with sparse, fine setae. *Terminalia*. Lateral view: surstylus parallel-sided with slight forward curve, cercus with apical hook, epandrium large (Fig. 41); in posterior view, base of cerci broad, distal 1/3 gradually narrowing to fine tip (Fig. 42); phallus in lateral view with epiphallus of medium width and with moderate backward curve (Fig. 131); in dorsal view, hypophallic lobes narrow (Fig. 132); T6, STS7+8, pre- and postgonite and ejaculatory sclerite as in Fig. 208; ST5 as in Fig. 251.

Female. Similar to male except frons 0.245 (0.23–0.25/4) of head width. T6 of RV shape with suture midway; T7 divided midway; T8 as two separate sclerites (Fig. 294); ST6–8 and hypoproct as in Fig. 338; spermathecae filiform (Fig. 380); ST1–5 as in Fig. 423.

Type material examined. HOLOTYPE ♂* (Venezuela, **Lara**; USNM; Fig. 463), labeled: VENEZUELA: Lara, / Parque Nac. / Yacambu / 6 – 8 – IV – 1981; A.S. Menke / L. Hollenberg / Collectors; HOLOTYPE / *Huascaromusca lara*. / S.R. Bonatto det. [red label]; USNMENT01288293.

Remarks. Bonatto & Marinoni (2005) provided added locality data for the specimen: 7°16′N 68°24′W. The specimen is in fairly good condition and is typical of other material examined in this study. It had been dissected by Bonatto; the rear half of T4 and all of T5 were removed and the terminalia were separated and placed in a vial under the specimen (except rear part of T4, which is missing).

PARATYPE: Venezuela. 1 ♂, Parque Nac. Yacambu, 6–8.iv.1981, A.S. Menke & L. Hollenberg (USNM).

Additional material examined. Venezuela, **Miranda.** 1 ♀♦* (TLW270), San Antonio de los Altos, IV, IC, 10°24′N 66°58′W, 1680 m, iv.2003, Y. Velásquez (MIZA); 1 ♀, El Hatillo, Las Marías, 1350 m, 26.v.1976, F. Kaletta (MIZA); 1 ♀, Falcon Curimagus, 1640 m, 22.III.1987, cloud forest, R. Miller & R.L. Stange (FSCA).

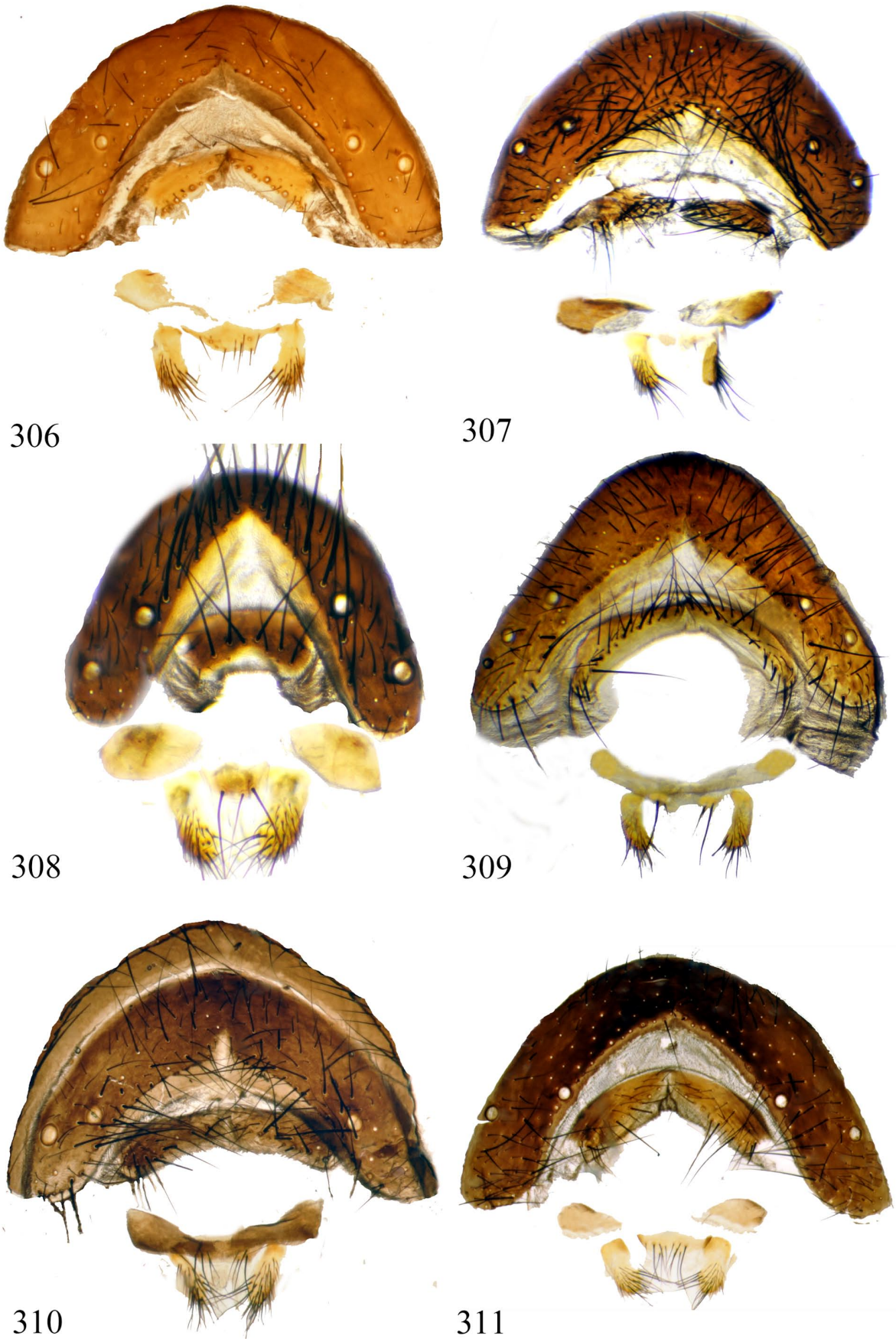
Distribution. Venezuela.

Remarks. A single specimen (TLW270) was barcoded; it was recovered in a distinct group close to *M. uniseta* and M. *bullata* (Fig. 488). More specimens are needed to fully resolve relationships within this group.

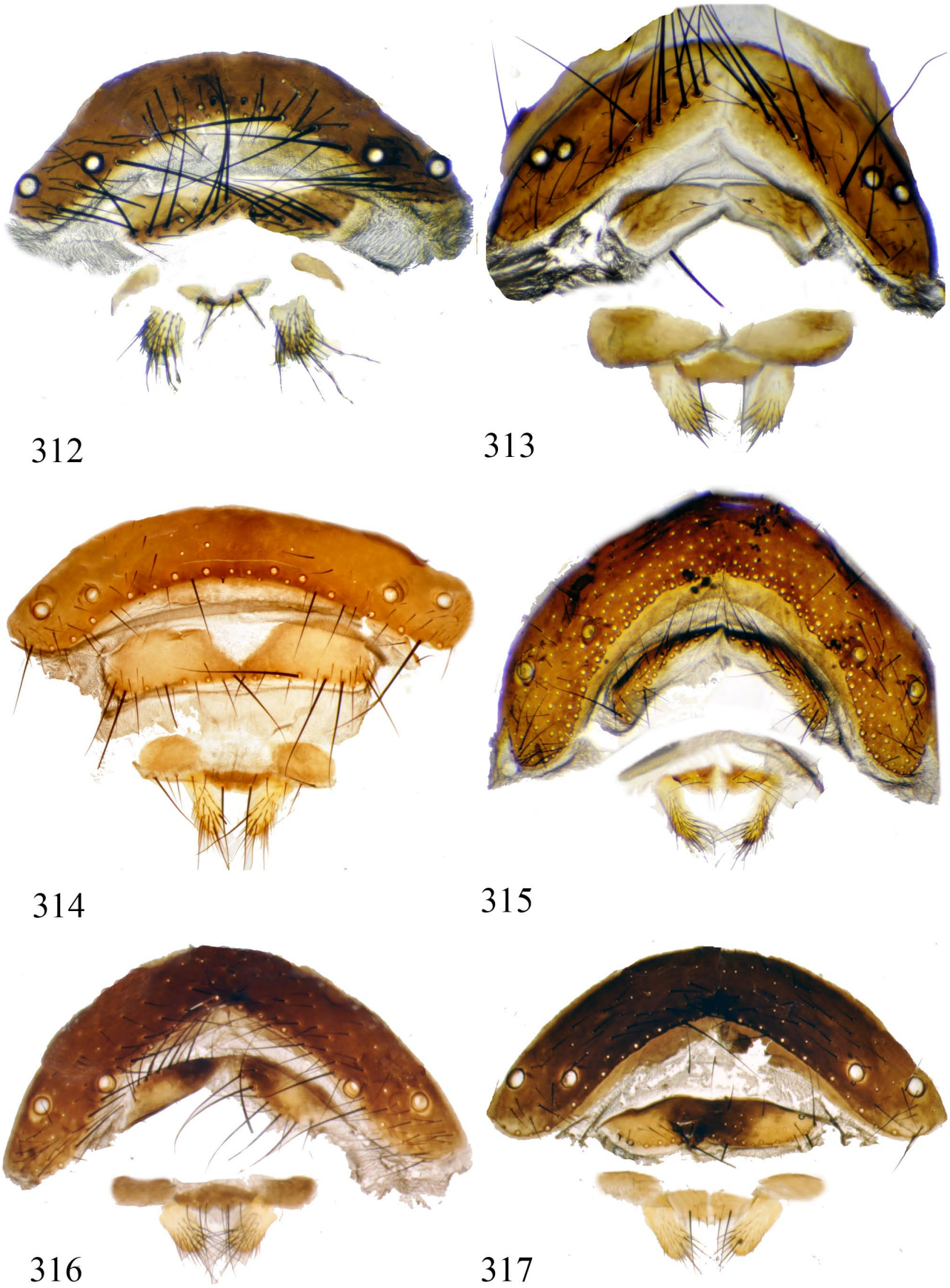
Mesembrinella nigrocoerulea Whitworth, sp. nov.

(Figs 43–44, 133–134, 209, 252, 295, 339, 381, 424, 464, 488)

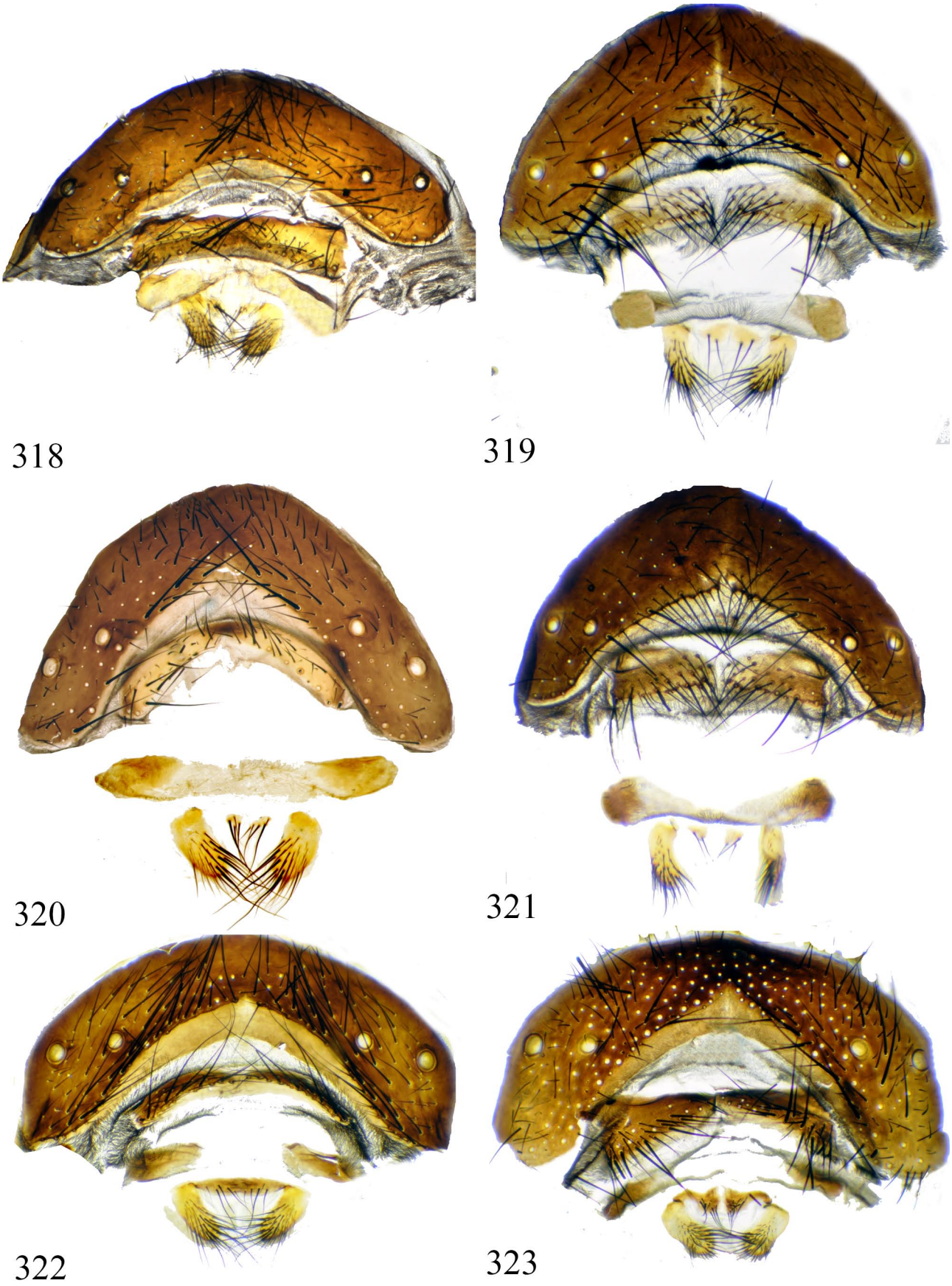
Diagnosis. A small to medium-sized blue-black fly averaging 9.8 mm (7–11/5) in length. Postpronotal lobe with 2x2 setae; subcostal sclerite bare; 1 ph; pleural area of thorax and femora orange; tibiae and tarsi brown; ac 1:1; male frons narrow, 0.039 of head width at narrowest. T1+2 of abdomen orange, T3–5 shiny purple with whitish tomentum.



FIGURES 306–311. Female terminalia (T6–T8, epiproct, cerci) of *Mesembrinella* spp., dorsal view. **306.** *M. bicolor* (Fabricius). **307.** *M. brunnipes* Surcouf **308.** *M. bullata* **sp. nov. 309.** *M. chantryi* **sp. nov. 310.** *M. currani* Guimarães. **311.** *M. cyaneicincta* (Surcouf).



FIGURES 312–317. Female terminalia (T6–T8, epiproct, cerci) of *Mesembrinella* spp., dorsal view. **312.** *M. flavicrura* Aldrich. **313.** *M. longicercus* **sp. nov. 314.** *M. peregrina* Aldrich. **315.** *M. pictipennis* Aldrich. **316.** *M. quadrilineata* (Fabricius). **317.** *M. randa* (Walker).



FIGURES 318–323. Female terminalia (T6–T8, epiproct, cerci) of *Mesembrinella* spp., dorsal view. **318.** *M. semihyalina* Mello. **319.** *M. serrata* **sp. nov. 320.** *M. socors* (Walker). **321.** *M. townsendi* Guimarães. **322.** *M. umbrosa* Aldrich. **323.** *M. velasquezae* **sp. nov.**

FIGURES 324–325. Female terminalia (T6–T8, epiproct, cerci) of Mesembrinellidae, dorsal view. **324.** *Mesembrinella anomala* (Guimarães). **325.** *Souzalopesiella facialis* (Aldrich).

Description. *Male.* Head. Frons narrow, 0.039 (0.030–0.050/5) of head width at narrowest, about same width as parafacial midway; fronto-orbital slender, silvery when viewed from above, orange when viewed from below, frontal setae ascending about halfway to vertex; frontal vitta reddish anteriorly, obliterated in upper half; parafacial narrow, silvery when viewed from above, orange below; gena orange with typical horizontal row of stout setae; postgena orange with a few dark setae anteriorly, remainder with long, slender golden setae; occiput with whitish tomentum and fine yellow setae, upper edge just below row of postoccipital setae shiny black; median occipital sclerite shiny black; palpus typical; antenna orange; eye with median facets about 2x size of lateral facets; ocellar triangle of moderate size, anterior ocellus and posterior ocelli about equal in size; small cluster of supravibrissal setae at base of facial ridge.

Thorax. Dorsum shiny brown with pale tomentum, faint purple highlights and four slender tan tomentose stripes; pleural area yellow-orange; chaetotaxy: ac 1:1, dc 2:3, ia 0, ph1, ppn 2x2, kat 1:1, 1 pair converging ap, sa absent, 1 weak lat, 1 stout bas, 1 pb weak, 1 disc; subscutellum weakly developed; spiracles medium-sized, pale orange; legs: femora orange, tibiae and tarsi brown. Wing faintly yellow, small darker yellow area along costa near wing base, best seen under reflected light; section IV of wing 0.010 of section III; basicosta pale yellow, tegula orange.

Abdomen. T1+2–5 purplish with whitish tomentum; T1+2 with cluster of lateral marginal setae midway and a pair of stout lateral marginal setae; posterior margin of T3 with pair of lateral setae; rear margin of T4 and T5 with rows of stout setae; disc of T5 with mid-dorsal horizontal row of stout setae, rest of disc with sparse, fine setae. *Terminalia*. In lateral view, surstylus with slight anterior bend at base then straight to tip, cercus with apical hook (Fig. 43); in posterior view, base of cerci broad, tapered steadily to tip (Fig. 44); phallus in lateral view with short epiphallus (Fig. 133); in dorsal view with narrow hypophallic lobes (Fig. 134); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 209; ST1–5 as in Fig. 252.

Female. Similar to male except frons 0.22 (0.21–0.23/5) of head width at narrowest. T6 of RV shape; T7 in wide arc, posterior edge unsclerotized midway; T8 bilobed narrowly joined above; epiproct bilobed (Fig. 295); ST6–8 and hypoproct as in Fig. 339; spermathecae filiform (Fig. 381); ST1–5 as in Fig. 424.

Type material. HOLOTYPE ♂ (Costa Rica, **Puntarenas**; INBIO; Fig. 464), labeled: Est. Pittier, Prov. Punta [= Puntarenas Province], COSTA RICA / 1670m. 22 JUN-4 JUL 1995. E. / Alfaro, L_S_330900 577400 #5928; COSTA RICA INBIO /CRI002 / 387098; HOLOTYPE / Mesembrinella / nigrocoerulea / T.L. Whitworth.

ALLOTYPE ♀♦ (TLW328): Costa Rica, **Limón.** R.B. Hitoy Cerere, Valle de la Estella Send. Espavel, 560 m, 27–30.ix.2003, W. Arana (INBIO).

PARATYPES: Costa Rica, **Alajuela.** 1 ♀*, Arenal Monteverde Eladio's, 830 m, 26–28.x.2006, J. Azofeifa (INBIO). **Guanacaste.** 1 ♂*, 1 ♂, Est Pitilla, 9 km S Sta Cecilia, iv.1991, C. Moraga (INBIO). **Puntarenas.** 1 ♀♦ (TLW326), Golfito P.N. Corcovado, Est Sirena, Send. Corcovado, 10 m, 23.xi.2001, #66630, K. Caballero (INBIO);

1 ♀♦* (TLW327), same data except 13.x.2001, #65635 (INBIO). Ecuador, **Santo Domingo de los Tsáchilas.** 1 ♂*, Pich. E., Sto Domingo [Santo Domingo], 6–12.v.1990, W.J. Hanson (LACM). Venezuela, **Miranda.** Parque Nac. Guatopo, 24 km N Altagracia de Orituco, 640 m, 5–9.v.1975 (INBIO).

Distribution. Costa Rica, Ecuador, Venezuela.

Remarks. Three specimens (TLW326–327 and TLW331) were barcoded. They clustered together, close to *M. violacea* (Fig. 488)

Etymology. The species name *nigrocoerulea* is a combination of the Latin *nige*r (black) and *coeruleus* (blue) and was selected because the species has a distinctive black and blue body color.

Mesembrinella obscura (Wolff, 2017)

Huascaromusca obscura Wolff *in* Wolff *et al.*, 2017: 253. Holotype male (CEUA), not examined. Type locality: Vereda La Floresta, Jardín, Antioquia, Colombia.
Mesembrinella obscura: Cerretti *et al.* (2017: tab. 2).

Diagnosis. Postpronotal lobe with 3x3 setae; subcostal sclerite bare; legs entirely dark; spiracles black; ac 0:1; outer ph 1.

Redescription. [Summarized from Wolff *et al.* (2017).] *Male.* A medium-sized dark blue fly with bright blue reflections. Frons 0.058 (0.044–0.69/8) of head width at narrowest. Scutellar chaetotaxy: 1 ap, 1 bas, 1 pb, 1 disc. Wing mostly hyaline, with slight darkening at base and around crossvein r-m. Epandrium, cerci and surstyli and other characters as in Wolff *et al.* (2017: figs 5–11).

Female. Wolff *et al.* (2017) give female frons width at narrowest as 0.238 (0.228–0.250/10). Terminalia not illustrated or described in detail.

Material examined. None (no specimens could be obtained for examination).

Distribution. Colombia.

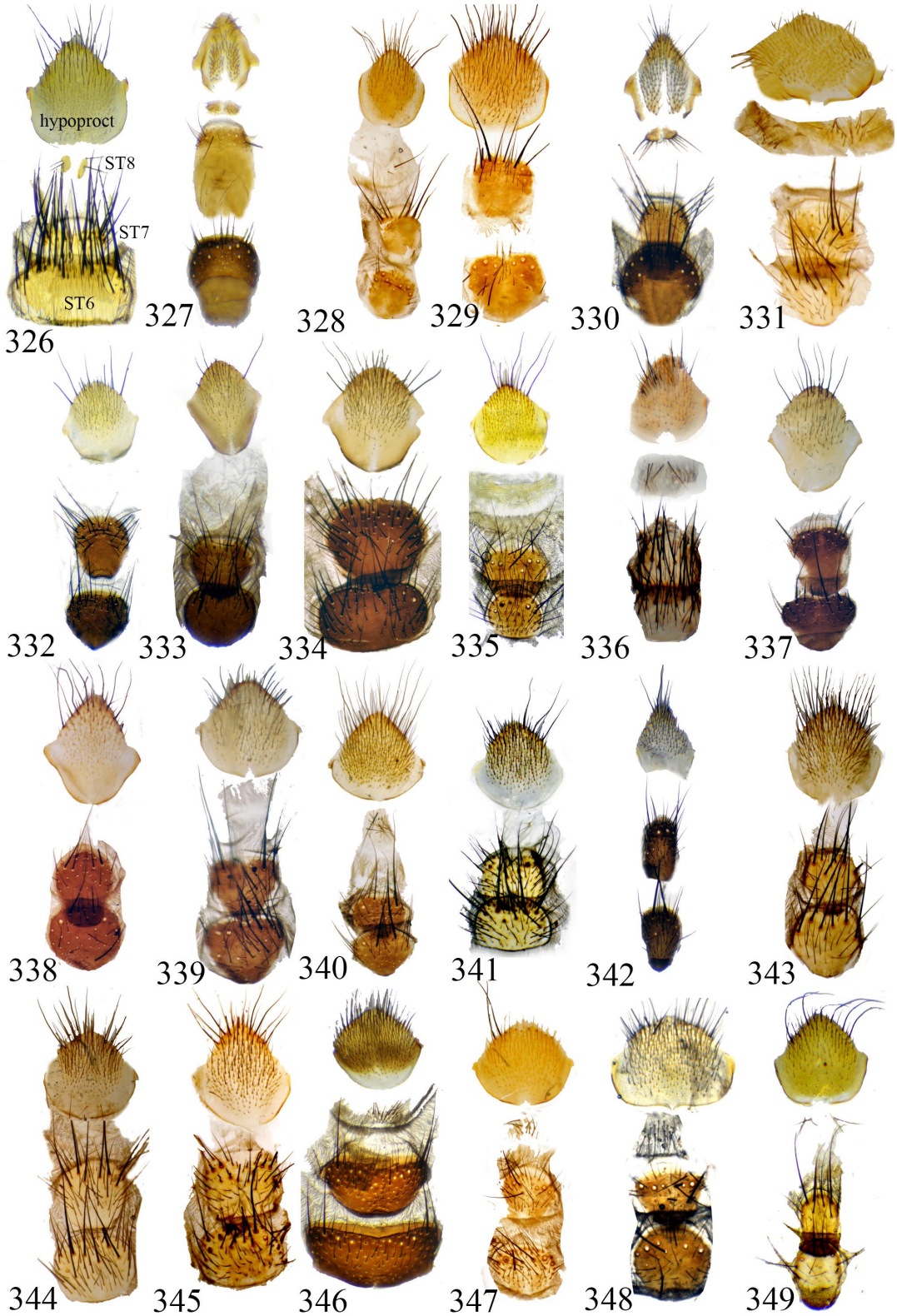
Mesembrinella purpurata Aldrich, 1922
(Figs 45–46, 135–136, 210, 253, 296, 340, 382, 425, 465)

Mesembrinella purpurata Aldrich, 1922: 16. Holotype male (USNM), examined. Type locality: Espirito Santo, Brazil.
Huascaromusca purpurata: Peris & Mariluis (1984: 255); Kosmann *et al.* (2013: 77); Wolff *et al.* (2017: 253); Marinho *et al.* (2017: tab. 1).
Mesembrinella purpurata: Cerretti *et al.* (2017: tab. 2).

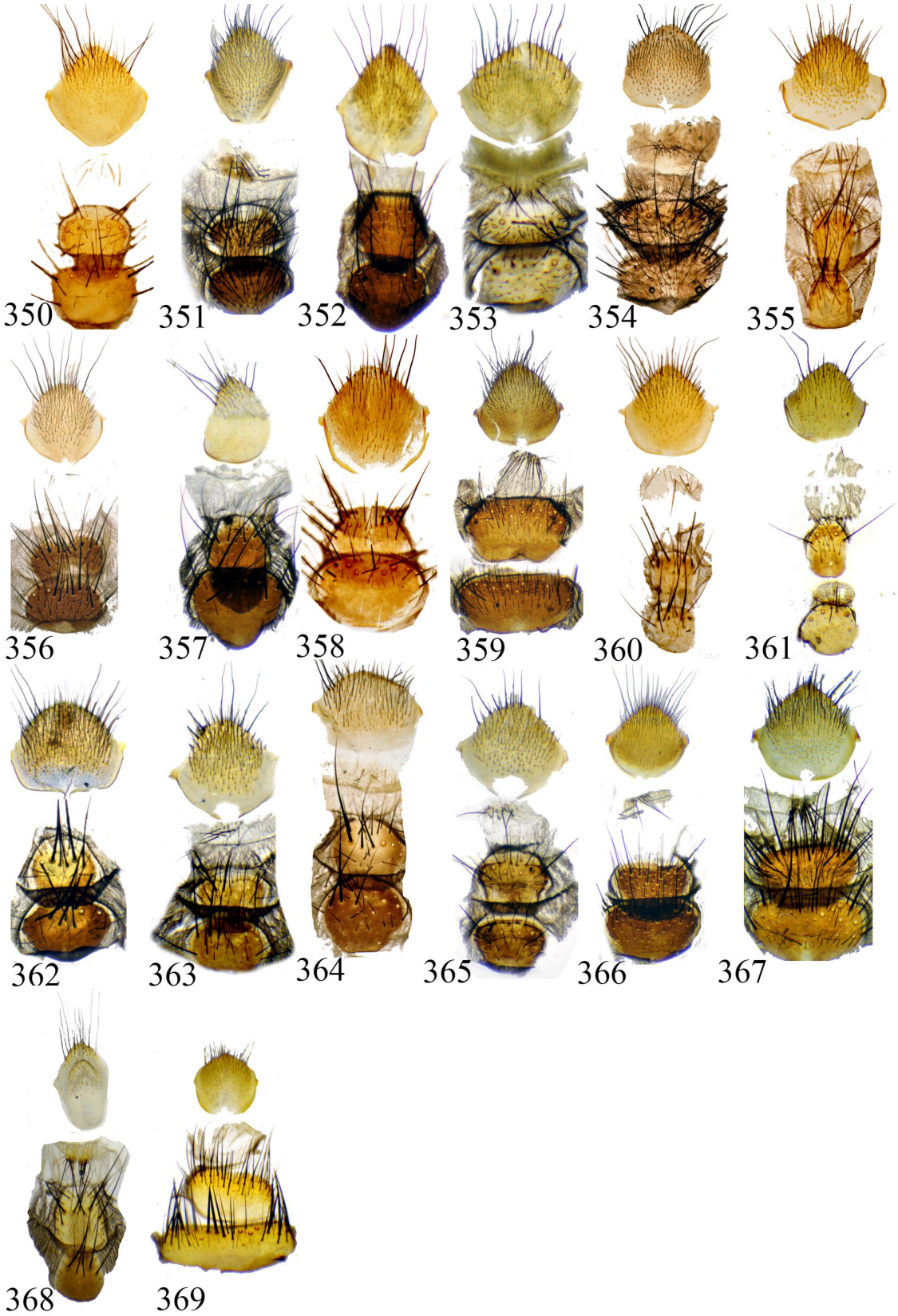
Diagnosis. A medium-sized fly averaging 10.6 mm (10–11/5) in length; postpronotal setae 2x2; subcostal sclerite bare; outer posthumeral seta absent; wing with well-defined macula along costa.

Redescription. *Male.* Head. Frons narrow, 0.018 (0.015–0.020/4) of head width at narrowest; fronto-orbital, frontal vitta and parafacial dull orange [holotype lacking tomentum, but better preserved specimens have whitish tomentum], frontal vitta reduced to thin strip about halfway to ocellar triangle; gena and postgena dull orange with whitish tomentum, gena with small brown setae and horizontal row of stout setae from postgena across to lower parafacial; postgena with long silky orange setae; palpus typical; antenna orange; first flagellomere with pale tomentum; occipital area with upper edge subshining black, remainder with silvery tomentum and fine pale setae; median occipital sclerite shiny black in upper area, orange in lower area; eye with median facets about 3x size of lateral facets; frontal setae ascending about 30% of distance to vertex; ocellar triangle orange with ocelli about equal in size; a few supravibrissal setae at base of facial ridge.

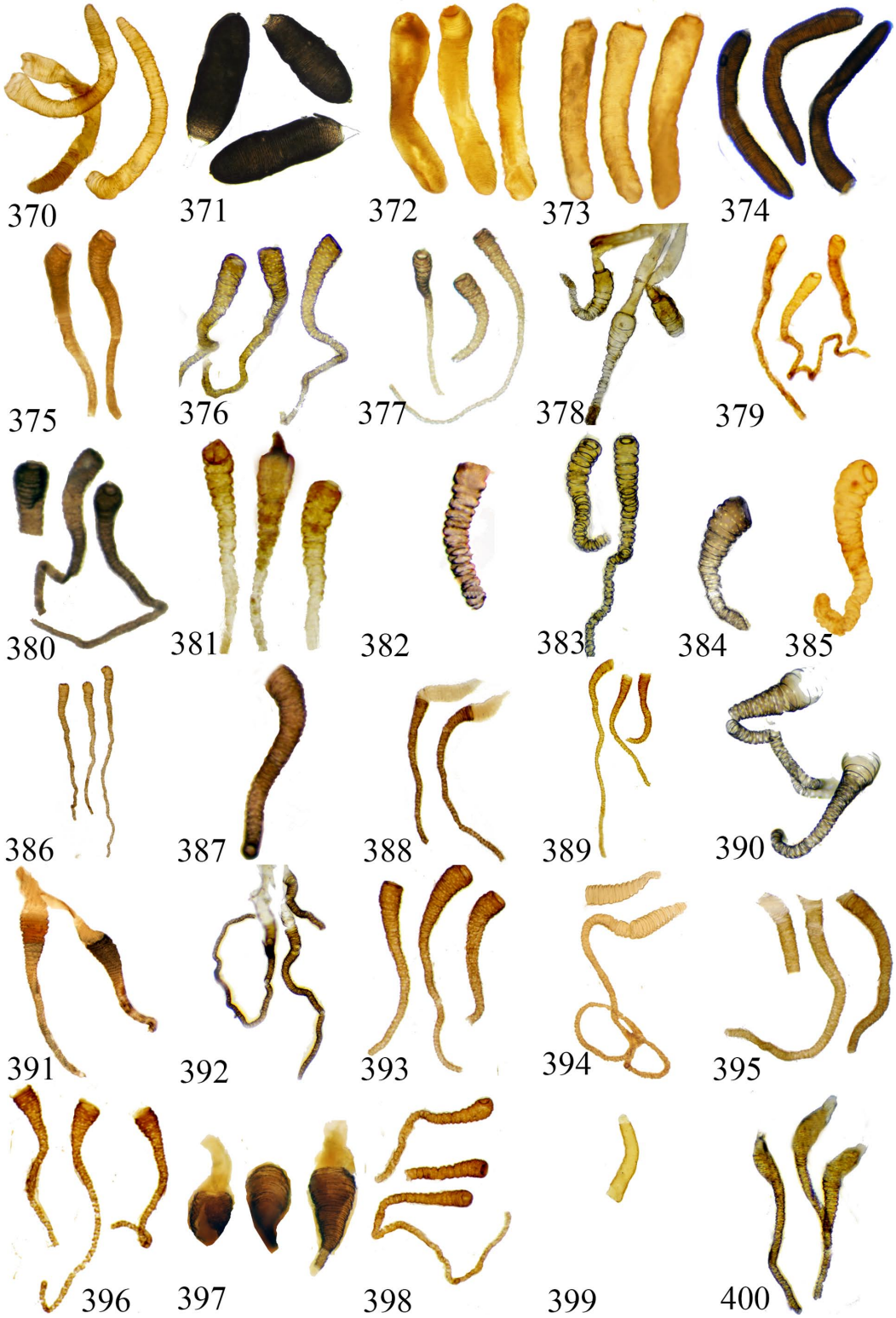
Thorax. Dorsum shiny orange-brown with whitish tomentum forming two stripes midway and with two anterolateral bare patches; pleura orange; chaetotaxy: ac 0:1, dc 2:3, ia 0, ph 0, ppn 2x2, kat 2:1, meron with long, slender tan setae, 1 pair of converging ap setae, sa absent, 1 weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum weakly developed; anterior spiracle yellow, posterior spiracle pale orange; legs: femora orange, apices of mid and hind femora darkened; tibiae and tarsi brown. Wing with well-defined infuscation along costa from base of subcosta to where R_{2+3} joins costa, remainder hyaline; subcostal sclerite orange and bare; basicosta and tegula orange; section IV 0.20 of section III; upper calypter with center of disc tan, outer edge white, rim dark with short tan setae; disc of lower calypter tan, rim with long white setae.



FIGURES 326–349. ST6–8 and hypoproct of Mesembrinellidae. **326.** *Laneella fusconitida* **sp. nov. 327.** *L. fuscosquamata* **sp. nov. 328.** *L. nigripes* Guimarães. **329.** *L. perisi* (Mariluis). **330.** *L. purpurea* **sp. nov. 331.** *Mesembrinella latifrons* (Mello). **332.** *M. guaramacalensis* **sp. nov. 333.** *M. mexicana* **sp. nov. 334.** *M. spicata* Aldrich. **335.** *M. epandrioaurantia* **sp. nov. 336.** *M. aeneiventris* (Wiedemann). **337.** *M. decrepita* Séguy. **338.** *M. lara* (Bonatto). **339.** *M. nigrocoerulea* **sp. nov. 340.** *M. purpurata* Aldrich. **341.** *M. semiflava* Aldrich. **342.** *M. uniseta* Aldrich. **343.** *M. violacea* **sp. nov. 344.** *M. vogelsangi* (Mello). **345.** *M. zurquiensis* **sp. nov. 346.** *M. apollinaris* Séguy. **347.** *M. batesi* Aldrich. **348.** *M. bellardiana* Aldrich. **349.** *M. benoisti* (Séguy).



FIGURES 350–369. ST6–8 and hypoproct of Mesembrinellidae. **350.** *M. bicolor* (Fabricius). **351.** *M. brunnipes* Surcouf. **352.** *M. bullata* **sp. nov. 353.** *M. chantryi* **sp. nov. 354.** *M. currani* Guimarães. **355.** *M. cyaneicincta* (Surcouf). **356.** *M. flavicrura* Aldrich. **357.** *M. longicercus* **sp. nov. 358.** *M. peregrina* Aldrich. **359.** *M. pictipennis* Aldrich. **360.** *M. quadrilineata* (Fabricius). **361.** *M. randa* (Walker). **362.** *M. semihyalina* Mello. **363.** *M. serrata* **sp. nov. 364.** *M. socors* (Walker). **365.** *M. townsendi* Guimarães. **366.** *M. umbrosa* Aldrich. **367.** *M. velasquezae* **sp. nov. 368.** *M. anomala* (Guimarães). **369.** *Souzalopesiella facialis* (Aldrich).



FIGURES 370–400. Spermathecae of Mesembrinellidae. **370.** *L. fusconitida* **sp. nov. 371.** *L. fuscosquamata* **sp. nov. 372.** *L. nigripes* Guimarães. **373.** *L. perisi* (Mariluis). **374.** *L. purpurea* **sp. nov. 375.** *Mesembrinella guaramacalensis* **sp. nov. 376.** *M. mexicana* **sp. nov. 377.** *M. spicata* Aldrich. **378.** *M. aeneiventris* (Wiedemann). **379.** *M. decrepita* Séguy. **380.** *M. lara* (Bonatto). **381.** *M. nigrocoerulea* **sp. nov. 382.** *M. purpurata* Aldrich. **383.** *M. semiflava* Aldrich. **384.** *M. uniseta* Aldrich. **385.** *M. vogelsangi* (Mello). **386.** *M. zurquiensis* **sp. nov. 387.** *M. apollinaris* Séguy. **388.** *M. batesi* Aldrich. **389.** *M. bellardiana* Aldrich. **390.** *M. benoisti* (Séguy). **391.** *M. bicolor* (Fabricius). **392.** *M. brunnipes* Surcouf. **393.** *M. bullata* **sp. nov. 394.** *M. chantryi* **sp. nov. 395.** *M. currani* Guimarães. **396.** *M. cyaneicincta* (Surcouf). **397.** *M. flavicrura* Aldrich. **398.** *M. longicercus* **sp. nov. 399.** *M. peregrina* Aldrich. **400.** *M. pictipennis* Aldrich.

Abdomen. Anterior half of T1+2 orange, remainder brown; T3–5 brown with pale tomentum and purple highlights. T1–4 each with pair of lateral setae; posterior margin of T4 with row of stout setae; disc of T5 with mid-dorsal horizontal row of stout setae, rest of disc with sparse, fine setae. *Terminalia* in lateral view with surstylus parallel-sided, long and slender, slightly expanded distally (Fig. 45); in posterior view, surstylus long and slender with inward curve (Fig. 46); phallus in left lateral view with epiphallus slender and curved posteriorly (Fig. 135); in dorsal view, hypophallic lobes slightly expanded (Fig.136); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 210; sternites with ST 3–4 narrow (Fig. 253).

Female. Similar to male except frons wider, 0.225 (0.22–0.23/2) of head width at narrowest. T6 of RV shape; T7 divided midway; T8 as two separate sclerites; epiproct divided (Fig. 296); ST6–8 and hypoproct as in Fig. 340; spermathecae filiform (Fig. 382); ST2–5 as in Fig. 425.

Type material examined. HOLOTYPE ♂ (Brazil, **Espirito Santo**; USNM; Fig. 465), labeled: T. María / 12.06.99 / M. Rodriguez; Espir. [= Espirito] / Santo; Mesembrinella / purpurata / Ald.; Type No. / 25825 [red label].

Remarks. The holotype is in fairly good condition, but the head lacks the whitish tomentum seen on better specimens; the antenna is missing on one side and the arista is missing on the other.

Additional material examined. Brazil, **São Paulo.** 2 ♂♂*, 1 ♂, Estacão Biológica Boracéia, Salesópolis, 16.iii.1972, J.H. Guimarães (USNM); 1 ♀, same data except 30.iv.2011, DZ, IBUSP (USNM); same data except ♀♦ (TLW390) (USNM). Peru, **Huánuco.** 1 ♀*, T. Maria, 17.vi.1999, M. Rodriguez (CEUA). **Cusco.** 1 ♀, Quincemil, 1–15.xi.1962, 700 m, L. Pena (CNC).

Distribution. Brazil. Guimarães (1977) also listed it from Ecuador and Peru.

Remarks. No specimens were barcoded.

Mesembrinella semiflava Aldrich, 1925

(Figs 47–48, 137–138, 211, 254, 297, 341, 383, 426, 466)

Mesembrinella semiflava Aldrich, 1925: 14. Holotype male (USNM), examined photographically. Type locality: La Suiza de Turrialba, Costa Rica.

Huascaromusca semiflava: Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 867); Wolff *et al.* (2017: 253); Marinho *et al.* (2017: tab. 1).

Mesembrinella semiflava: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized fly averaging 10.6 mm (9–12/5) in length; ppn with 2x2 setae; subcostal sclerite bare; outer posthumeral seta absent; wing hyaline; T1+2 and anterior third or more of T3 yellow-orange; femora orange; katepisternum 2:1, often with a second small seta posteriorly.

Redescription. *Male.* Head. Frons 0.043 (0.04–0.05/3) of head width at narrowest. Fronto-orbital silvery when viewed from above, pale orange when viewed from below; frontal setae ascending about halfway to vertex; frontal vitta orange, obliterated about 40% of distance to vertex; parafacial slender, silvery when viewed from above, orange below; gena pale orange with silvery tomentum and with a few dark setae anteriorly, with pale fine setae posteriorly; postgena yellowish with pale tomentum and golden setae; occiput with shiny black upper edge, remainder with silvery tomentum and fine tan setae; median occipital sclerite shiny black; antenna: pedicel and first flagellomere yellow-orange, arista brown; palpus typical; ocellar triangle medium-sized, anterior ocellus 1.5x size of posterior ocelli; supravibrissal setae weak, clustered at base of facial ridge.

Thorax with whitish tomentose stripes; pleura all orange; chaetotaxy: ac 0:1, dc 2:3, ia 0, ph 0, ppn 2x2, kat 2:1 [may have an extra weak posterior seta; this condition is variable but fairly common], horizontal portion of meral setae composed of only a couple of setae, 1 pair converging ap, sa absent, 1 lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum weakly developed; spiracles small, yellow-orange; legs: trochanters and femora orange, tibiae and tarsi brown. Wing hyaline, faintly yellowish, slightly darker yellow along costa; subcostal sclerite bare; basicosta yellow, tegula orange; section IV 0.14 of section III; disc of both calypters pale yellow; rim of upper calypter dark with pale setae, rim of lower calypter pale with long golden setae.

Abdomen. T1+2 yellow-orange, anterior 2/3 of T3 yellow-orange, rear 1/3 of T3 darker, often with inverted V pattern mid-dorsally; T4–5 shiny blue-purple with whitish tomentum; T1+2 with cluster of stout lateral marginal setae and single seta posteriorly; T3 with lateral marginal seta; T4–5 each with row of marginal setae; disc

of T5 with mid-dorsal horizontal row of stout setae, rest of disc with sparse, fine setae. *Terminalia* in lateral view with surstylus straight, parallel-sided, cercus with apical hook (Fig. 47); in posterior view, cerci broad at base, tapering to tip (Fig. 48); phallus in lateral view with short stout epiphallus (Fig. 137); in dorsal view, hypophallic lobes slightly expanded with coarse serrations (Fig. 138). T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 211; ST2–5 as in Fig. 254.

Female. Similar to male except frons 0.194 (0.18–0.20/5) of head width at narrowest and abdomen lacking arrow-like mid-dorsal black area on T3 (found in some males), that area orange. T6 of OV shape; T7 continuous, narrowed midway; T8 thinned and translucent midway; epiproct bilobed (Fig. 297); ST6–8 and hypoproct as in Fig. 341; spermathecae filiform (Fig. 383); ST1–5 as in Fig. 426.

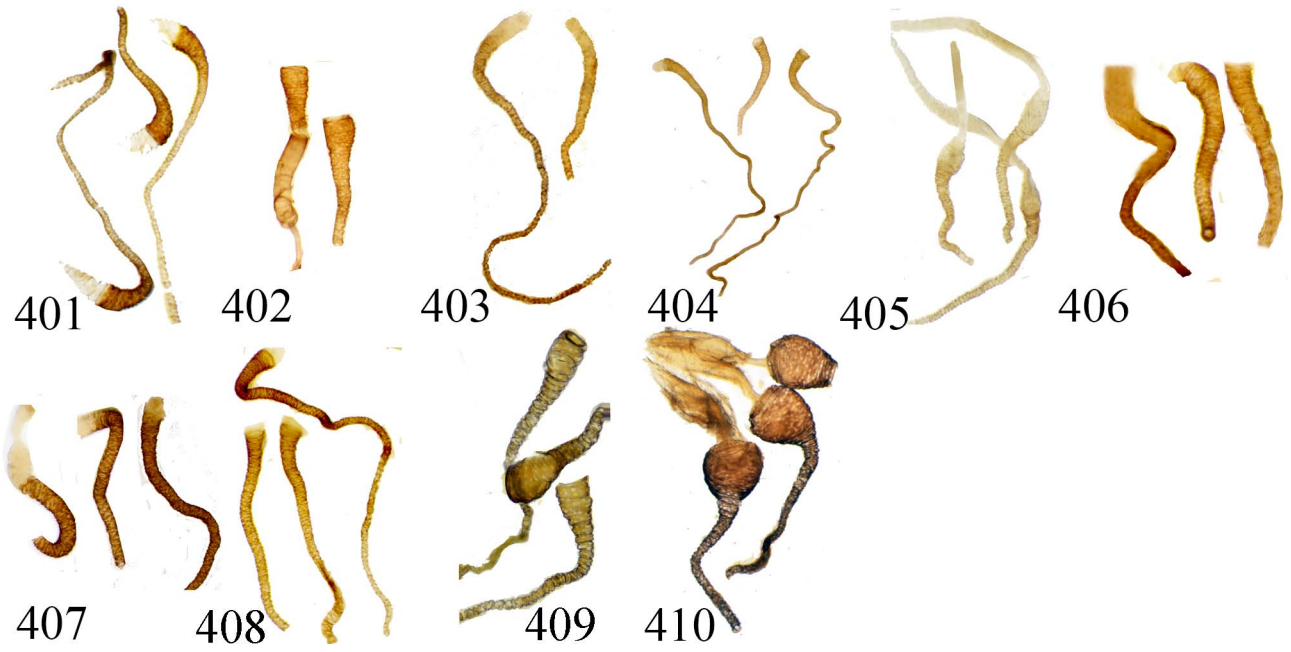
Type material examined. HOLOTYPE ♂ (Costa Rica, **Cartago**; USNM; examined photographically: Fig. 466), labeled: COSTA RICA / La Suiza '23 [= 1923] / Pab. Schild; 16 III [apparently day and month]; AL Melander / Collection / 1961; USNMENT / 01295434; Mesembrinella / semiflava / Ald..

PARATYPE: Costa Rica. 1 ♀, La Suiza, Pablo Schild, 28.ii.1923, paratype 26799 (USNM).

Additional material examined. Costa Rica, **Cartago.** 1 ♂*, Quebrada Segunda, P.N. Tapanti, 1250 m, iii.1992, L_N_194000 560000, G. Mora (INBIO); 1 ♀♦ (TLW286), Turrialba P.N., Barbilla Cerro Tigre, 1400 m, 16.iv.2002, B. Hernández (INBIO); 1 ♀♦ (TLW287), Pejibaye Estación, Biológica Copal Sendero Garvula, Cima 1090 m, 8.iv.2005, B. Gambon (INBIO). **Heredia.** 1 ♀*, Sarapiqui P.N., Braulio Carillo Send. El Saino al Rio Peje, 400–500 m, 18.ix.2005, M. Ballestero, A. Peraza (INBIO). **Puntarenas.** 1 ♂*, 1 ♂, San Vito, Rio Jaba, 8°46′N 82°57′W, 1100 m, 24.i.1998, D.M. Wood (CNC); 1 ♀, Est. Altamira Sendero al Rio Platanillal, 1100 m, 21.ii–16iii. 1972, R. Villalobos (INBIO). Ecuador, **Pichincha.** 1 ♀, Maguipucuna Biol. Res., 0.12°N 78°.63°W, 24–25.ii.1996, P. Hibbs (LACM).

Distribution. Costa Rica, Ecuador.

Remarks. Three specimens were extracted; the DNA recovered was of too low quality to obtain good barcodes, therefore they were not included in the NJ analysis.



FIGURES 401–410. Spermathecae of Mesembrinellidae. **401.** *Mesembrinella quadrilineata* (Fabricius). **402.** *M. randa* (Walker). **403.** *M. semihyalina* Mello. **404.** *M. serrata* **sp. nov. 405.** *M. socors* (Walker). **406.** *M. townsendi* Guimarães. **407.** *M. umbrosa* Aldrich. **408.** *M. velasquezae* **sp. nov. 409.** *M. anomala* (Guimarães). **410.** *Souzalopesiella facialis* (Aldrich).

Mesembrinella uniseta Aldrich, 1925

(Figs 49–50, 139–140, 212, 255, 298, 342, 384, 427, 467, 488)

Mesembrinella uniseta Aldrich, 1925: 13. Holotype male (USNM), examined. Type locality: La Suiza de Turrialba, Costa Rica.

Huascaromusca uniseta: Hall (1948: 84, transferred to *Huascaromusca*); Kosmann *et al*. (2013: 77); Wolff *et al.* (2017: 253); Marinho *et al.* (2017: tab. 1).

Mesembrinella uniseta: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized blue-black fly averaging 9.8 mm (9–10/5) in length. Postpronotal lobe with 3x3 setae; subcostal sclerite bare; femora dark; anterior thoracic spiracle pale. Male frons exceptionally wide, about 0.14 of head width at narrowest.

Redescription. *Male*. Head. Frons broad, 0.136 (0.13–0.15/5) of head width at narrowest. Fronto-orbital, frontal vitta and parafacial pale yellow-gold when viewed from above, orange when viewed from below; fronto-orbital with row of setae ascending about 2/3 up frons, ending with a few weak setae below ocellar triangle; lower 1/4 frontal vitta orange, the rest black; gena with horizontal row of stout black setae extending from postgena across to lower parafacial; postgena dark with silvery tomentum, anterodorsal edge with dark setae, remainder with long silky yellow setae; palpus typical; antenna, pedicel and first flagellomere orange, base of arista orange, remainder brown; occiput blue with pale tomentum; upper 1/3 of occiput with short dark setae, lower 2/3 with pale setae; median occipital sclerite shiny, upper edge bluish, remainder black; eye with facets uniform in size; ocellar triangle medium-sized; anterior ocellus slightly larger than posterior ocelli; facial ridge with small cluster of black supravibrissal setae at base.

Thorax. Dorsum and pleura dark blue with whitish tomentose stripes and a pair of polished areas dorsolaterally in presutural area; chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 1, ppn 3x3, kat, 2:1, meron with long slender black setae, 1 pair converging ap, sa absent, sometimes 1 weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum prominently developed; anterior spiracle pale yellow, posterior spiracle darker orange; legs brown except small orange area at joint of femora and tibiae. Wing hyaline; section IV 0.10 of section III; disc of upper calypter tan, rim dark with long tan setae; disc of lower calypter tan, rim tan with long pale setae; subcostal sclerite tan with pubescence only; basicosta yellow-brown, tegula dark brown.

Abdomen blue with whitish tomentum, with pair of stout setae on lateral margins of T1–5; row of stout setae on posterior margins of T4–5, disc of T5 with row of stout setae midway, rest of disc with sparse, fine setae. *Terminalia* in lateral view with surstylus narrow at base, expanded midway and narrower at tip (Fig. 49); in posterior view, cerci short and broad, unlike in other species of the genus (Fig. 50); phallus in lateral view as in Fig. 139; in dorsal view, hypophallic lobes very narrow (Fig. 140); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 212; ST1–5 as in Fig. 255.

Female. Similar to male except frons 0.246 (0.23–0.26/5) of head width at narrowest. T6 of OU shape; T7 continuous, narrowed midway; T8 as two widely separated sclerites; epiproct bilobed (Fig. 298); ST6–8 and hypoproct as in Fig. 342; spermathecae filiform (Fig. 384); ST2–5 as in Fig. 427.

Type material examined. HOLOTYPE ♂ (Costa Rica, **Cartago**; USNM; Fig. 467), labeled: COSTA RICA / La Suiza ’23 [= 1923] / Pab. Schild; 29 III [probably 29 March]; Mesembrinella / uniseta / Ald.; AL Melander / Collection / 1961; Type / 26798 / No. / U.S.N.M. [red label]; USNMENT01288287.

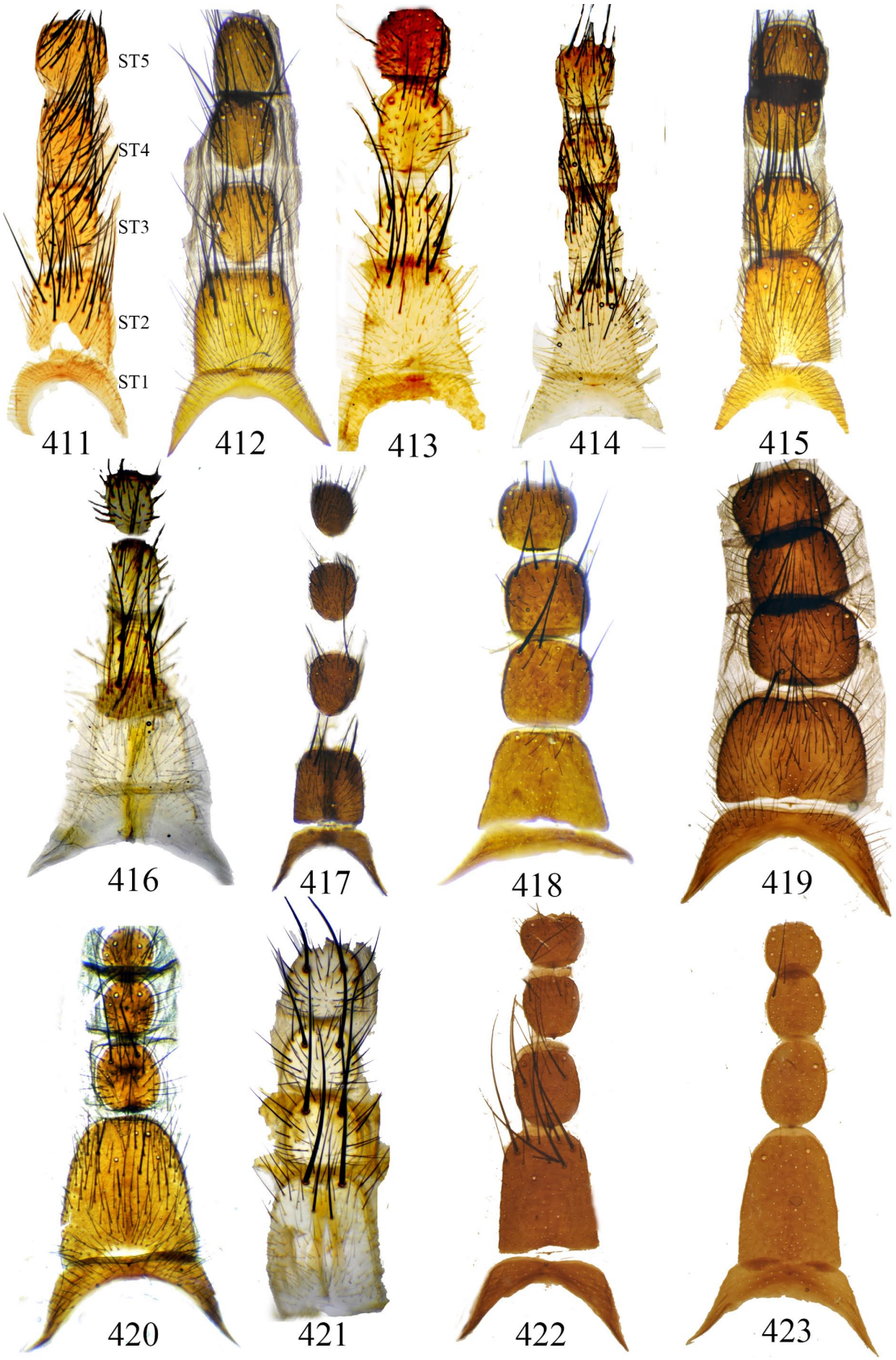
Remarks. Aldrich (1925) stated that the number was 26797 but the specimen label on the type says 26798.

PARATYPES: Costa Rica, **Cartago.** 1 ♂, 1 ♀ [both labeled “paratype #26798”], La Suiza, 29.iii.1923, Pablo Schild (USNM); 1 ♂, 1 ♀ [both labeled “paratype #26798”], same data as previous (NHMUK).

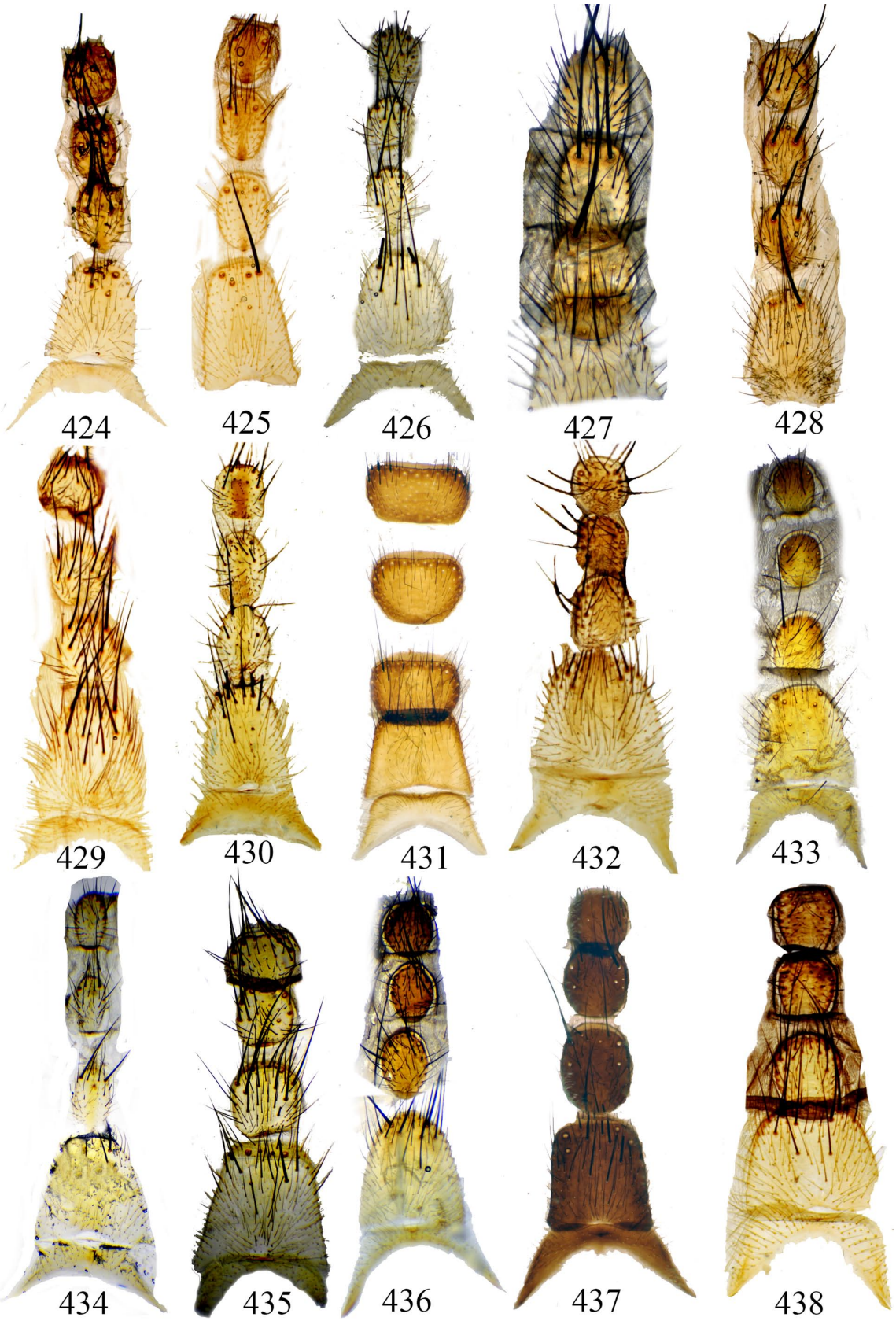
Additional material examined. Costa Rica, **Cartago.** 1 ♂*, 1 ♂♦ (TLW408), 1 ♀*, 1 ♀, R. Grande de Orosi desde Administracion hasta Send. La Pava, 1150–1600 m, ii.1997, R. Guzmán (INBIO); 1 ♂, 1 ♀, R. Grande de Orosi, desde Administración hasta Send. La Pava, 1150–1600 m, ii.1997, L_N_192500 560400 #45463, R. Guzmán (INBIO); 1 ♂♦ (TLW404), 1 ♂♦* (TLW405, terminalia glued on pin), 1 ♂, 1 ♀*, Tapanti, Quebrada Segunda, Orilla del Rio Grande de Orosi, 1–150 m, 18–20.ii.1997, L_N_192500 560401 #45297, M. Segura (INBIO).

Distribution. Costa Rica.

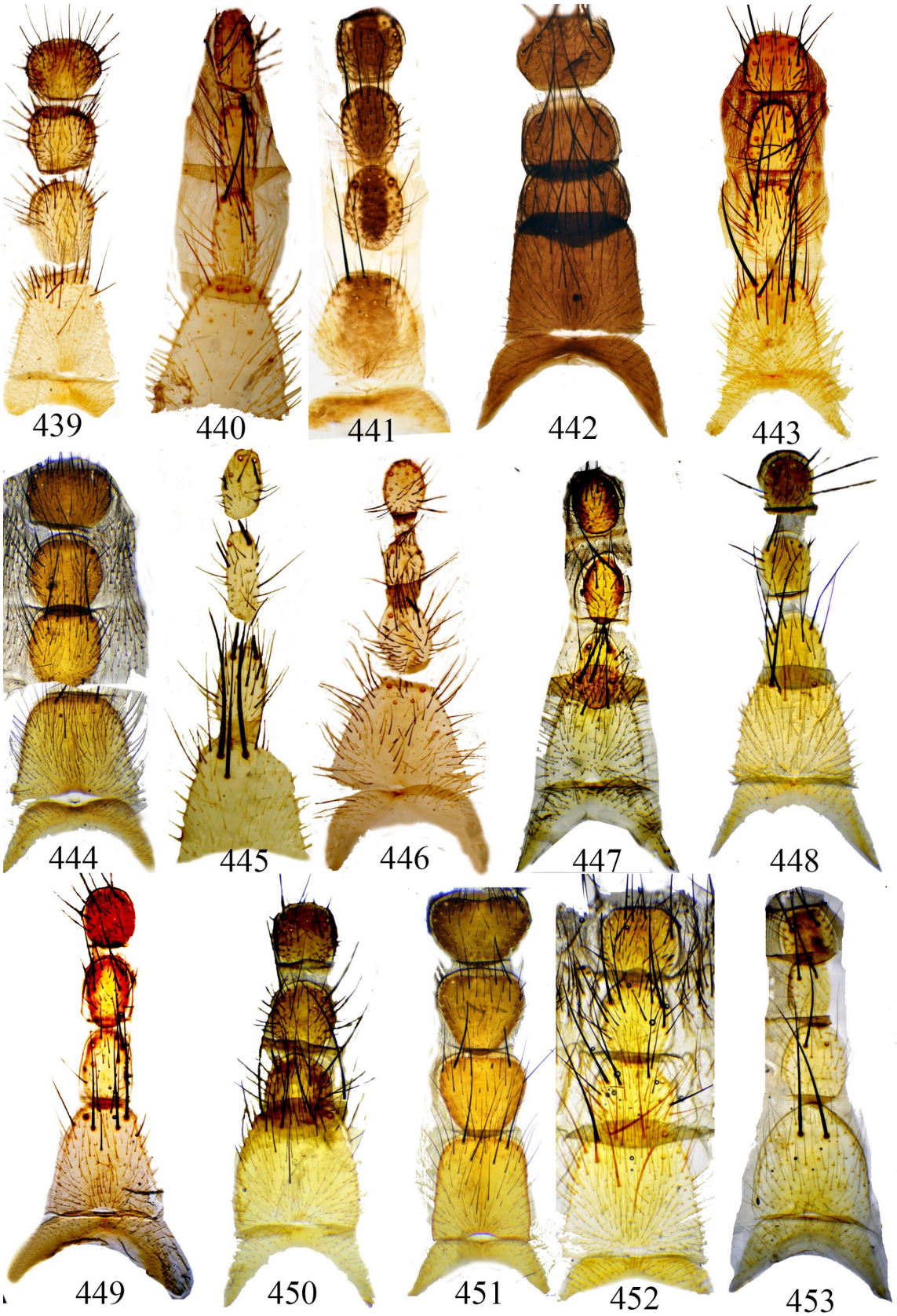
Remarks. Hall (1948) moved *M. uniseta* to *Huascaromusca*. Three specimens (TLW404–405 and TLW408) were barcoded; the sequences clustered together close to *M. bullata* (Fig. 488).



FIGURES 411–423. Female sternites of Mesembrinellidae. **411.** *Laneella fusconitida* **sp. nov.** (LACM). **412.** *L. fuscosquamata* **sp. nov. 413.** *L. nigripes* Guimarães. **414.** *L. perisi* (Mariluis). **415.** *L. purpurea* **sp. nov. 416.** *Mesembrinella latifrons* (Mello). **417.** *M. guaramacalensis* **sp. nov. 418.** *M. mexicana* **sp. nov. 419.** *M. spicata* Aldrich. **420.** *M. epandrioaurantia* **sp. nov. 421.** *M. aeneiventris* (Wiedemann). **422.** *M. decrepita* Séguy. **423.** *M. lara* (Bonatto).



FIGURES 424–438. Female sternites of *Mesembrinella* spp. **424.** *M. nigrocoerulea* **sp. nov. 425.** *M. purpurata* Aldrich. **426.** *M. semiflava* Aldrich. **427.** *M. uniseta* Aldrich. **428.** *M. violacea* **sp. nov. 429.** *M. vogelsangi* (Mello). **430.** *M. zurquiensis* **sp. nov. 431.** *M. apollinaris* Séguy. **432.** *M. batesi* Aldrich. **433.** *M. bellardiana* Aldrich. **434.** *M. benoisti* (Séguy). **435.** *M. bicolor* (Fabricius). **436.** *M. brunnipes* Surcouf. **437.** *M. bullata* **sp. nov. 438.** *M. chantryi* **sp. nov.**



FIGURES 439–453. Female sternites of *Mesembrinella* spp. **439.** *M. currani* Guimarães. **440.** *M. cyaneicincta* (Surcouf). **441.** *M. flavicrura* Aldrich. **442.** *M. longicercus* **sp. nov. 443.** *M. peregrina* Aldrich. **444.** *M. pictipennis* Aldrich. **445.** *M. quadrilineata* (Fabricius). **446.** *M. randa* (Walker). **447.** *M. semihyalina* Mello. **448.** *M. serrata* **sp. nov. 449.** *M. socors* (Walker). **450.** *M. townsendi* Guimarães. **451.** *M. umbrosa* Aldrich. **452.** *M. velasquezae* **sp. nov. 453.** *M. anomala* (Guimarães).

FIGURE 454. Female sternites of *Souzalopesiella facialis* (Aldrich).

***Mesembrinella violacea* Whitworth, sp. nov.**
(Figs 51–52, 141–142, 213, 256, 299, 343, 428, 468, 488)

Diagnosis. A large blue-black fly, averaging 11.75 mm (11–13/4) in length. Postpronotal setae 2x2; subcostal sclerite bare; outer ph absent; wing faintly yellowish, darker yellow near base of costa; abdomen blue-black; male frons narrow, 0.015 of head width at narrowest.

Description. *Male*. Head. Frons narrow, 0.015/3 of head width at narrowest, about half width of parafacial at level of lunule; fronto-orbital pale and slender, frontal setae ascending about 30% of distance to vertex; frontal vitta obliterated in upper 2/3, lower third of frontal vitta orange, of triangular shape; parafacial narrow, silvery when viewed from above, orange when viewed from below; gena pale orange with mix of long and short black setae, posteroventral corner with silvery tomentum and black setae extending from occiput; postgena orange with long orange setae; occiput mostly covered with silvery tomentum and fine, short golden setae; median occipital sclerite shiny dark reddish-brown; upper edge just below postoccipital setae without tomentum, shiny black with short black setae; antenna orange; palpus typical; eye with median facets about 3x size of lateral facets; ocellar triangle small, anterior ocellus about 1/3 larger than posterior ocelli; facial ridge with only small cluster of supravibrissal setae at base of facial ridge.

Thorax. Dorsum shiny orange-brown with three broad, irregular tomentose stripes extending from prescutum through to scutum; pleural area orange; chaetotaxy: ac 1:1, dc 2:3, ia 0, ph 0, ppn 2x2, kat 2:1, meral setae typical, 1 pair crossed ap, sa absent, 1 weak lat, 1 stout bas, pb absent, 1 disc; subscutellum weakly developed; spiracles medium-sized, anterior spiracle pale yellow, posterior spiracle orange; legs: femora orange, tibiae and tarsi brown. Wing faintly yellowish, slightly darker yellow near base of costa; basicosta pale orange, tegula brown; section IV 0.13 of section III; discs of calypters reddish-brown; rim of upper calypter dark with short, dark reddish setae; rim of lower calypter pale with long, pale reddish setae.

Abdomen. T1+2 orange-brown; T3–5 dark shiny purple with whitish tomentum in anterior half; T1+2 with lateral cluster of long setae and lone marginal seta posterolaterally; T3 with pair of posterolateral setae; T4 and T5 each with row of stout marginal setae; disc of T5 with horizontal row of stout setae midway, rest of disc with dense, fine setae. Terminalia in lateral view with surstylus fairly broad and parallel sided, with slight backward bend distally, cercus with apical hook (Fig. 51); in posterior view, base of cerci narrow, parallel-sided, rectangular and with pointed tips (Fig. 52); phallus in lateral view with medium-sized epiphallus and large basiphallus (Fig. 141); in dorsal view, hypophallic lobes narrow with coarse serrations (Fig. 142); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 213; ST2–5 as in Fig. 256.

Female. Similar to male except frons 0.223 (0.21–0.24/3) of head width at narrowest. T6 of RV shape; T7 broad and continuous, weakened midway; T8 wide, weakened midway; epiproct divided (Fig. 299); ST6–8 and hypoproct as in Fig. 343; ST2–5 as in Fig. 428.

Type material. HOLOTYPE ♂* (Costa Rica, **Limon**; INBIO; Fig. 468), labeled: Est. Hitoy Cerere, 100 m, / R. Cerere. Res. Biol. Hitoy / Cerere, Prov. Limon, / Costa Rica, 30 jul a 20 jun / 1992, F.A. Quesada / L-N 184200, 643300; COSTA RICA INBIO / CRI000 / 769913; HOLOTYPE / Huascaromusca / violacea / T.L. Whitworth.

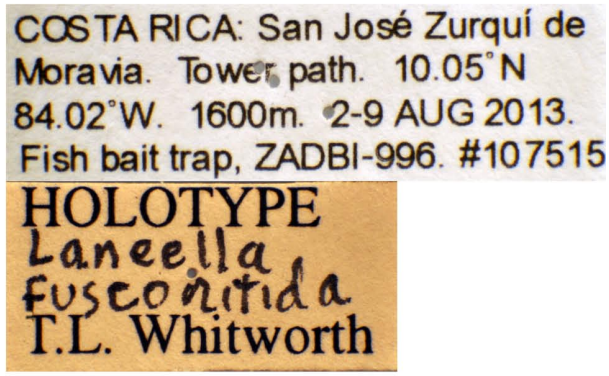
ALLOTYPE ♀♦ (TLW410): Costa Rica, **Limón.** Matina, 2.5 km sw de Colonia Puriscalefia 300 m, 15 Oct 1999, E. Rojas L_N_221700 604300 #56990 (INBIO).

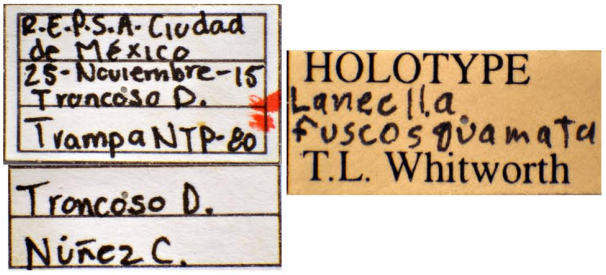
PARATYPES: Costa Rica, **Alajuela.** 1 ♂♦* (TLW265), P.N. Volcau Teuorio Est. Pilou, 1.5 km s. C. Carmela, 700–800 m, 15.ix–9.x.2006, J.A. Azofiefa, Malaise Trap (INBIO). **Cartago.** 1 ♀♦ (TLW332), Turrialba Tres Equis, P.N. Barbilla Send Prinicipal a R. Barbilla, 400–500 m, 20–21.i.2002 (INBIO); 1 ♂♦ (TLW400), Chirripo, Turrialba, Grano de Oro, 1120 m, 31.viii.1992, P. Campos (INBIO). **Limón.** 1 ♀*, Est. Hitoy Cerere, R. Cere Res. Biol. Hitoy Cerere, Costa Rica, 100 m, vi.1992, L_N_184200 643300, G. Carballo(INBIO).

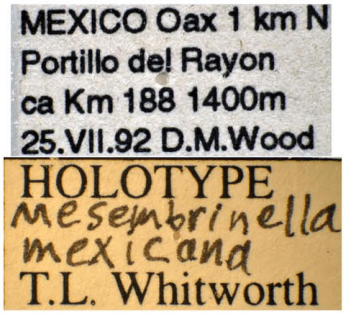
Distribution. Costa Rica.

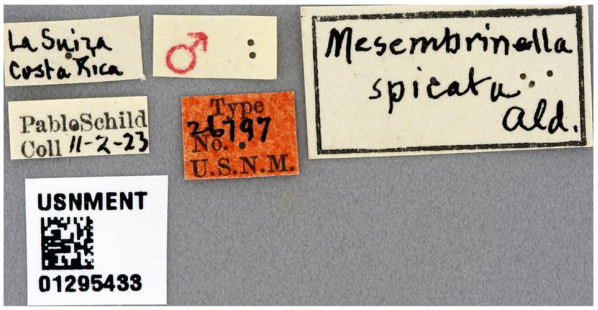
Remarks. Four specimens (TLW265, TLW332, TLW400 and TLW410) were barcoded. They formed a distinct group close to *M. nigrocoerulea* **sp. nov.** (Fig. 488).

Etymology. The species name *violacea* is derived from the Latin *violaceus* (purple) and was chosen because of the distinctive dark purple abdomen in well-preserved specimens.

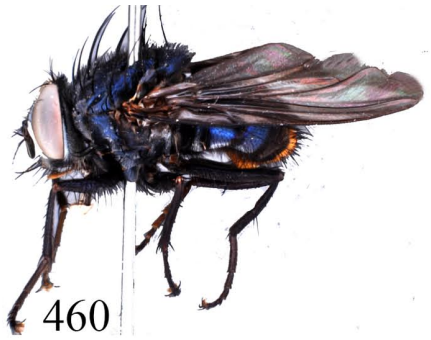


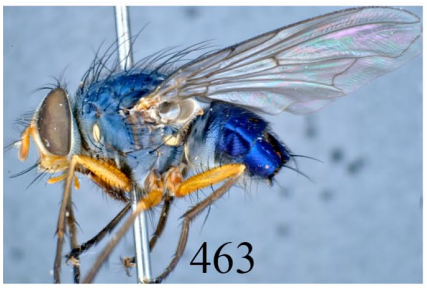


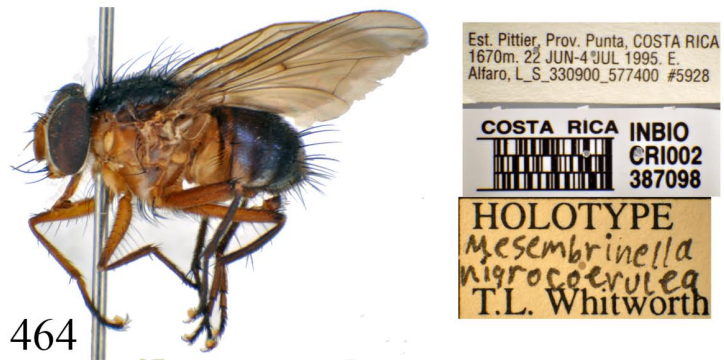




FIGURES 455–459. Lateral habitus and labels of holotypes. **455.** *Laneella fusconitida* **sp. nov.** (LACM). **456.** *L. fuscosquamata* **sp. nov.** (USNM). **457.** *L. purpurea* **sp. nov.** (INBIO). **458.** *Mesembrinella mexicana* **sp. nov.** (CNC). **459.** *M. spicata* Aldrich (USNM).







FIGURES 460–464. Lateral habitus and labels of holotypes. **460.** *Mesembrinella epandrioaurantia* **sp. nov.** (MJMO). **461.** *M. woodorum* **sp. nov.** (CNC). **462.** *M. bolivar* (Bonatto) (USNM). **463.** *M. lara* (Bonatto) (USNM). **464.** *M. nigrocoerulea* **sp. nov.** (INBIO).

FIGURES 465–469. Lateral habitus and labels of types. **465.** *Mesembrinella purpurata* Aldrich (holotype; USNM). **466.** *M. semiflava* Aldrich (holotype; USNM). **467.** *M. uniseta* Aldrich (holotype; USNM). **468.** *M. violacea* **sp. nov.** (holotype; INBIO). **469.** *M. xanthorrhina* (Bigot) (lectotype; OUMNH).

FIGURES 470–473. Habitus and labels of holotypes. **470.** *Mesembrinella zurquiensis* **sp. nov.** (INBIO). **471.** *M. batesi* Aldrich (NHMUK). **472.** *M. bellardiana* Aldrich (USNM). **473.** *M. bullata* **sp. nov.** (CNC).

FIGURES 474–478. Lateral habitus and labels of types. **474.** *Mesembrinella chantryi* **sp. nov.** (holotype; USNM). **475.** *M. flavicrura* Aldrich (holotype; USNM). **476.** *M. longicercus* **sp. nov.** (holotype; USNM). **477.** *M. peregrina* Aldrich (holotype; USNM). **478.** *M. pictipennis* Aldrich (lectotype; NHMUK).

***Mesembrinella vogelsangi* (Mello, 1967)**
(Figs 8, 53–54, 143–144, 214, 257, 300, 344, 385, 429)

Huascaromusca vogelsangi Mello, 1967: 46. Holotype male (FIOC), not examined. Type locality: Aragua, Venezuela.
Huascaromusca vogelsangi: Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 867); Wolff *et al.* (2017: 253); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 109).
Mesembrinella vogelsangi: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A brownish, medium-sized fly averaging 11.6 mm (11–12/5) in length. Abdomen with distinct dark marginal bands on posterior edge of each segment; T4–5 sometimes with purplish reflections; subcostal sclerite setose; femora all orange; male frons narrow, about 0.017 of head width at narrowest, about half width of anterior ocellus.

Redescription. *Male.* Head. Frons narrow, 0.017 (0.015–0.020/3) of head width at narrowest, about half width of anterior ocellus; fronto-orbital slender, silvery when viewed from above, orange when viewed from below, frontal setae ascending about halfway to vertex; frontal vitta orange, obliterated about midway; parafacial golden to orange, narrow above, broader below; gena orange with horizontal row of stout setae on ventral edge and small scattered dark setae, posterodorsal corner with silvery tomentum extending from occiput; postgena orange with tan setae; occiput with silvery tomentum and fine golden setae; median occipital sclerite broad, shiny dark orange; antenna orange; palpus typical; eye with median facets about 2x size of lateral facets; ocellar triangle small, anterior ocellus slightly larger than posterior ocelli; facial ridge with dark brown supravibrissal setae extending about 1/5 of distance to antennal base.

Thorax brown with dense tan tomentum, with irregular shiny brown areas and a pair of shiny anterolateral brown spots in presutural area; postsutural area similar, with irregular bare areas; pleura orange; chaetotaxy: ac 1, dc 2:3, ia 0, ph 1, ppn 3x3, kat 1, meron with fine setae and short horizontal portion, 1 pair converging ap, sa absent, lat weak, bas stout, pb weak, 1 disc subscutellum moderately developed; spiracles medium-sized, anterior one pale yellow, posterior one orange; legs: femora orange, tibiae and tarsi brown. Wing hyaline, faintly yellowish, slightly darker yellow along costa; subcostal sclerite setose; tegula orange, basicosta brown; section IV 0.27 of section III; calypters with tan discs; upper calypter with dark rim and short reddish setae, lower calypter with brown rim and long reddish setae.

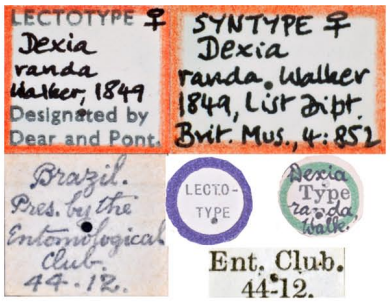
Abdomen brownish with dark band on posterior edge of each segment [in the three examined males the abdomens are dull and may be discolored; female abdomens were much brighter blue]; T4–5 sometimes with faint purplish reflections; lateral margin of T3 with two pairs of setae; posterior margins of T4–5 with rows of stout setae; disc of T5 with horizontal row of stout setae midway, rest of disc with sparse, short, fine setae. Terminalia in lateral view with surstylus curved backward [unusual for *M. aeneiventris* species-group], cercus with apical hook (Fig. 53); in posterior view, basal half of cerci broad, distal half tapering to a point (Fig. 54); in dorsal and lateral views, hypophallic lobes narrow (Figs 143–144). T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 214; ST2–5 as in Fig. 257.

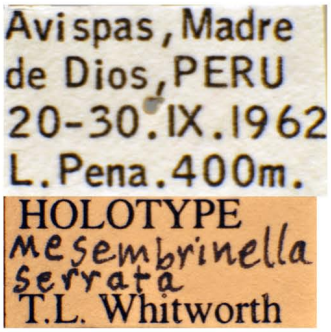
Female. Similar to male except frons 0.235 (0.23–0.24/2) of head width at narrowest. Females tend to have more purple on abdomen than males, especially toward posterior end. T6 of WV shape, T7 slender and weakened midway, T8 as separate sclerites (Fig. 300). ST6–8 and hypoproct as in Fig. 344; spermathecae filiform (Fig. 385). ST1–5 as in Fig. 429.

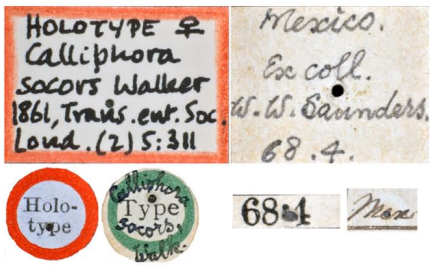
Material examined. Venezuela, **Aragua.** 1 ♂*, 1 ♂, 1 ♀*, 1 ♀, Edo. Aragua, 18–27.ii.1971, 1100 m, G. & M. Wood (CNC); 1 ♂, Aragua, Giradot, Rancho Grande, 14.vii.1979, R.O. Schuster, R.W. Brooks, A.A. Grigarick, J. McLaughlin (UCDC).

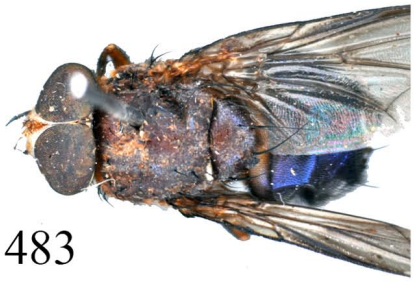
Distribution. Venezuela. Marinho *et al.* (2017) listed Colombia.

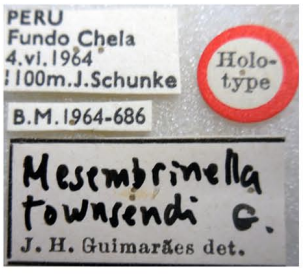
Remarks. The male and female terminalia in *M. vogelsangi* are similar to those of *M. zurquiensis* **sp. nov.**, but frons width in the male is very different. In *M. vogelsangi* the frons is quite narrow, about 0.02 of head width at narrowest, vs. much wider, 0.09 of head width at narrowest, in *M. zurquiensis*. No specimens were barcoded.



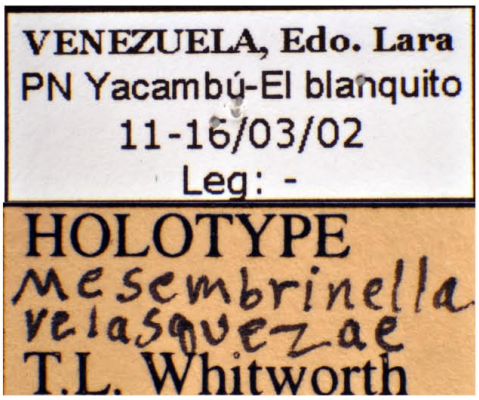


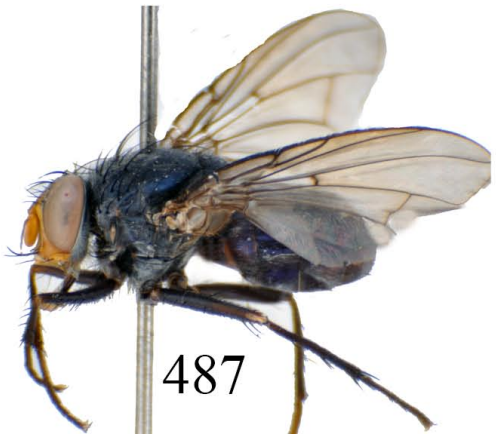


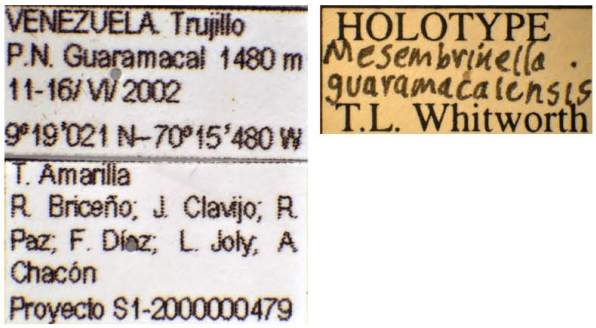




FIGURES 479–483. Habitus and labels of types. **479.** *Mesembrinella randa* (Walker) (lectotype; NHMUK). **480.** *M. serrata* **sp. nov.** (holotype; CNC). **481.** *M. socors* (Walker) (holotype; NHMUK). **482.** *Huascaromusca abaca* Hall (holotype; USNM). **483.** *M. townsendi* Guimarães (holotype; NHMUK).







FIGURES 484–487. Lateral habitus and labels of holotypes. **484.** *M. umbrosa* Aldrich (USNM). **485.** *M. velasquezae* **sp. nov.** (MJMO). **486.** *Souzalopesiella facialis* (Aldrich) (USNM). **487.** *M. guaramacalensis* **sp. nov.** (MJMO).

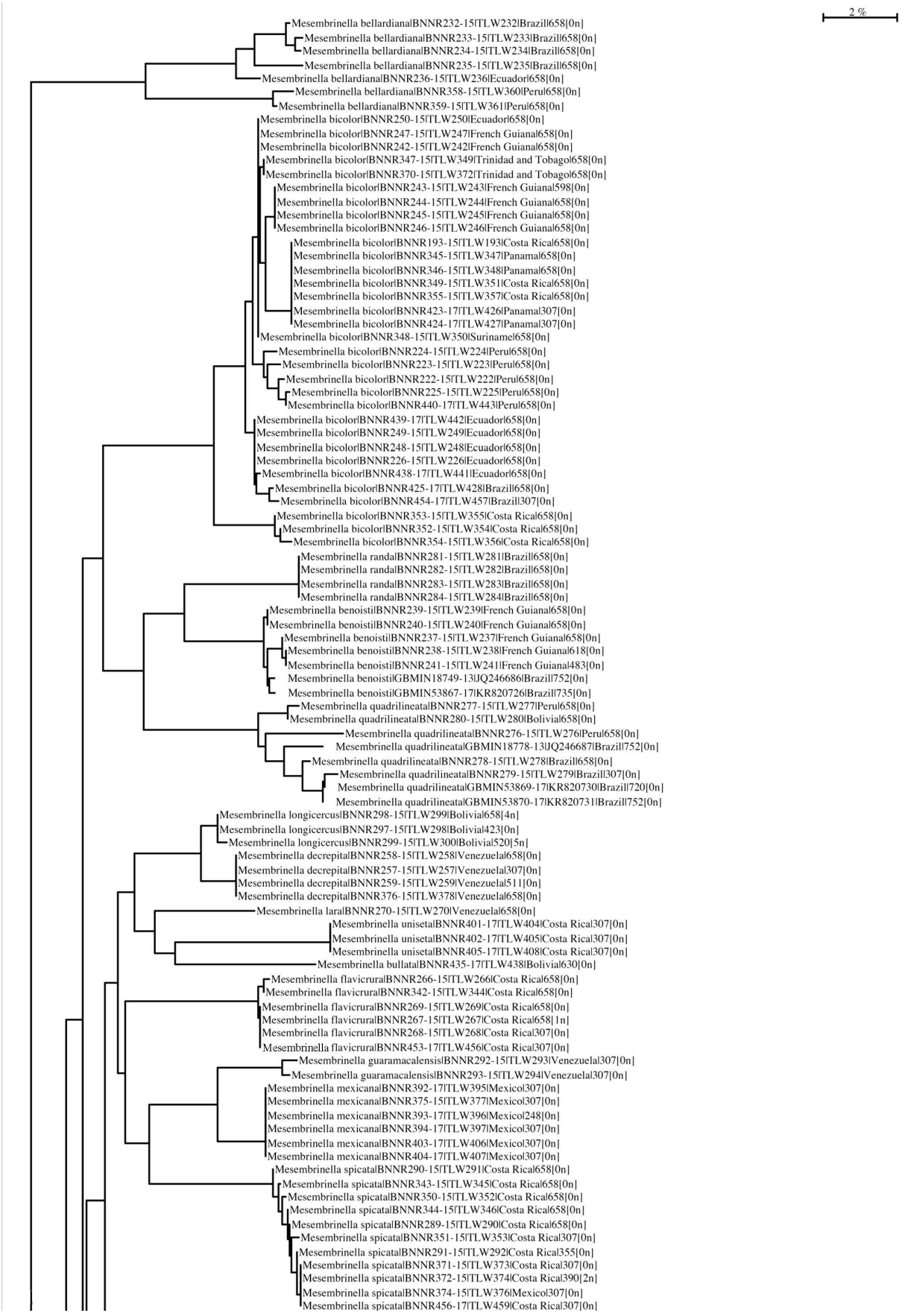


FIGURE 488. Neighbor-joining tree of *COI* DNA barcode sequences of specimens and species of Mesembrinellidae, using K2P distances and generated in BOLD; species names on the tree are followed by BOLD accession number, voucher number, country of origin, number of sequenced base pairs and number of ambiguous nucleotides.

FIGURE 488 (Continued). Neighbor-joining tree of *COI* DNA barcode sequences of specimens and species of Mesembrinellidae, using K2P distances and generated in BOLD; species names on the tree are followed by BOLD accession number, voucher number, country of origin, number of sequenced base pairs and percentage of ambiguity.

***Mesembrinella xanthorrhina* (Bigot, 1887)**
(Fig. 469)

Calliphora xanthorrhina Bigot, 1887: 619. Lectotype female (OUMNH), examined. Type locality: Mexico.
Mesembrinella xanthorrhina: Guimarães (1977: 35); Peris & Mariluis (1984: 260); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Marinho *et al*. (2017: tab. 1); Velásquez *et al.* (2017: 109).
Mesembrinella xanthorrhina: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized fly, the two specimens examined measured 11 mm each. A dark-colored fly, normal color likely bluish with pale tomentum [the specimens examined were faded and discolored]; ppn with 3x3 setae; subcostal sclerite bare; legs dark reddish brown, apex of femora orange; anterior spiracle yellow-brown, posterior spiracle darker brown; acrostichal setae 2:1; upper calypter with tan disc and dark brown rim with short dark setae; lower calypter with disc darker brown, rim reddish brown with long reddish-brown setae.

Redescription. [Based only on the lectotype female (Fig. 469) and a female paralectotype.] *Female.* Head. Frons 0.245 (0.240–0.250/2) of head width at narrowest. Fronto-orbital and upper 2/3 of parafacial yellow-orange, lower 1/3 of parafacial dull orange; frontal vitta reddish below, black above; gena dull orange; postgena with long golden setae and silvery tomentum over dark vestiture; occiput with silvery tomentum and weak yellow setae; palpus and antenna typical; eye with median facets about 3x size of lateral facets; frontal setae ending just before ocellar triangle; ocellar triangle small, with ocelli similar in size; supravibrissal setae dark brown, ascending about 1/5 of distance to antennal base.

Thorax. Dorsum and pleura blackish, subshining, with faint presutural stripes; chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 0, ppn 3x3, kat 2:1, meral setae typical, in an inverted L shape with long black setae, 1 pair converging ap [remaining scutellar chaetotaxy not noted]; subscutellum weakly developed; anterior spiracle yellow-brown, posterior spiracle brown; legs dark reddish-brown, apices of femora orange. Wing hyaline with some darkening at base; section IV 0.20 of section III; disc of upper calypter tan, rim dark with dark setae; disc of lower calypter brown, rim reddish with reddish-brown setae; subcostal sclerite bare; basicosta dark orange, tegula orange.

Abdomen black, T4 subshining with complete row of marginal setae; T5 without posterior row of setae; disc of T5 with irregular stout setae, rest of disc with sparse, fine setae. [Terminalia and sternites were not dissected because of the fragile condition of the specimens.]

Male. Unknown.

Type material examined. LECTOTYPE ♀ (Mexico; OUMNH; Fig. 469), labeled: C. xanthorhina ♀ / Somomyia / Mexique [= Mexico] J. Bigot; Brauer / WIEN. CVIII / (No. 230); Mesembrinella id / syn M. cruciata Townsend / of Aldrich 1922.; CALLIPHORA ♀ / XANTHORHINA Bigot / LECTOTYPE -1974 / J. H. Guimarães det.; LECTO- / TYPE [round label with purple border]; *Huascaromusca* / *xanthorrhina* / S.R. Bonatto det. 2001.

PARALECTOTYPE: ♀, Brauer; Wien., CVIII, (No. 230); Calliphora xanthorrhina Bigot, paralectotype 1974, J.H. Guimarães det.; *Huascaromusca xanthorrhina* S.R. Bonatto det. 2001 (OUMNH).

Remarks. Both specimens are in poor condition. They are discolored, faded and covered with hyphae from fungal growth and with many setae missing (Fig. 469). The lectotype has its right wing broken off, but it is with the specimen on a piece of card; the left posterior thoracic spiracle is damaged and several legs are damaged or missing. The paralectotype has a fracture on the dorsum of the thorax from the left lateral side along the transverse suture, but the thorax is still intact.

Remarks. Only two females are known from Bigot's (1887) type series. Though he listed five syntypes, no other specimens from the type series have been located. Bigot wrote the species name as "xanthorhina" on a label pinned under the lectotype, but he spelled it with two r's in the text of his paper. Guimarães (1977) followed this label when he wrote the lectotype label with only one r. Bonatto (2001) added a label to the specimen when he transferred this species to *Huascaromusca*, writing the name with two r's. Based on the spelling used in the text of his paper, we have concluded that Bigot intended the species name to be spelled with two r's and have listed *H. xanthorrhina* as the correct name.

Guimarães (1977) placed this species in *Mesembrinella* and synonymized *Mesembrinella spicata* with it based on examination of the lectotype and paralectotype. Bonatto & Marinoni (2005) considered this an error, resurrected *M. spicata* and placed it in a new genus, *Henriquella*. My examination of the *M. xanthorrhina* types confirmed their conclusion: they resemble *M. spicata* but differ in several characters (see key).

The identity of *M. xanthorrhina* remains a puzzle. Males are unknown and the exact locality of collection of the

two remaining type specimens is unknown, the only information being "Mexique [Mexico]". The type specimens are in very fragile condition and it seemed unwise to dissect the terminalia, which might have helped match it with another known species; however, no other female or male specimens with the exact same combination of characters noted for the types have been found. Females of both *M. mexicana* **sp. nov.** and *M. spicata* found in Mexico resemble these specimens, but neither are an exact match for the types of *M. xanthorrhina*. The most notable difference is that the *M. xanthorrhina* types have a row of stout discal setae on ST5 placing them in *M. aeneiventris* species-group, whereas species in the *M. spicata* group lack discal setae in the male and have only a few irregular discal setae in some females. Marinho *et al.* (2017) retained *M. xanthorrhina* in the genus *Mesembrinella* rather than transferring it to *Huascaromusca* as Bonatto (2001) suggested, because that recommendation was contained in his dissertation, which is widely available but unpublished. Bonatto (2001) described and illustrated a male of "*xanthorrhina*" from in Peru. However, the specimen he illustrated does not match any known mesembrinellid species and likely belongs to an undescribed species. He did not match any female specimens from Peru to that male. He also listed this species from Colombia, Mexico and Panama. In our opinion, the male of this species is still unknown. No specimens were barcoded.

Distribution. Mexico. Guimarães (1977) listed it from Panama; Bonatto (2001) also listed it from Colombia and Peru. We consider only the Mexico record as valid and the other records as uncertain, as we believe there has been some confusion about the identity of this species.

Mesembrinella zurquiensis Whitworth, sp. nov.

(Figs 55–56, 145–146, 215, 258, 301, 345, 386, 430, 470, 488)

Diagnosis. A medium-sized, blue-brown fly averaging 9.6 mm (9–10/5) in length. Postpronotal setae 3x3; subcostal sclerite setose; apex of mid and hind femur darkened; thorax usually with ac 2:1; T4 and T5 with purple highlights and whitish tomentum. Male frons about 0.09 of head width at narrowest.

Description. *Male.* Head. Frons broad, 0.09 (0.08–0.10/5) of head width at narrowest, about equal to 2/3 width of first flagellomere; fronto-orbital slender, upper half silvery, lower half orange; frontal setae extending to ocellar triangle, very tiny in upper half; frontal vitta dark orange; parafacial slender and yellow-orange; gena orange with horizontal row of stout, black setae along venter and across parafacial to vibrissa otherwise with small dark setae; postgena orange with long golden setae; occipital area with fine golden setae and silvery tomentum, upper edge bare and more or less shiny black; median occipital sclerite dark brown; palpus typical; antenna orange, first flagellomere with gray tomentum; eye with median facets about 4x size of lateral facets; ocellar triangle small with anterior ocellus and posterior ocelli about equal in size; supravibrissal setae black, short and stout, ascending about 1/5 of distance to antennal base.

Thorax shiny; dorsum brown with four irregular whitish, tomentose stripes; pleura dark orange with silvery tomentum; chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 1, ppn 3x3 [two examined specimens ppn 2x2], kat 1:1, meral setae typical, 1 pair converging ap, sa absent, 1 weak lat, 1 stout b, 1 pb, 1 disc; subscutellum weakly developed; spiracles orange, medium-sized; legs: femora orange, distal end of mid and hind femora black, tibiae and tarsi brown. Wing faintly yellow, darker yellow at base near costa; subcostal sclerite with long, dense setae; section IV 0.25 of section III; upper and lower calypters brown; rim of upper calypter sooty with short brown setae, rim of lower calypter pale with long brown setae.

Abdomen. T1+2 yellow-orange, T3–5 more or less shiny bluish-purple with whitish tomentum; T1+2 with cluster of setae laterally; T3 with 1 or 2 stout lateral marginal setae; rear margins of T4–5 with row of stout setae; disc of T5 with stout horizontal row of setae midway, rest of disc with sparse, short, fine setae. *Terminalia* in lateral view with surstylus curving backward, cercus with apical hook (Fig. 55); in posterior view cerci pear-shaped, narrowed at base, widest midway then tapering to rounded tips (Fig. 56); phallus in left lateral view with long slender epiphallus with moderate backward curve (Fig. 145); in dorsal view, hypophallic lobes narrow (Fig. 146); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 215; ST1–5 as in Fig. 258.

Female. Similar to male except frons 0.208 (0.20–0.22/5) of head width at narrowest. Median eye facets only slightly larger than lateral facets. T6 of OV shape, T7 with suture midway, T8 as separate sclerites, rear of epiproct recessed midway (Fig. 301); ST6–8 and hypoproct as in Fig. 345; spermathecae filiform (Fig. 386). ST1–5 as in Fig. 430.

Type material. HOLOTYPE ♂ (Costa Rica, **San José**; INBIO; Fig. 470), labeled: COSTA RICA. Prov. San José. Moravia. Zurquí de / Moravia, Creek 2. 1600 m. 17 NOV 2012. Proyecto / ZADBI. Mercury light trap, ZADBI-217. -84:00:57 / 10:02:58 #105404; INB0004343316 / INBIOCRI COSTA RICA; HOLOTYPE / Mesembrinella / zurquiensis / T.L. Whitworth.

ALLOTYPE ♀: Costa Rica, San José, Zurquí de Moravia, Tower path, 1600 m, 26.iv–3.v.2013, Project ZADBI-728, Malaise trap, #106748 (LACM).

PARATYPES: Costa Rica, **Cartago.** 1 ♂*, Quebrada Segunda, P.N. Tapanti, A.C. Amistad, 1250 m, xi.1993, L_N_194000 559800 #2497, G. Mora (INBIO); 1 ♂, Paraiso, P.N. Tapanti, 1600 m, 11–17.xi.2012, Malaise trap, #105648, ZADBI; 2 ♂♂, same data except 18–28.x.2012; 2 ♂♂, same data except 9–16.xii.2012, #105652 (INBIO); 1 ♂, same data except 23–30.xii.2012, #106166 (INBIO); 1 ♂, same data except 30.xii.2012–6.i.2013, #106167 (INBIO); 2 ♂♂, same data except 25.xi–2.xii.2012 #105650 (INBIO); 1 ♀, Paraiso, P.N. Tapanti-Macizo de La Muerte, 1600 m, 18–28.x.2012, Malaise trap, #105322, ZADBI (INBIO); 1 ♀, Paraiso, P.N. Tapanti, 1600 m, 10–17.ii.2013, Malaise trap, #106173, ZADBI (INBIO). **Heredia.** 1 ♀♦ (TLW336), 4 ♀♀, 16 km SSE La Virgen, 1050-10°16′N 84°05′W, 1150 m, 9–14.iii.2001, flight intercept trap, primary forest, E.G. Riley (TAMU). **Puntarenas.** 2 ♀♀♦ (TLW382, TLW415), 2 ♀♀, Monteverde, 25–30.viii.1991, 1500 m, D.M Wood (CNC); 1 ♂, same data except 20–25.viii.1991 (CNC); 1 ♀, same data except Cloud Forest Lodge, 22.viii.1995 (CNC); 1 ♀♦.(TLW383), same data except 14.vii.2010, J.M. Cumming (CNC); 1 ♀, Monteverde, 20–24.vi.1986, W. Hanson, G. Bohart (LACM); 1 ♂♦* (TLW402), Las Alturas Biol. Stat., 20 air km NE of San Vito, Cerro Chai at peak, 2100 m, 13.viii.1995, C.R. Nelson and S. Marshall, #6255 (BYU). **San José.** 1 ♂*, Zurquí de Moravia, Zurquí Project, end of path tower, 1600 m, 12–18.vii.2012, [no collector], bait trap with chicken (INBIO); 1 ♂* 1 ♂, same data except Creek 2, 17.xi.2012, mercury light trap (INBIO); 1 ♀*, same data except 16.iii.2013, hand collected, #106376 (INBIO); 4 ♂♂, same data except 2–4.viii.2012, Malaise trap (INBIO); 1 ♂♦* (TLW379), 1♂♦ (TLW380), same data except vii.1989, P. Hanson (CNC); 1 ♂♦ (TLW333), Zurquí de Moravia, 12–18.vii.2012, [no collector] (INBIO); 1 ♀♦ (TLW381), same data except 31.vii.1989, P. Hanson (CNC); 1 ♂♦ (TLW334), 1 ♀♦ (TLW414), same data except 22.ix.2012 (CNC); 1 ♂♦ (TLW335), same data except 18.xi.2012(CNC); 1 ♂, Zurquí de Moravia, Tower path, 50 m, 19–26.vii.2013, Emergence trap over vegetation, #107290, ZADBI (LACM); 1 ♀♦ (TLW413), 4 ♀♀, same data except Malaise trap, #107274 (LACM); 3 ♂♂, 1 ♀♦ (TLW412), 6 ♀♀, Zurquí de Moravia, Creek 2 North, 26.vii–2.viii.2013, Malaise trap #2, #107489, ZADBI (LACM); 1 ♂, Zurquí de Moravia, Creek 2 North, 1600 m, 3–10.v.2013, Malaise trap #2, #106721, ZADBI (INBIO); 1 ♂, Zurquí de Moravia, end path torre, 1600 m, 23.ix.2012, CDC light trap, #105065, ZADBI (INBIO); 1 ♂, 1 ♀* Zurquí de Moravia, North pasture, 1600 m, 16.xii.2012, bait trap with pig dung, #105697, ZADBI (INBIO); 1 ♀♦ (TLW411), same data except 16.iv.2013 hand collected, #106595(INBIO); 1 ♂, Zurquí de Moravia, Tower path, 75 m. 11–18.x.2013, Emergence trap over leaf litter, #107963, ZADBI (LACM); 2 ♀♀, Zurquí de Moravia, Creek 2 North, 19–26.vii.2013, Malaise trap #2, #107274, ZADBI (LACM); 9 ♀♀, Zurquí de Moravia, Tower path, 10.05°N 84.02°W, 1600 m, 2–9.viii.2013, fish bait trap, #207515, ZADBI (LACM); 6 ♀♀, same data except 16–23.viii.2013, #107690 (LACM); 5 ♀♀, same data except 19–26.viii.2013, #107277(LACM); 1 ♀, same data except 9–16.viii.2013, #107541 (LACM); 1 ♀, Cascajal de Coronado, Bajo La Rosa, 3.v.1995, Baumann & Houseman (BYU).

Distribution. Costa Rica.

Remarks. Fifteen specimens (TLW333–337, TLW379–383 and TLW411–415) were barcoded; they formed a distinct cluster with some genetic variation within it, probably reflecting intra-specific variation (Fig. 488).

The condition of presutural ac setae was consistently 2:1 in the many specimens examined from the Zurqui area of San José province. However, this condition was variable in specimens from other provinces, from presutural ac setae normal to very weak to both absent in the Cartago, Heredia and Puntarenas provinces.

Etymology. The species name *zurquiensis* was chosen for the area known as Zurquí, found at 9°54′38″N 84°3′10″W, a Costa Rican cloud forest at 1600 m on the southwest margin of Braulio Carrillo National Park where the species was found to be a common. This area was the subject of an intensive collection effort to study fly diversity over several years (Borkent *et al*. 2018).

Mesembrinella bicolor species-group

Recognition. Anterior spiracle with broad oval opening above; disc of T5 without horizontal row of stout setae.

Male with epandrium moderate in size; surstylus and cercus in close proximity, tending to curve toward each other in lateral view (as in Fig. 63); only *M. longicercus* has both surstylus and cercus straight (Fig. 77). Surstylus usually with a distinct curve posteriorly, whereas the cercus is fairly straight except for forward-curving tip; phallus broad in dorsal view anterior to hypophallic lobes (as in Fig. 154); sternites typically broader at base (ST1) and usually progressively narrower and smaller distally (ST2–4), with ST5 bilobed as in Fig. 262 [in a few species, segments ST1–4 are about of equal width, Fig. 278]; T4 and T5 about equal in length.

Key to species of the *M. bicolor* species-group

1 Postpronotal lobe with 3 setae **2**

\- Postpronotal lobe with 2 setae **19**

2 Stem vein setose dorsally (Fig. 489) **3**

\- Stem vein bare dorsally **4**

3 Wing yellowish along costa; subcostal sclerite with pubescence only; male frons narrow, 0.01 of head width at narrowest; female T6 of FU shape (Fig. 314); [known only from Brazil] . . . . . ***M. peregrina***

\- Wing with dark infuscation along costa (similar to Fig. 2); subcostal sclerite setose; male frons broader, 0.03–0.06 of head width at narrowest; female T6 in WU shape (Fig. 304); [known from Argentina, Brazil, Ecuador, Paraguay, Peru; Marinho *et al*. (2017) also listed it from Bolivia, Colombia, French Guiana, Suriname and Venezuela] . . . . . ***M. bellardiana***

4 Wing with brownish to dark brown infuscation along costa (similar to Fig. 2). **5**

\- Wing hyaline (similar to Fig. 1) or yellowish (not brown) along costa; basal area of wing may be darkened **13**

5 Abdomen with heavy whitish tomentum and dark pit-like spots around setal sockets (Fig. 103); epiphallus of normal length; hypophallic lobes broad and of elongate oval shape in dorsal view (Fig. 148); female T6 of WV shape (Fig. 303); [known from Brazil, Ecuador and Peru; Marinho *et al.* (2017) also listed it from Colombia, Trinidad and Venezuela] . . . . . ***M. batesi***

\- Abdomen without heavy whitish tomentum or dark pit-like spots; epiphallus of variable length; hypophallic lobes not broad, elongate and oval in dorsal view **6**

6 Supravibrissal setae bright orange; setae on subcostal sclerite, if present, bright orange **7**

\- Supravibrissal setae usually brown or black; if orange, then very dark not bright; setae on subcostal sclerite, if present, not orange **8**

7 All legs reddish; wing with section IV 0.63 of section III; epiphallus of normal length (Fig. 187); hypophallic lobes very narrow in dorsal view (Fig. 188); [known only from Venezuela]. . . . . ***M. velasquezae* sp. nov.**

\- Mid and hind tibiae and tarsi black or dark brown; wing with section IV 0.82 of section III; epiphallus unusually short (Fig. 161); hypophallic lobes broad and pear-shaped in dorsal view (Fig. 162); [known from Brazil, Ecuador and Peru; Marinho *et al.* (2017) also listed it from Bolivia and Colombia] . . . . . ***M. currani***

8 A large fly (usually 16–17 mm); section IV of wing 0.50 of section III or more **9**

\- A small to medium-sized fly (8–12 mm); section IV of wing 0.35 of section III or less, except 0.44 in *M. serrata* **10**

9 Palpus yellow; discal scutellar setae present; section IV of wing 0.51 of section III; face dark; wing with veins in posterior half outlined with dark shading; epandrium, cerci and surstyli as in Figs 81–82; [known only from Bolivia; Marinho *et al.* (2017) also listed it from Colombia and Costa Rica]. . . . . ***M. pictipennis***

\- Palpus brown; discal scutellar setae absent; section IV of wing 0.75 of section III; face yellowish; wing veins in posterior half only faintly shaded; epandrium, cerci and surstyli illustrated in Guimarães (1977: figs 70, 87); [known only from Colombia] . . . . . ***M. apollinaris***

10 Wing with section IV more than 0.30 of section III; hypophallic lobes in dorsal view with distinctive coarse serrations (Figs 156, 180). **11**

\- Wing with section IV less than 0.25 of section III; hypophallic lobes with finer serrations dorsally (Figs 178, 184) **12**

11 Wing with dark infuscated area along costa to R_{2+3}; a larger fly, about 12 mm in length; mid and hind femora with basal 1/4 to 1/2 brown and apical half of lighter, yellow-orange color [slightly darker in one specimen]; ac usually 2:3 or 2:2; wing with section IV 0.31 of section III; epiphallus very short (Fig. 155); hypophallic lobes narrow in dorsal view (Fig. 156); female T6 of OV shape (Fig. 307), without suture midway; [known only from Bolivia and Peru] . . . . . ***M. brunnipes***

\- Distal 2/3 of wing faintly infuscated along costa; a smaller fly, around 9 mm in length; all femora entirely orange; ac 2:1; wing with section IV 0.44 of section III; epiphallus of normal length (Fig. 179); hypophallic lobes broad and pear-shaped in dorsal view (Fig. 180); female T6 of WV shape (Fig. 319), with suture midway; [known only from Peru] . . . . . ***M. serrata* sp. nov.**

12 Tibiae and tarsi brown; abdomen with distinct oblique pale streaks of tomentum; ac usually 2:3; male frons 0.015 of head width at narrowest; female T6 of OV shape (Fig. 321); [known only from Brazil (Marinho *et al.* 2017), Peru and Bolivia] . . . . . ***M. townsendi***

\- Tibiae orange; abdomen with some pale tomentum, but not in oblique streaks; ac usually 2:1; male frons 0.063 of head width at narrowest; female T6 of WU shape (Fig. 318); [known only from Brazil] . . . . . ***M. semihyalina***

13 Wing with distinct yellowish area along costa or entirely yellowed **14**

\- Wing usually hyaline or with very faint yellowing, primarily along costa **16**

14 Subcostal sclerite bare; discs of upper and lower calypters pale; rim of upper calypter dark with pale setae, rim of lower calypter pale with long pale setae; wing with section IV 0.28 of section III; [widespread and common; Mexico and Central and South America except Argentina and Chile (Marinho *et al.* 2017)]. . . . . ***M. bicolor***

- Subcostal sclerite setose; wing section IV 0.45 or more of section III **15**

15 Scutellum without discal setae; abdomen entirely shiny purple-blue; wing with heavy yellowing along costal margin, whole wing yellowish except cell r_{4+5} with clear oval in middle; upper and lower calypters reddish; rim of upper calypter dark with short reddish setae, rim of lower calypter pale with long reddish setae; epandrium with fine dark setae (Fig. 95); phallus in dorsal view without curved horn-like structures projecting from sides of basiphallus; hypophallic lobes narrow (Fig. 186); female T6 of WV shape (Fig. 322); [widespread in Central America and northern South America] . . . . . ***M. umbrosa***

- Scutellum with discal setae; abdomen bluish, with heavy whitish tomentum and dark pit-like areas around setal sockets (similar to Fig. 103); wing mostly hyaline, with yellow area only along costa; upper and lower calypters pale; rim of upper calypter slightly darkened, with short pale setae, rim of lower calypter pale with long pale setae; epandrium with stout black setae (Figs 69–70); phallus in dorsal view with long curved posterior directed horn-like structures projecting from sides of basiphallus; hypophallic lobes broad and oval-shaped (Fig. 160); female T6 of RV shape (Fig. 309); [known from French Guiana and Brazil] . . . . . ***M. chantryi* sp. nov.**

16 Postpronotal lobe and femora orange **17**

- Postpronotal lobe and femora bluish **18**

17 Subcostal sclerite setose; thorax with 2:2 or 2:3 ac, 1 ia, kat 2:1; male frons 0.08 of head width at narrowest; male T3 a triangle of bluish cuticle from hind margin to point in middle of tergite (Fig. 493); surstylus and cercus robust (Figs 91–92); epiphallus normal (Fig. 181); female T6 of OV shape; [known from Central America and northern South America] . . . . . ***M. socors***

- Subcostal sclerite bare; thorax with 2:1 ac, 0 ia, kat 1:1; male frons 0.025 of head width at narrowest; T3 without a triangle of bluish cuticle on hind margin; surstylus and cercus slender (Figs 75–76); epiphallus very short (Fig. 165); female T6 of in WV shape (Fig. 312); [known from Costa Rica and Panama]. . . . . ***M. flavicrura***

18 T5 with dense, irregular, long and slender setae; kat 2:1; male frons 0.04 of head width at narrowest; epandrium, cerci and surstyli distinctive: surstylus long and straight in lateral view, cercus even longer and also straight (Fig. 77); in posterior view, surstyli much shorter than cerci and apically curved outward, basal two-thirds of cerci narrow, parallel-sided (Fig. 78); phallus in dorsal view exceptionally narrow (Fig. 168). Female T6 of OV shape (Fig. 313); [known only from Bolivia]. . . . . ***M. longicercus* sp. nov.**

- T5 with shorter, sparser setae; kat 1:1; male frons broader, 0.09 of head width at narrowest; epandrium, cerci and surstyli in lateral view with surstylus very short, slightly curved backward, and cerci much longer than surstyli (Fig. 67); in posterior view, basal half of cerci bulbous, apical half abruptly narrowing to tip (Fig. 68); phallus in dorsal view broader (Fig. 158); female T6 of RV shape (Fig. 308); [known only from Bolivia] . . . . . ***M. bullata* sp. nov.**

19 Wing entirely hyaline; male frons narrow, 0.06 of head width at narrowest; female T6 of WV shape (Fig. 305); [known from French Guiana, Guyana, Peru and Venezuela; Marinho *et al*. (2017) also listed it from Brazil]. . . . . ***M. benoisti***

- Wing with more or less dark infuscation along costa; male frons broader, 0.08–0.12 of head width at narrowest. **20**

20 Wing with weak infuscation along costa; T1+2–T4 with bluish-purple horizontal bands on posterior margins (best seen in well-preserved specimens); ac 0:2; rim of upper calypter sooty; female T6 of OV shape (Fig. 311); [known only from Brazil; Marinho *et al.* (2017) also listed it from Colombia] . . . . . ***M. cyaneicincta***

- Wing with dark infuscation along costa; T1+2-T4 without horizontal bands on posterior margin; ac 0:1; rim of upper calypter light or dark **21**

21 T4 with complete row of marginal setae; posthumeral seta absent; upper calypter with pale rim; male frons 0.10 of head width at narrowest; female T6 of WV shape; T7 narrowed midway (Fig. 316); [known from Bolivia, Brazil, Guyana, Peru and Venezuela; Marinho *et al.* (2017) also listed it from Colombia and Venezuela] . . . . . ***M. quadrilineata***

- T4 without row of marginal setae; posthumeral seta present, sometimes small; upper calypter with dark rim; male frons narrower, 0.08 of head width at narrowest; female T6 of FU shape; T7 broad midway (Fig. 317); [known from Bolivia, Brazil, Guyana and Peru] . . . . . ***M. randa***

Mesembrinella apollinaris Séguy, 1925

(Figs 302, 346, 387, 431, 488)

Mesembrinella apollinaris Séguy, 1925: 196. Lectotype male (MNHN), not examined. Type locality: Villavicencio, Colombia.
Mesembrinella apollinaris: Peris & Mariluis (1984: 259); Kosmann *et al*. (2013: 77); Wolff (2013: 121); Wolff & Kosmann (2016: 866); Marinho *et al*. (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A very large species [a single female was examined by us, measuring 17 mm in length; Guimarães (1977) gave a body length of 15 mm for this species]; postpronotal setae 3x3; stem vein bare; wing heavily infuscated, dark brown: anterior half all dark, posterior half with infuscation around veins; dorsum of abdomen without heavy, irregular, tomentose pit-like spots (see Fig. 103); supravibrissal setae dark reddish-brown; section IV of wing 0.75 of section III; palpus brown; scutellum without discal setae.

Redescription. *Male* [none available for examination; the information given here is taken from Guimarães (1977)]. Frons 0.05 of head width at vertex; thoracic chaetotaxy: ac 2:1, dc 3:3, ppn 3x3, kat 2:1, 1 pair converging ap, 1 sa, 1 lat, 1 bas, 1 pb, disc absent. [Guimarães (1977) illustrated the epandrium, cerci and surstyli (figs 70, 87) and phallus (figs 116, 137).]

Female [one specimen examined and dissected]. Frons 0.26/1 of head width at narrowest. Fronto-orbital yellow with silvery tomentum; frontal vitta broad and reddish-brown; frontal setae ascending to vertex; parafacial with heavy, shiny silvery tomentum; gena dark orange with faint silvery tomentum, unusually narrow with typical horizontal row of about five stout black setae midway; postgena orange with dark setae; occiput with gleaming silvery tomentum and long wiry whitish setae, median occipital sclerite shiny dark reddish-brown; antenna: pedicel dull orange, first flagellomere brown, base of arista orange, remainder brown; palpus nontypical, brown [not orange)]; eye with median facets about 3x size of lateral facets; ocellar triangle medium-sized, ocelli about equal in size; supravibrissal setae dark reddish-brown, in cluster near base and in single row above, ascending about 50% of distance to antennal base.

Thorax reddish-brown with a pair of pale tomentose stripes; pleura reddish-brown with weak, pale tomentum; chaetotaxy: ac 2:1, dc 2:3, ia 1, ph; ppn 3x3, kat 2:1, meral setae pattern typical but setae very fine and weak, crossed ap, 1 sa, 0 lat, 1 bas, 1 small pb, 0 disc [unusual for this species-group]; subscutellum moderately developed; spiracles medium-sized, pale; legs brown, apex of for femur orange, mid and hind femora with orange distal half. Wing tinted brown with heavy black infuscated area along costa to R_{2+3}; subcostal sclerite setose (setae tending to blend in with sclerite); basicosta and tegula typical; section IV 0.75 of section III; disc of upper calypter tan with pale area ventrally, rim dark brown with dark setae; disc of lower calypter tan, rim yellow with yellow setae.

Abdomen entirely shiny reddish-brown with purple reflections and weak pale tomentum; rear of T4 with a few stout dorsolateral marginal setae, disc of T5 with sparse, fine setae only. *Terminalia.* T6 of RU shape; T7 narrowed midway; T8 thin and divided midway; epiproct complete (Fig. 302); ST6 very broad, rectangular; ST7 also wide (Fig. 346); ST1–5 of equal width (Fig. 431).

Material examined. Colombia, **Meta.** 1 ♀, 23 km NW Villavicencio Qbda [Quebrada] Susamuco, 1000 m, 5.iii.1972, S. & J. Peck (CNC).

Distribution. Colombia.

Remarks. The type series consists of the lectotype male and two female paralectotypes collected from the same general area as the lone female specimen examined for this study. This species was not seen from any other area of the Neotropics during this study. One sequence from GenBank (KR820707) was added to the barcode analysis. It was distinct from other species and was recovered close to *M. umbrosa* (Fig. 488).

Mesembrinella batesi Aldrich, 1922

(Figs 5, 57–58, 103, 147–148, 216, 259, 303, 347, 388, 432, 471, 488, 490)

Mesembrinella batesi Aldrich, 1922: 15. Holotype female (NHMUK), examined. Type locality: Brazil, R. Amazons [= Amazon River].

Mesembrinella batesi: Peris & Mariluis (1984: 260); Toma & Carvalho (1995: 137); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Marinho *et al.* (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A large dark fly averaging 12 mm (11–13/5) in length. Postpronotal lobe 3x3, stem vein bare; wing with strong infuscation along anterior margin between costa and R_{4+5}; subcostal sclerite with long, dark setae; abdomen with heavy white tomentum and dark, pit-like areas around setal bases (Fig. 103).

Redescription. *Male.* Head. Frons narrow, 0.017 (0.01–0.02/5) of head width at narrowest, about equal to width of base of arista; fronto-orbital broad below, very slender above, frontal setae ascending about 30% of distance to vertex; frontal vitta as an orange triangle in lower 1/3, obliterated above; parafacial bright silvery, narrow above, broad below; gena orange with short, tan setae and a horizontal row of stout setae extending across gena and lower parafacial to vibrissa; pale tomentum extending from occiput into posterodorsal corner of gena; postgena with silvery tomentum with long golden setae; occiput with heavy yellow tomentum and with long, weak pale yellow setae; median occipital sclerite shiny, dark orange; pedicel and first flagellomere yellow-orange; palpus typical; ocellar triangle small, anterior ocellus slightly larger than posterior ocelli; eye with median facets about 2x size of lateral facets; facial ridge with short row of dark brown supravibrissal setae ascending about 1/6 of distance to antennal base.

Thorax. Dorsum orange-brown with four broad irregular pale tomentose stripes, pleural area orange; chaetotaxy: ac variable, usually 2:3 but sometimes 2:1 or 2:2, dc 2:3, ia 1, ph 1, ppn 3x3, kat 1:1, 1 pair converging ap, 1 weak sa, 1 weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles medium-sized,

pale yellow. Legs yellow-orange; mid and hind tibiae and tarsi tan. Wing with strong macula along anterior edge between costa and R_{4+5}; subcostal sclerite with long dark cilia (Fig. 490); basicosta dark orange; tegula pale orange; section IV 0.36 of section III; calypters with tan discs; upper calypter with dark rim and short pale setae, lower calypter with pale rim and long, pale setae.

Abdomen. T1+2–5 more or less shiny blue and covered with heavy whitish tomentum, with dark pit-like areas around setal sockets (Fig. 103); T3 with two pairs of lateral marginal setae, T4 with weak row of setae on posterior margin; disc of T5 with dense, fine setae only. *Terminalia* in left lateral view with surstylus curved backward, cercus nearly straight with apical hook (Fig. 57); in posterior view, cerci with narrow base, of rectangular shape with blunt, rounded tips (Fig. 58); phallus in lateral view with epiphallus with broad base and tip sharply curved backward to a fine point (Fig. 147); in dorsal view, hypophallic lobes broad and elongate, oval-shaped (Fig. 148); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 216; ST1–5 as in Fig. 259, ST3–4 unusually narrow.

Female. Similar to male except frons 0.302 (0.29–0.31/5) of head width at narrowest. T6 of WV shape; T7 broad, continuous with anterior edge, recessed midway; T8 as separate sclerites (Figs 303); ST6–8 and hypoproct as in Fig. 347; spermathecae filiform (Fig. 388); ST1–5 as in Fig. 432.

Type material examined. HOLOTYPE ♀ (Brazil; NHMUK; Fig. 471), labeled: Brazil: / R. Amazons. / H.W. Bates. / 66.53.; Amazon. / 66 53; Mesembrinella / batesi / Type Ald.

Additional material examined. Brazil, **Rondônia.** 1 ♂, 2 ♀♀, 62 km SE Ariquemes, 22–31.x.1997, W.J. Hanson (LACM); ♀*, same data except 13–25.iv.1992 (LACM); 2 ♀♀, same data except 8–20.xi.1994 (LACM); 1 ♂, 1 ♀*, 1 ♀, 62 km SE Ariquemes, nr. Fzda. Rancho Grande, 6–15.xii.1990, D.A. Rider & J.E. Eger (FSCA); 1 ♀*, 1 ♀♦ (TLW424), 4 ♀♀, same data except 4–16.XI.1997, Fish Carrion Pitfall, J.E. Eger (LACM); 1 ♂♦ (TLW421), 1 ♀, same data except 3–15.xii.1996, MV & black lights, J.E. Eger (LACM); 1 ♀, 160–350 m vic. Caucalandia, 10°32′S 62°48′W, 12–13.x.1991, pitfall trap baited with human feces, J.R. MacDonald (MEM). Ecuador, **Napo.** 1 ♂♦ (TLW228), 1 ♂, 1 ♀♦ (TLW231), 1 ♀, Misahualli nr. Tena, 6–19.x.2001, Mal. Tr., C. Brammer (LACM); 1 ♂*, 1 ♂♦ (TLW227), 1 ♀♦ (TLW229), same data except 27.iv–2.v.2003 (LACM); 1 ♂, same data except Yasuni Res. Sta., 0°40.566′S 076°23.851′W, 250 m, M.T. (LACM). **Orellana.** 1 ♀♦ (TLW230), RioTiputini, 0°38.2′S 76°8.9′W, 12–26.viii.1999, W.N. Mathis, A. Baptista, M. Kotrba (LACM). **Pastaza.** 1 ♂, Limoncocha, 70 mi. SE, on Rio Cononaco, at Anglo air strip, 1°19′S–76°6′W, 29.v.1976, Malaise trap, J. Cohen (LACM). Peru, **Cusco.** 1 ♂, 2 ♀♀, Pilocapata, Villa Carmen Biológica Sta., 12°53′S 71°24′W, i–iii.2013, E. Rodriguez (FSCA); 1 ♀♦ (TLW422), same data except v.2014, multilure trap, M. Choque (FSCA); 1 ♂*, Estación Biológica Villa Carmen, clearing edge, 12°53′39″S 71°24′14″W, xi.2012, T. Forster (USNM); 1 ♀♦ (TLW423), same data except 12.xii.2013, bait trap, dead fish, A.L. Norbom, B.D. Sutton (FSCA). **Loreto.** 1 ♀, 80 km NE Iquitos, Explorama Lodge, 11 km from Amazon R. on Rio Yanamono, 1–5.ix.1992, human dung trap, Castner & Skelley (FSCA); 1 ♂*, La Merced, Fundo Genova, 30.vii.2008, [no collector] (CEUA).

Distribution. Brazil, Ecuador, Peru. Marinho *et al.* (2017) also listed it from Colombia, Venezuela and Trinidad and Tobago.

Remarks. Eight specimens were barcoded, from Ecuador (TLW227–230), Peru (TLW422–423) and Brazil (TLW421 and TLW424). An additional GenBank sequence from Brazil (KR820711) was added to the analysis. All sequences clustered together, with some genetic variation likely based on geographical separation. The genetic distance between sequences from within Ecuador was less than 2%, whereas between sequences from Peru and Ecuador it was around 6% and between sequences from Brazil and Ecuador it was around 5% (Fig. 488). This is a distinctive species and no significant morphological differences were found in specimens from different countries.

Mesembrinella bellardiana Aldrich, 1922

(Figs 59–60, 149–150, 193, 217, 260, 304, 348, 389, 433, 472, 488–489)

Mesembrinella (*Mesembolia*) *bellardiana* Aldrich, 1922: 21. Holotype female (USNM), examined photographically. Type locality: Espirito Santo, Brazil.

Mesembrinella bellardiana: Peris & Mariluis (1984: 261); Toma & Carvalho (1995: 137); Marinho *et al.* (2012: 142); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Wolff & Kosmann (2016: 868); Marinho *et al*. (2017: tab. 1); Velásquez *et al.* (2017: 109); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A fairly large fly averaging 12.2 mm (11–13/5) in length. Thorax reddish-brown; wing with stem vein setose above and anterior margin heavily infuscated along costa; subcostal sclerite setose. Similar to *M. latifrons*, but wing with section IV 0.67 of section III compared to 0.29 in *M. latifrons*; terminalia in posterior view with surstyli gently curved (Fig. 60), whereas they are right-angled in *M. latifrons* (Fig. 26).

Redescription. *Male.* Head. Frons 0.05 (0.03–0.08/5) of head width at narrowest. Fronto-orbital pale gold; frontal setae ascending about halfway to vertex; frontal vitta dark orange, upper half obliterated parafacial golden; gena orange with horizontal row of stout black setae and scattered smaller dark setae; postgena orange with golden setae; occiput dark orange with yellow setae and silvery tomentum; median occipital sclerite shiny dark orange; antenna entirely orange; eye with median facets about 2x size of lateral facets; ocellar triangle with anterior ocellus slightly larger than posterior ocelli; supravibrissal setae on facial ridge brown to reddish-brown (Fig. 193), ascending about 1/4 of distance to antennal base.

Thorax. Dorsum brown with pale tomentose stripes; pleural area pale orange with whitish tomentum; chaetotaxy: ac variable, 2:1 or 2:2, sometimes with one or more setae missing, dc 2:3, ia 1, ph 1, ppn 3x3, kat 1:1, line of thin meral setae with short bend with only one or two horizontally-arranged setae above, 1 pair converging ap, sa and lat absent, 1 stout bas, 1 weak pb, 1 disc; subscutellum weakly developed; both spiracles orange, medium-sized; legs entirely orange. Wing with long, dark infuscation along costa to R_{2+3}; subcostal sclerite with long reddish setae; stem vein setose (Fig. 489); basicosta and tegula orange; section IV 0.67 of section III; disc of calypters light tan; rim of upper calypter dark with short dark setae, rim of lower calypter pale with long pale setae.

Abdomen. T1+2 yellowish, T2–5 shiny blue with grayish tomentum; T4 and T5 with rows of marginal setae; disc of T5 with dense, short, fine setae only. *Terminalia* in lateral view with surstylus moderately curved backward, cercus with apical hook (Fig. 59); in posterior view, cerci broad, in an inverted narrow V-shape distally (Fig. 60); phallus in lateral view with broad, narrow hypophallic lobes (Fig. 149), in dorsal view as in Fig. 150; T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 217; ST1–5 as in Fig. 260.

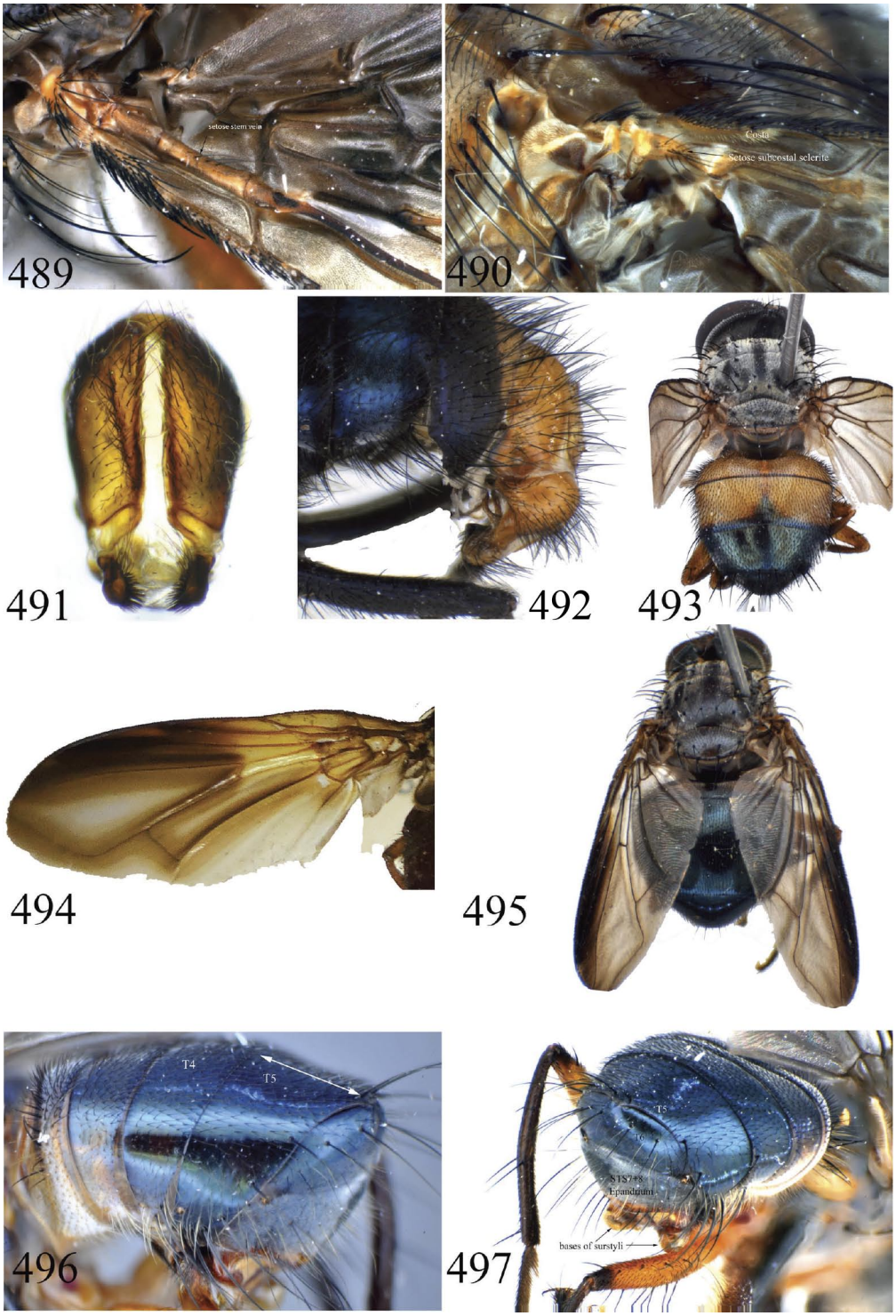
Female. Similar to male except frons 0.294 (0.27–0.31/5) of head width at narrowest. T6 of WU shape, T7 broad and continuous, T8 as separate sclerites, epiproct divided (Fig. 304); ST6–8 and hypoproct as in Fig. 348; spermathecae filiform (Fig. 389); ST1–5 as in Fig. 433.

Type material examined. HOLOTYPE ♀ (Brazil; USNM; examined photographically: Fig. 472), labeled: Brazil; Mesembolia / bellardiana / A. Ald.; USNMent 1295430.

Additional material examined. Argentina, **Misiones.** 1 ♂, 1 ♀, Puerto Uguazu, i.1979, [no collector listed] (CNC). Bolivia, **La Paz.** 1 ♀, S. Inicua Riv. Alto Beni, 15–18.i.1976, 1100 m, L.E. Pena (CNC). Brazil, **Rio de Janeiro.** 1 ♂, Yellow Fever Service, M.E.S Brazil, x.1938, R.C. Shannon (USNM). **Distrito Federal.** 1 ♀, Servicio Febre Amarela, M.E.S. Brasil, xii.1932, [no collector] (USNM). **Rondônia.** 3 ♀♀♦ (TLW232–TLW235), 1 ♀, 62 km SW Ariquemes, nr Fzda Rancho Grande, 4–16.xi.1997, fish carrion pitfall, J.E. Eger (FSCA); 1 ♀♦ (TLW235), same data except 3–15.xii.1996 (FSCA). **São Paulo.** 1 ♂, Registro, 2.xii.1965, R. Inoue (CNC); 1 ♂, Est. Biol. Boracéia nr. Salesópolis, 850 m, 13.iii.1972, E.G.L. & F.A. Munroe (CNC); 1 ♀, R. Parana Porto Cabral, 20–31.iii.1944, Trav. Fo. & Carrera & E. Dente (USNM). **Santa Catarina.** 1 ♀, Nova Teutonia, v.1969, F. Plaumann (CNC); 1 ♂, Nova Teutonia, 27°11′S, 52°23′W, 300–500 m, 30.i.1960, F. Plaumann (CNC); 1 ♂, 1 ♀, same data except ii.1965. Ecuador, **Napo.** 1 ♀, Finca Primavera Rio Napo, 240 ft., 0°24′S 76°46′W, 26.vi.1980, J.P. & K.E. Donahue (LACM); 1 ♀♦* (TLW236), Puerto Misahuali, 1650–1900 ft, 6–19.ix.1998, J.E. Eger (FSCA); Paraguay, **Alto.** 2 ♀♀, Parana Centro Forestal Alto Paran km 12N of Puerto Stroessener, 29.iv–5.v.1986, R.E. Woodruff (FSCA). Peru, **Cusco.** 1 ♀, Quincemil, 1–15.xi.1962, 700 m, L. Pena (CNC); 1 ♂♦* (TLW361), Estación Biológica Villa Carmen, 12°53′39″S 71°24′14″W, clearing edge, 15–27.xi.2012, Malaise trap, citrus tree, T. Forster (FSCA); 1 ♂♦* (TLW360), La Merced, Fundo Genova, 30.vii.2008 (CEUA).

Distribution. Argentina, Brazil, Ecuador, Paraguay, Peru. Bonatto (2001) listed Bolivia, Colombia, French Guiana, Suriname and Venezuela.

Remarks. Guimarães (1977) described a subspecies of *M. bellardiana*, *M. bellardiana fuscicosta* Guimarães, 1977, distinguishing populations in northern and southern South America based on some color variation. Marinho *et al*. (2017) noted that presumed populations of this species that are widely separated geographically may actually belong to separate species.



FIGURES 489–497. Diagnostic characters of *Mesembrinella* spp. **489.** Dorsal view of stem vein of wing of *M. bellardiana* Aldrich showing stem vein setose. **490.** Detail of wing of *M. batesi* Aldrich in ventral view, showing setose condition of subcostal sclerite. **491.** Epandrium of *M. mexicana* **sp. nov.** in posterior view, showing broad dorsal division found in *M. spicata* group. **492.** Detail of abdomen of male *M. epandrioaurantia* **sp. nov.**, showing orange color of rear segments. **493.** Detail of dorsal habitus of *M. socors* (Walker), showing triangle of bluish cuticle on hind margin T3. **494.** Wing of *M. pictipennis* Aldrich, showing pattern of infuscation. **495.** Posterodorsal habitus of male *M. townsendi* Guimarães, showing wing pattern and stripes on thorax. **496.** Detail of male abdomen of *M. anomala* (Guimarães), showing relative lengths of T4 and T5. **497.** Same as previous, showing modification of T6, STS7+8 and epandrium.

Seven specimens were barcoded: TLW232–234 from Brazil grouped closely; TLW235, also from Brazil, and TLW236, from Ecuador, were about 2% different from other Brazilian specimens. Barcoded specimens from Peru (TLW360–361) were much different, around 6.8%, from the Ecuador and Brazilian specimens (Fig. 488). Morphologically all these specimens key to *M. bellardiana*, though some minor differences in the epandrium, cerci and surstyli were noted. The specimens illustrated herein are from Brazil, where the holotype came from, and the barcoded Brazilian specimens were mostly very similar. At this point, morphological differences between the Peruvian and Brazilian specimens do not seem sufficient to merit describing the specimens from each area as a different species, but further studies are needed.

Mesembrinella benoisti (Séguy, 1925)

(Figs 61–62, 151–152, 218, 261, 305, 349, 390, 434, 488)

Ochromyia benoisti Séguy, 1925: 196. Holotype male (MNHN), not examined. Type locality: French Guiana.
Eumesembrinella benoisti: Toma & Carvalho (1995: 141); Marinho *et al.* (2012: 842); Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 866); Marinho *et al*. (2017: tab. 1); Velásquez *et al.* (2017: 108).
Mesembrinella benoisti: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A fairly large fly averaging 11.4 mm (11–12/5) in length. Postpronotal lobe with 2x2 setae; wing hyaline with only faint yellowing along costa; thorax orange-brown with pale tomentose stripes; abdomen shiny blue; ac 0:1.

Redescription. *Male.* Head. Frons 0.06 (0.05–0.07/5) of head width at narrowest. Fronto-orbital orange below, silvery above; frontal setae ascending about 40% of distance to vertex; frontal vitta orange, obliterated about midway above; parafacial silvery; gena pale yellow with silvery tomentum; postgena yellow with silvery tomentum and silky yellow setae; occiput shiny dark brown dorsolaterally, remainder pale yellow with fine yellow setae; median occipital sclerite shiny dark brown; pedicel, first flagellomere and arista yellow-orange; palpus typical; eye with median facets about 2x size of lateral facets; ocellar triangle medium-sized, diameter of anterior ocellus about twice that of posterior ocelli; supravibrissal setae limited to small cluster near base of facial ridge.

Thorax. Dorsum dark orange-brown with four pale orange tomentose stripes; pleura orange; chaetotaxy: ac 0:1, dc 2:3, ia 0, ph 0, ppn 2x2, kat 1:1, meral setae fine, tan, in shape of inverted L, horizontal portion very short, 1 pair of parallel ap, sa and lat absent, 1 bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles small and orange; legs: trochanters and femora orange, tibiae and tarsi brown, darker on fore leg. Wing hyaline with faint yellowing along costa, whole wing somewhat yellowish; subcostal sclerite yellow and bare; basicosta yellow, tegula orange; section IV 0.16 of section III; disc of upper calypter pale, rim dark with short pale-yellow setae; disc of lower calypter golden, rim yellow with long golden setae.

Abdomen. T1+2 orange, T3 orange with small forward-pointing arrow-like dark area mid-dorsally [good specimens]; T4 mostly metallic blue-black with some orange color laterally and a pair of lateral marginal setae; T5 shiny blue-black, disc with dense, medium-long fine setae only. *Terminalia* in lateral view with surstylus moderately curved backward, cercus with apical hook (Fig. 61); posterior view as in Fig. 62; phallus in lateral view with short, slightly curved epiphallus (Fig. 151); in dorsal view, hypophallic lobes narrow (Fig. 152); T6, STS7+8, pre- and postgonite, ST6 and ejaculatory sclerite as in Fig. 218; ST1–5 narrowed, as in Fig. 261.

Female. Similar to male except frons 0.274 (0.26–0.28/5) of head width at narrowest. T6 of WV shape, T7 continuous, weakened midway, T8 as separate sclerites (Fig. 305). ST6–8 and hypoproct as in Fig. 349; spermathecae filiform (Fig. 390). ST1–5 as in Fig. 434.

Material examined. French Guiana. 2 ♂♂*, 1 ♀*, 5 ♀♀♦ (TLW237–TLW241), 3 ♀♀, Kaw Mountain, 04°33′58″N 52°12′43″W, 8.ii.2008, 310 m Bait trap, T.L. Whitworth (TW); 7 ♂♂, 1 ♀, same data except 4–9.ii.2008 (TW). Guyana, **Potaro-Siparuni.** 1 ♀, Kaieteur, 6.viii.1911, [no collector] (USNM). Peru, **Cusco.** 1 ♀, Madre de Dios Parque Manu., pakitza, 11°53′S 70°58′W, 400 m, 16.xi.1990, J. MacDonald (MEM). Venezuela, **Bolivar.** 1 ♂, Rio Teuanen 24 mi. N. Kavanayen ca., 1600 m, 13.viii.1970, R.E. Dietz IV (LACM); 1 ♀, El Bochinche Res., Forestal Imataca, 200 m, 6–13.xii.1974, [no collector] (MIZA).

Distribution. French Guiana, Guyana, Peru, Venezuela. Bonatto (2001) listed it from Brazil.

Remarks. Five specimens (TLW237–241) were barcoded, all from one location in French Guiana. Two GenBank sequences (JQ246686, KR820726) from Brazil were added to the analysis. All sequences clustered together (Fig. 488).

Mesembrinella bicolor (Fabricius, 1805)

(Figs 7 13, 63–64, 153–154, 194, 219, 262, 306, 350, 391, 435, 488)

Musca bicolor Fabricius, 1805: 291. Holotype female (NHMD), not examined. Type locality: "America Meridionalis" [= South America].

Mesembrinella bicolor: Peris & Mariluis (1984: 261); Toma & Carvalho (1995: 137); Marinho *et al.* (2012: 142); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Wolff & Kosmann (2016: 868); Marinho *et al*. (2017: tab. 1); Velásquez *et al.* (2017: 109); Cerretti *et al.* (2017: tab. 2).

Diagnosis. Size variable: averaging11 mm (8–13/5) in length, most specimens seen between 12 and 13 mm in length. Thorax reddish-brown with faint pale tomentose stripes; abdomen gleaming blue [in well-preserved specimens; shiny brown in poor specimens]. Postpronotal setae 3x3; stem vein bare; wing hyaline, but area from costa to R_1 and areas along veins usually moderately yellowed under magnification and reflected light; subcostal sclerite bare; section IV of wing 0.28 of section III; discs of upper and lower calypters tan; upper calypter with tan rim and short brown setae, lower calypter with pale rim and long pale setae. Epandrium, cerci and surstyli as in Figs 63–64. Female terminalia as in Fig. 306. [A common and widespread nondescript species that occurs over a wide area of the Neotropical Region and which tends to be somewhat variable.]

Redescription. *Male.* Head. Frons 0.027 (0.015–0.050/5) of head width at narrowest [this species is widely distributed, and frons width can be variable]. Fronto-orbital and parafacial with silvery tomentum when viewed from above, orange tomentum when viewed from below; frontal setae ascending about halfway to vertex; frontal vitta orange, obliterated from midway up; gena and postgena orange with silvery tomentum, with mostly long golden setae, gena with horizontal row of three stout setae; occiput with silvery tomentum and yellow setae; median occipital sclerite broad, shiny dark orange (Fig. 13); antenna orange, arista reddish-brown; palpus typical; eye with median facets about 3x size of lateral facets; ocellar triangle medium-sized, ocelli about equal-sized; supravibrissal setae dark brown, ascending about 1/6 of distance to antennal base.

Thorax. Dorsum reddish-brown with faint pale whitish tomentose stripes; pleura yellowish; chaetotaxy: ac variable, 2:2 to 2:3, sometimes anterior postsutural ac missing on one or both sides, dc 2:3, ia 1, ph, 1; ppn 3x3, kat 2:1, meral setae a vertical line, usually with only 1 horizontal seta, 1 pair converging ap, sa absent, 1 very weak lat, 1 stout bas, 1 very weak pb, 1 disc (Fig. 194); subscutellum weakly developed; spiracles medium-sized, yellow-orange; legs: trochanters and femora orange, tibiae and tarsi more or less brownish. Wing appearing hyaline, but area from costa to R_1 and areas along veins distinctly yellowed when observed under reflected light; subcostal sclerite bare; basicosta and tegula orange; section IV 0.28 of section III; discs of calypters light tan; rim of upper calypter brown with short brown setae, rim of lower calypter pale with long pale setae.

Abdomen. T1+2 more or less yellowish midway, metallic blue laterally, T3–5 metallic blue with whitish tomentum, T4–5 with marginal setae; disc of T5 with dense, medium-long, fine setae only. *Terminalia* in lateral view with surstylus moderately curved backward (Fig. 63); in posterior view, base of cerci broad, evenly tapered to tips (Fig. 64); phallus in lateral view with epiphallus with moderate backward curve (Fig. 153); in dorsal view, hypophallic lobes expanded slightly, edges of lobes with coarse, shallow serrations (Fig. 154). T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 219; ST1–5 as in Fig. 262.

Female. Similar to male except frons 0.278 (0.25–0.31/5) of head width at narrowest and eye with median facets about 2x size of lateral facets. T6 of OV shape; T7 slender, divided midway; T8 as separate sclerites (Fig. 306); ST6–8 and hypoproct as in Fig. 350; spermathecae filiform (Fig. 391); ST1–5 as in Fig. 435.

Material examined. Bolivia, **Santa Cruz.** 1 ♀, 210 km NW of Santa Cruz at Rio Yapacani, 5–10.v.1983, insect flight trap, D.G. Young (FSCA). Brazil, **Rondônia.** 1 ♂♦ (TLW428), 2 ♂♂, 3 ♀♀, 62 km SW Ariquemes. Nr. Fzda. Rancho Grande, 6–15.xii.1990, D.A. Rider, J.E. Eger (FSCA); 3 ♀♀, same data except 4–16.xi.1997, Fish carrion pitfall (FSCA); 1 ♀, Maracaju, ii.1937, M. Grosso (USNM); 3 ♀♀, same data except v.vi.1937, R.C. Shannon; 1 ♂♦* (TLW457), vic. Caucalandia, 10°32′S 62°48′W, 160–350 m, 10–11.x.1991, J. MacDonald (MEM); 1 ♀, same data except 12–13.X.1991 (MEM); 1 ♂♦ (TLW457), same data except 14.x.1991 (MEM). Costa Rica, **Alajuela.**

1 ♂*, Upala Bijagua, Albergue Heliconias, 700 m, 22–29.vi.2000, L_N_298000 423800 #56844, J.D. Gutierrez de Luz (INBIO); 1 ♂, P.N. Volcau Teurio Est. Pilon, 1.5 SO C. Carmela, 700–800 m, 5.vii–17.viii.2006, Malaise trap, L_N_298212 427913 #86941, J.A. Azofeifa (INBIO); 1 ♀, Bijagua, P.N. Volcan Teurio, Albergue Heliconias, Send. Heliconias, 680 m, 1.ii.2008, Tp. Luz, L_N_299100 422600 #94184, A. Zumbado (INBIO). **Guanacaste.** 1 ♂, Est Las Pailas, 800 m, P.N. Rincón de la Vieja, 27.vii–15.viii.1992, L_N_306300 388600, C. Cano (INBIO); 1 ♂, Sendero, Pailas, Catarata, 800 m, 11–12.i.1994, L_N_306300 388600 #2666, M. Zumbado (INBIO); 1 ♂, Estación Santa Rosa, 300 m, 5.iv.1997, L_N_313000 359800 #50732, D.H. Janzen, Gusaneros (INBIO); 1 ♂♦ (TLW357), Santa Cruz, vista del mar Torre Cocfsna 972 m, 10.ii.2003, Libre, L_N_235350 357500 #73267, W. Porras (INBIO); 3 ♀♀, Santa Rosa, 16–17.i.2005, [no collector] (INBIO). **Heredia.** 1 ♂♦ (TLW351), 1 ♀, Santo Domingo, 10.i.2011, bait trap, T.L. Whitworth (TW). **Limón.** 1 ♂, Est. Hitoy Cerere, 100 m, R. Cerere Res. Biol. Hitoy, 13–27.iv.1992, L_N_184200 643300, G. Carballo (INBIO); 1 ♀, same data except ix.1991 (INBIO); 1 ♂, 2 ♀♀, Hdas. La Suerte/Tapezco, 29 air km W Tortuguero, elev. 40 m, 10°27′–30′N 83°47′W, 13–31.viii.1979, J.P. & K.E. Donahue, C.C. Hair, N.K. Moore, M.A. Hopkins (LACM); 1 ♂, R.B. Hitoy Cerere, Valle de la Estrella, Send. Espavel, 560 m, 27–30.ix.2003, L_S_401200 569800 #75563, Libre, W. Arana (INBIO); 1 ♂, Amburi, 70 m, ix.1996, L_S_385000 578100 #8397, G. Gallardo (INBIO); 1 ♀, same data except Talamanca, 6–11.vi.1993, L_S_385500 578050 (INBIO); 1 ♂, Guacime, LRO 15 km NE, 23.ii.1988, F.D. Parker, J.B. Welch, F. Ramírez (USNM). **Puntarenas.** 1 ♂, Est. Sirena, 0–100 m, P.N. Corcovado, iv.1992, L_S_270500 508300, G. Rodríguez (INBIO); 1 ♀, same data except x.1989, G. Fonseca; 1 ♀, same data except vi.1990, F. Quesada (INBIO); 1 ♂, Tropical youth center, 5 km S of Rincón, 95 m, 8°42.1′N, 83°30.8′W, 11.viii.2001, at light, N.E. Woodley (USNM); 1 ♂*, 3 ♀♀♦ (TLW354–TLW356), Mauglar boca Rio Arajuez, Pto A, 2 km SW Cocal, 20 m, 16.xii.2006, Tp. Frutas, L_N_219755 44651 #90195, Moraga, Zumbado, Azofeifa, Gamboa (INBIO); 1 ♂, Est. Sirena, P.N. Corcovado, 0–100 m, vi.1990, L_S_270500 508300, F. Quesada (INBIO); 1 ♀, Cobano, R.N.A. Cabo Blanco, Estac. Cabuya, Send. sueco 200–300 m, 13.iii.2002, Libre, L_N_173500 415500 #67200, Y. Tardenas (INBIO); 1 ♀, San Vito de Java, 26.iv.1954, J.O. Harrison (FSCA). **San José.** 1 ♀, Z.P. Mora El Rodeo, Fila Diamaute, 900–1000 m, 3.xii.2005, Tp. Frutas, L_N_209300 507000 #95137, A. Hoepker, J. Mata (INBIO). Ecuador, **Imbabura.** 4 ♂♂, 6 ♀♀, Lita Imbabura, 12.iv.2016, traps 1–5, 2016-10, P. Ponce (FSCA). El Salvador, **Santa Tecla.** 2 ♀♀, 900 m, 26.v.1972, S. Leg & L. Steinhauser (FSCA). French Guiana. 1 ♂*, 10 ♂♂, 1 ♀*, 6 ♀♀♦ (TLW242–TLW247), 4 ♀♀, Kaw Mountain, 04°33′58″N 52°12′43″W, 310 m, 4–9.ii.2008, bait trap T.L. Whitworth (TW). Guatemala, **San Marcos.** 2 ♀♀, Bojoual 1600 m, 2.vii.2011, F. Camposeco (WSU). **Suchitepequez.** 1 ♂*, 1 ♀*, Univ. Guatemala Res. Station, 1500 m, 14°32′88″N 91°11′62″W, 10.vi.2011, F. Carillo (TW). Honduras, **Tegucigalpa.** 1 ♂, Escuela Agricola Panamericana, 28.xi.1983, swine feces, J. Dick (FSCA). Mexico, **Tamaulipas.** 2 ♀♀, Gomez Farias, Atlas Cimas, 1000 m, 20.iii–29.iv.1987, carrion pitfall trap, Kovarik (TAMU); 1 ♀, Tamaulipas, Santa Engracia, 20.x.1937 (TAMU). Panama, **Cocle.** 2 ♂♂♦ (TLW426–427), El Valle de Anton, Sen. Los Arboles Cuadrato, FIT 8.61669°N, 80.13336°W, 6–7.viii.2011, E.G. Riley (TAMU); 2 ♂♂, same data except 6–7.viii.2011 (TAMU); 1 ♀, Almirante Bocas del Toro, yellow camp fever, Shannon trap, [no collector] (FSCA); 1 ♀, same data except 15.viii.1951. **Canal Zone.** 1 ♀, Black Tank Rd. Ft. Sherman, 1.i.1985, J. & S. MacDonald (MEM); 1 ♀, Gatun, West Creek Trail, 7–9.iv.1987, J.R. MacDonald (MEM); 1 ♀, Caurto, Shannon trap, 11.v.1961, [no collector] (FSCA); 1 ♂, Cristobal v.1960, Malaise trap, S.G. Breeland (FSCA); 1 ♂*, Pan Barro Colorado, 8.viii.1978, R.B & L.S. Kimsey (UCDC); 1 ♂♦ (TLW446), Cerro Paraiso, 4.i.1986, J. & S. MacDonald (MEM); 1 ♀♦ (TLW447), Black Tank Rd, Ft Sherman, 1.i.1986, J. & S. MacDonald (MEM). Peru, **Cusco.** 1 ♀, Madre de Dios Parque Manu, Pakitza 11°53′S 70°58′W, 400 m, 16.xi.1990, J. MacDonald (MEM). Suriname, **Brokopondo.** 1 ♀, nr. Brownsberg, Ston Eliand Eco Ressort, N04°59.0′, W055°08.0′, 10–13.ii.2010, Banana trap, P. Skelley (FSCA). Trinidad and Tobago, 1 ♂, Trinidad, 8 km N Arima, Simla Res. Sta. 260 m, 14.vi.93, trop. Forest, FIT & S. and J. Peck (CNC); 1 ♂, St Augustine, Pax Guest House, 29.x–3.xi.2000, black light trap, R.E. Woodruff (FSCA); *1 ♀, Arima Valley "simla" Beebe Trop. Res. Center, 29.x–2.xi.2000, dung traps, R.I. Hernández and R.E. Woodruff (FSCA); 1 ♀, same data except 3–17.xi.2000, hand catch at night. Venezuela, **Bolivar.** 1 ♂, Carret. Caicara, San Juan de Manapiare, km 170, 300 m, 21–30.xii.1973, J.L. Garcia (MIZA); 1 ♂♦ (TLW425), Edo. Lara, PN Yacambu-El blanquito 11–16.iii.2002, [no collector] (MJMO).

Distribution. Bolivia, Brazil, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Honduras, Mexico, Panama, Peru, Suriname, Trinidad, Venezuela. Marinho *et al.* (2017) stated this species occurs in Central, South America except Chile, Argentina.

Remarks. Thirty-two specimens were barcoded: TLW428 and TLW457 from Brazil, TLW193, TLW351 and

TLW354–357 from Costa Rica, TLW226, TLW248–250 and TLW441–442 from Ecuador, TLW242–247 from French Guiana, TLW347–348 and TLW426–427 from Panama, TLW222–225 and TLW443 from Peru, TLW350 from Suriname, and TLW349 and TLW372 from Trinidad (Fig. 488). This species is widespread in the Neotropical Region and the barcodes grouped into several clusters in the NJ analysis. Typically, barcodes for specimens collected in close proximity were very similar. For specimens from widely separated geographical areas, as is the case of *M. bicolor*, the NJ analysis showed considerable molecular divergence, though morphologically the specimens were very similar. A similar situation was discussed by Tantawi *et al*. (2017) and Yusseff-Vanegas & Agnarsson (2017), who mentioned that barcode data for common, widespread species like *Lucilia eximia* (Wiedemann, 1819) suggested the existence of several cryptic species. Whitworth (2014) studied the morphology of *L. eximia* from many different areas, and although there were slight morphological differences between populations, he could not identify reliable characters to justify splitting them into separate species. It is likely that a similar situation exists with *M. bicolor*. A specimen from Brazil keyed to the *bicolor* species-group because it had 2x2 postpronotal setae, but it would not key to a known species. The specimen was barcoded (TLW457) and it grouped with *M. bicolor*. Once it was assumed that this specimen's condition was aberrant and that its normal condition was to have 3x3 postpronotal setae, it keyed perfectly to *M. bicolor.*

Without microscopic examination, the wing of *M. bicolor* appears hyaline; under a microscope, and using reflected light through the wing, the area along the costa is distinctly yellowish. To key specimens properly, this condition must be recognized. Variation was noted in frons widths in both sexes and some series of smaller specimens were also seen. A detailed study of morphology supports retaining a single, somewhat variable, species, but further studies are warranted.

Mesembrinella brunnipes Surcouf, 1919

(Figs 65–66, 155–156, 220, 263, 307, 351, 392, 436, 488)

Mesembrinella brunnipes Surcouf, 1919: 78. Lectotype female (MNHN), not examined. Type locality: Bolivia. [NB: Guimarães (1977) noted that Surcouf did not select a holotype, so he designated a lectotype from one of three conspecific female syntypes from Bolivia.]

Mesembrinella brunnipes: Peris & Mariluis (1984: 260); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Marinho *et al*. (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A fairly large brown fly averaging 12 mm (11–13/3) in length. Postpronotal lobe 3x3; stem vein bare dorsally; wing infuscated; dorsum of abdomen without pits; supravibrissal setae dark brown or black; subcostal sclerite setose; section IV of wing 0.31 of section III; mid and hind femora with basal 1/4–1/2 brown, apical 1/2–3/4 orange; whitish tomentum on abdomen uniform on T1+2–4 vs. the similar *M. townsendi*, which has pale tomentum in oblique streaks. This species resembles *M. bicolor*, but has wing with strong, dark infuscated area along costa to R_{2+3} instead of wing hyaline with yellowish area along costa.

Redescription. *Male.* Head. Frons 0.02/1 of head width at narrowest. Fronto-orbital and parafacial pale orange with pale tomentum, frontal seta ascending about 1/3 of distance to vertex; frontal vitta orange, obliterated in upper 2/3; gena: anterior half orange with pale orange tomentum, posterior half orange with silvery tomentum; postgena orange with silvery tomentum; gena and postgena with dark setae, except rear edge of postgena with pale setae; occiput with pale gold tomentum and pale gold setae; median occipital sclerite shiny dark orange; antenna dark orange; palpus typical; eye with median facets about 3x size of lateral facets; ocellar triangle small with ocelli about equal in size; supravibrissal setae dark, ascending about 1/5 of distance to antennal base.

Thorax. Dorsum shiny brown with pale tomentose stripes; pleura dark reddish with pale tomentum; chaetotaxy: ac 2:3, anteriormost postsutural setae may be lacking on one side, dc 2:3, ia 1, ph 1, ppn 3x3, kat 1:1 or 2:1, meral setae typical, 1 ap converging slightly, sa absent, 2 very weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles medium, pale yellow; legs brown except mid and hind femora with apical 1/4–1/2 orange. Wing heavily infuscated along anterior edge from costa to R_{2+3}; subcostal sclerite with dark setae; basicosta and tegula orange; section IV 0.31 (0.303–0.313/3) of section III; discs of calypters light tan; rim of upper calypter light tan with short reddish setae; rim of lower calypter yellow with long pale-yellow setae.

Abdomen. T1+2 yellow-brown, T3–5 purple-blue with pale tomentum, row of marginal setae on T4; T5 without marginal setae. *Terminalia* in lateral view with surstylus moderately curved backward (Fig. 65); in posterior view

cerci short and stout (Fig. 66); phallus in lateral view with tiny, short epiphallus (Fig. 155); in dorsal view, hypophallic lobes rectangular with prominent coarse serrations along edge (Fig. 156); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 220; ST1–5 broad, as in Fig. 263.

Female. Similar to male except frons 0.27 (0.26–0.28/2) of head width at narrowest. T6 of WV shape; T7 slender, divided midway; T8 as separate sclerites (Fig. 307); ST6–8 and hypoproct as in Fig. 351; spermathecae filiform (Fig. 392); ST1–5 as in Fig. 436.

Type material examined. PARALECTOTYPE: Bolivia. ♀*, "Bolivien," [only country listed] (USNM).

Additional material examined. Bolivia, **La Paz.** 1 ♂♦* (TLW430), Sud Yungas, Puente Villa, Hotel Tamampaya, 4300 ft, 19–24–1989, Flight intercept trap, J.E. Eger (FSCA); Peru, **Cusco.** 1 ♀♦* (TLW429), Paucatambo, Puente, San Pedro 50 km NW Pilocapata, 3.ix.1988, 1600 m, A. Freidberg (LACM); 1♀, Cock-of-the Rock Lodge, Loop Trail, 13°3′21″W 71°32′46″W, 1450 m, 6.xii.2011, dung bait, debu00340874, S.A. Marshall (UGG).

Distribution. Bolivia, Peru.

Remarks. Two specimens (TLW429–430) were barcoded, and clustered together (Fig. 488).

Mesembrinella bullata Whitworth, sp. nov.

(Figs 67–68, 157–158, 221, 264, 308, 352, 393, 437, 473, 488)

Diagnosis. A small fly averaging 9.4 mm (9–10/5) in length. Thorax, subshining dark blue and abdomen shiny blue-purple, both covered with whitish tomentum; ppn bluish with 3x3 setae; wing hyaline; disc of T5 with some fairly stout, disorganized setae, more or less at middle of disc. Epandrium, cerci and surstyli distinctive: cerci in posterior view with broad basal half and sharply narrowed in distal half (Fig. 68). Female terminalia as in Fig. 308.

Description. *Male.* Head. Frons broad, 0.09 (0.08–0.09/2) of head width at narrowest, almost as broad as width of first flagellomere; fronto-orbital pale with whitish tomentum; lower half of frontal vitta orange, upper half black, frontal vitta significantly narrowed midway; fronto-orbitals broad, frontal setae ascending about 65% of distance to vertex; parafacial pale orange. Gena with horizontal row of 3–4 stout, black setae and a few sparse short setae, anterior 1/2–2/3 of gena orange, posterior 1/2–1/3 with dense silvery tomentum; postgena with silvery tomentum and covered with pale, silky setae; occiput black with silvery tomentumand dense, silky golden setae; median occipital sclerite with silvery tomentum in upper third, lower 2/3 subshining black; palpus typical; pedicel and first flagellomere orange; eye with median facets slightly larger than lateral facets; ocellar triangle small, anterior ocellus 1/3 larger than posterior ocelli; supravibrissal setae dark brown, ascending about 1/5 of distance to antennal base.

Thorax. Dorsum and pleural area of thorax dark blue with silvery tomentum, and with faint pale presutural tomentose stripes [some specimens]; chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 1, ppn 3x3, kat 1:1, meral setae in unusual pattern, in straight line, row with slight bend anteriorlyabove, 1 pair of crossed ap, sa absent, 2 lat, 1 stout bas, 1 pb weak, 1 disc; subscutellum weakly developed; spiracles medium-sized, brown to yellow-brown; legs entirely dark brown with tips of femora orange. Wing hyaline, faintly yellow, veins darker at base, basal cells faintly darkened; subcostal sclerite bare; basicosta tan with pale setae, tegula brown; section IV 0.13 of section III; calypters with tan discs and brown rims with brown setae.

Abdomen purple, subshining, with pale tomentum; T1+2 and T3 each with a pair of lateral marginal setae; T4 with row of stout, erect marginal setae on posterior margin; T5 disc with some fairly stout, unordered setae together with dense, short, fine setae. *Terminalia* in lateral view with surstylus very short, slightly curved backward, cercus much longer (Fig. 67); in posterior view, basal half of cerci bulbous, distal half abruptly narrowing to tip (Fig. 68); phallus in lateral view: base of epiphallus broad with moderate backward curve (Fig. 157); in dorsal view, hypophallic lobes narrow (Fig. 158); T6, STS7+8, pre- and postgonite, ejaculatory sclerite ST6 and hypandrium as in Fig. 221; ST1–5 with broad sclerites (Fig. 264).

Female. Similar to male except frons 0.234 (0.20–0.26/5) of head width at narrowest. T6 of RV shape; T7 continuous, rear edge recessed midway; T8 as separate sclerites (Fig. 308); ST6–8 and hypoproct as in Fig. 352; spermathecae filiform (Fig. 393); ST1–5 as in Fig. 437.

Type material. HOLOTYPE ♂♦*(TLW437) (Bolivia, **Chapare**; CNC; Fig. 473), labeled: BOLIVIA Cbba Chapare / Villa Turnarí-Cochabamba / road - km 362 - 1550m / Pruett & Wood 24 III.95; HOLOTYPE / Mesembrinella / bullata / T.L. Whitworth.

ALLOTYPE ♀♦* (TLW438): same data as holotype except km 365, 3–10.xii.1996, G. & M. Wood (CNC).

PARATYPES: Bolivia, **Cochabamba.** 2 ♀♀, Chapare, Villa Turnarf-Cochabamba road, km 362, 1550 m, 24.iii.1995, Pruett & Wood (CNC). **La Paz.** 1 ♂*, 1 ♀*, 1 ♀, Sud Yungas, Punte Villa, hotel Tamampaya, 4300 ft., 19–24.v.1989, flight intercept trap, J. Eger (FSCA).

Distribution. Bolivia.

Remarks. The allotype (TLW438) was barcoded and was recovered in a distinct cluster near *M. uniseta* and *M. lara* (Fig. 488). The terminalia of this species resemble Bonatto's (2001: fig. 103) sketch of what he called "*xanthorrhina*". In both specimens the base of the cercus is much enlarged, though in Bonatto's sketch the cercus is sinuous, whereas in *M. bullata* **sp. nov.** it is gently curved forward (Fig. 67). The setae on the disc of T5 in *M. bullata* could be confused with the stout setae on the disc seen in the *M. aeneiventris* species-group. However, the setae in *M. bullata* are weaker and denser and not in a prominent row. Though the new species groups near two species in the *M. aeneiventris* group, its surstylus is distinctly curved backward. For now, we place it in the *M. bicolor* group pending a more in-depth genetic analysis.

Etymology. The species name *bullata*, derived from the Latin *bullatus* (inflated), refers to the unusual bulbous basal half of the cerci when seen in posterior view (Fig. 68).

Mesembrinella chantryi Whitworth, sp. nov.

(Figs 69–70, 159–160, 222, 265, 309, 353, 394, 438, 474, 488)

Diagnosis. A medium-sized fly averaging 11.8 mm (11–13/5) in length. Postpronotal lobe with 3x3 setae; stem vein bare; wing hyaline with faint yellowing along costa; subcostal sclerite with long, reddish wiry setae; section IV of wing 0.46 of section III. Male: epandrium and cerci with unusually stout with dark setae (Figs 69–70).

Description. *Male.* Head. Frons narrow, 0.02/3 of head width at narrowest, narrower than anterior ocellus; fronto-orbital yellow with whitish tomentum; frontal vitta reddish with white tomentum, obliterated midway; frontal setae ascending about 30% of distance to vertex; parafacial golden when viewed from above and below; gena yellow with whitish tomentum, horizontal row of stout dark setae and few scattered dark setae; postgena yellow with golden setae; palpus typical; eye with median facets about 2x size of lateral facets; occiput with pale tomentum and yellow setae; median occipital sclerite shiny dark orange; pedicel reddish, first flagellomere orange, arista tanocellar triangle tiny, anterior ocellus 2x size of posterior ocelli; only a small cluster of dark brown supravibrissal setae at base of facial ridge.

Thorax yellow-orange with whitish tomentum and irregular tomentose stripes; chaetotaxy: ac variable, 2:1 most common but 1:2 and 1:1 also found, dc 2:3, ia 1, ph 1, ppn 3x3, kat 1:1, meral setae very weak, in straight vertical line, sometimes with one or two horizontally-arranged setae, 1 pair converging ap, 1 sa, 2 lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles yellowish, medium-sized; femora yellow, tibiae and tarsi brown. Wing mostly hyaline, area along costa yellowed; both calypters pale; subcostal sclerite with long, reddish-brown setae; basicosta yellow with dark pubescence, tegula yellow; section IV 0.46 of section III; frontal setae ascending about 30% way of distance to vertex.

Abdomen. Anterior half of T1+2 yellowish; posterior half of T1+2 and T3–5 bluish with heavy whitish tomentum and dark pit-like spots around setal pockets (similar to Fig. 103); posterolateral area of T4 with 4 or 5 stout setae on each side; disc of T5 with dense, fine setae only. *Terminalia* with unusually stout, dark setae; in lateral view with surstylus slender with slight backward bend, cercus with apical hook (Fig. 69); in posterior view, cerci broad at base, tapering to chisel-like tip (Fig. 70). Phallus in lateral view with short, stout epiphallus with slight backward curve (Fig. 159); in dorsal view, basiphallus with curved horn-like projections directed posteriorly; hypophallic lobes broad and pear-shaped with coarse serrations along edge (Fig. 160); T6, STS7+8, pre- and postgonite and ejaculatory sclerite as in Fig. 222; ST–5 with ST1–2 broad and ST3–4 small, as in Fig. 265.

Female. Similar to male except frons 0.272 (0.26–0.30/5) of head width at narrowest. T6 of RV shape; T7 narrowed midway with V-shaped incision on posterior edge; T8 as separate sclerites; epiproct with separate sclerites (Fig. 309); ST6–8 and hypoproct as in Fig. 353; spermathecae filiform (Fig. 394); ST1–5 as in Fig. 438.

Type material. HOLOTYPE ♂* (French Guiana; USNM; Fig. 474), labeled: French Guiana Kaw Mt. / 04°33′58"N 52°12′43"W / 8.ii.2008 Bait Trap 310m / T.L. Whitworth. HOLOTYPE / Mesembrinella / chantryi / T.L. Whitworth.

ALLOTYPE ♀♦ (TLW312): same data as holotype (USNM).

PARATYPES: Brazil, **Amazonas.** 1 ♂*, Rio Negro, Mirapinima, 8.iv.1972, E.G. & E.A. Munroe (CNC). French Guiana. 1 ♂, 1 ♀♦* (TLW313), 2 ♀♀♦ (TLW314–TLW315), 2 ♀♀*, 6 ♀♀, Kaw Mountain, 04°33′58”N 52°12′43”W, 310 m, 8.ii.2008, T.L. Whitworth (USNM); 2 ♀♀, Amazone Nature Lodge, 30 km SE Roura on Kaw Rd, 300 m, 5–19.ii.2010, J.E. Eger (FSCA); 1 ♂, 1 ♀, Mitaraka Expedition, 02°14′02″N 54°27′01″, 300 m, iii.2015, Marc Pollet (USNM).

Distribution. French Guiana, Brazil.

Remarks. The terminalia of *M. chantryi* **sp. nov.** are similar to those of *M. batesi*, and these two species also share the heavy, irregular whitish tomentose spots on the abdomen; however, *M. chantryi* has a hyaline wing, vs. the dark infuscation along the costa in *M. batesi*. Three males and 12 females were found for *M. chantryi*. Most specimens examined were from the same location in French Guiana. A single male specimen from northern Brazil (about 700 km SW of French Guiana) was dissected and appears to belong to the same species. Three specimens (TLW312–314) were successfully barcoded and clustered together, close to *M. batesi* (Fig. 488).

Etymology. The species name *chantryi* was chosen to honor Corey Chantry, a friend of TW and a dedicated amateur entomologist who collected with TW on the trip to French Guiana when this species was discovered.

Mesembrinella currani Guimarães, 1977

(Figs 2, 71–72, 161–162, 223, 266, 310, 354, 395, 439, 488)

Mesembrinella currani Guimarães, 1977: 27. Holotype male (MZSP), not examined. Type locality: Maloquinha, near Itaituba, Pará, Brazil.

Mesembrinella currani Toma & Carvalho (1995: 138); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Wolff & Kosmann (2016: 869); Marinho *et al.* (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A large, dark fly averaging 13.4 mm (12–15/5) in length. Postpronotal lobe with 3x3 setae; wing with dark infuscation along anterior margin; dorsum of abdomen without tomentose pits; supravibrissal setae orange, ascending about 1/3 of distance to antennal base; legs: orange except tibiae and tarsi tan to dark brown; subcostal sclerite with stout reddish setae; section IV of wing 0.82 of section III. Epandrium, cerci and surstyli as in Figs 71–72. Female terminalia as in Fig. 310.

Redescription. *Male.* Frons narrow, 0.013 (0.01–0.02/5) of head width at narrowest, about half the width of anterior ocellus. Most of head pale gold, including fronto-orbital, frontal vitta, parafacial, gena, postgena occiput and antenna; fronto-orbitals very slender, obliterating frontal vitta in upper half, frontal setae ascending halfway to vertex; gena with pale yellow tomentum and row of stout brown setae extending horizontally across parafacial to vibrissa, otherwise with scattering of tan setae; postgena with pale yellow tomentum, anterior 1/3 with tan setae, posterior 2/3 with golden setae; occiput with pale tomentum and golden setae, median occipital sclerite shiny orange; antenna entirely gold with pale tomentum, arista tan; palpus typical; eye with median facets about 3x size of lateral facets; ocellar triangle small, with ocelli about equal in size; supravibrissal setae bright orange, ascending about 1/3 of distance to antennal base.

Thorax. Dorsum dark orange with faint golden tomentose stripes; pleura orange with golden tomentum; chaetotaxy: ac 2:1, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae tan, very fine, otherwise typical, 1 slightly converging pair ap, sa absent, 1 very weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles orange, medium-sized; legs: femora orange, tibiae and tarsi tan to dark brown. Wing with broad infuscated area on anterior margin from costa to R_{4+5}; subcostal sclerite with stout reddish setae; basicosta dark orange, tegula bright orange; section IV of wing 0.82 of section III; discs of upper and lower calypters pale orange-brown; rim of upper calypter dark with short dark setae, rim of lower calypter pale with long pale orange setae.

Abdomen. T1+2 yellow-orange; T3–5 shiny brown to blue or purple, anterior 2/3 of T3 with whitish tomentum, remainder of T3 and all of T4–5 shiny dark blue; T4 with pair of posterolateral marginal setae, T5 with row of small marginal setae, disc of T5 with dense, long, fine setae only. *Terminalia* in lateral view with surstylus curved backward, cercus straight, ending in apical hook (Fig. 71); in posterior view, base of cerci broad, evenly tapered to blunt tip (Fig. 72); phallus in lateral view with epiphallus short and almost straight (Fig. 161); in dorsal view, hypophallic lobes very broad, pear-shaped, fine serrations (Fig. 162). T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 223; sternites broad, uninform in width, as in Fig. 266.

Female. Similar to male except frons 0.29 (0.28–0.30/5) of head width at narrowest. T6 of WU shape, with pos-

terior incision midway; T7 continuous, weakened midway; T8 as separate sclerites (Fig. 310); ST6–8 and hypoproct as in Fig. 354; spermathecae filiform (Fig. 395); ST1–5 as in Fig. 439.

Material examined. Brazil, **Rondônia.** 1 ♂*, 1 ♀, 62 km SE Ariquemes, 7–18.xi.1995, W.J. Hanson (LACM); 1 ♀♦ (TLW387), Candeias do Jamari, Balneario Rio Preto, 1.iv.2001, Melke and Casagrande (LACM). Ecuador, **Napo.** 1 ♂, Coca, 250 m, v.1965, L. Pena (CNC). **Sucumbios.** 1 ♂*, Sacha Lodge, 0.05°S 76.5°, 290 m, 4–14.v.1994, P. Hibbs (LACM). Peru, **Cusco.** 3 ♀♀, Estación Biológica Villa Carmen, 12°54′08″S 71°24″38″W, 718 m, 16–26.xi.2012, J.K. Alvarez (USNM); 2 ♀♀, 1 ♂, same data except Trail 8, 700 m, 16–26.xi.2012 (USNM); 2 ♀♀, same data except 721 m, 20–26.i.2013 (USNM); 1 ♀♦ (TLW251), same data except A.L. Norrbom, E. Rodríguez, G.J. Steck, B.D. Sutton (USNM); 1 ♀*, 7 ♀♀, same data except 12°53′39″S 71°24′14″W, 540 m, 12.xii.2013, trap-dead fish (USNM); 2 ♀♀♦ (TLW252, TLW255), same data except A.L. Norrbom & B.D. Sutton (USNM); 1 ♀, same data except Trail Mark 7-474, 12.89009°S 71.40556°W, 529 m, 27.xi.2012, G.J. Steck, E. Rodriguez, A.L. Norrbom, B.D. Sutton (USNM); 3 ♀♀, same data except garden area, 1–11.i.2013 (USNM); 1 ♀♦ (TLW254), T. Forster (USNM); 1 ♀, same data except clearing edge, 12°53′39″S 71°24′14″W, 540 m, 14–29.xii.2012, trap-VC-ML-05 in citrus tree, T. Forster (USNM); 7 ♂♂, 21 ♀, Pilocapata, Villa Carmen, 12°53′S 71°24′W, v.2014, multilure trap, M. Choque (FSCA); 1 ♀, 1 ♂, same data except i–iii.2013, E. Rodriguez (FSCA); 1 ♀, Quincemil, 700 m, 1–15.xi.1962, L. Pena (CNC); 1 ♂, same data except 740 m, 29–30.viii.1962 (FSCA).

Distribution. Brazil, Ecuador, Peru. Marinho *et al.* (2017) also listed it from Bolivia and Colombia.

Remarks. Five specimens were barcoded: TLW251–252 and TLW254–255 from Peru and TLW387 from Brazil. They clustered together (Fig. 488).

Mesembrinella cyaneicincta (Surcouf, 1919)

(Figs 73–74, 163–164, 224, 267, 311, 355, 396, 440)

Ochromyia cyaneicincta Surcouf, 1919: 69. Holotype female (MNHN), not examined. Type locality: Brazil.
Eumesembrinella cyaneicincta: Peris & Mariluis (1984: 264); Toma & Carvalho (1995: 141); Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 866); Marinho *et al*. (2017: tab. 1).
Mesembrinella cyaneicincta: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A fairly large dark fly averaging 13 mm (12–14/5) in length. Postpronotal lobe 2x2; anterior margin of wing weakly infuscated from costa to beyond R_{2+3}; dorsum of thorax yellow-brown with pale tomentose stripes; T1+2–T5 with bluish-purple bands on posterior margin in good specimens. Epandrium, cerci and surstyli as in Figs 73–74. Female terminalia as in Fig. 311.

Redescription. *Male.* Head. Frons broad, 0.073 (0.07–0.08/3) of head width at narrowest, about 1/3 broader than width of parafacial at level of lunule. Fronto-orbital, frontal vitta, parafacial, gena and postgena pale orange with pale tomentum; fronto-orbital broad, frontal setae ascending 60% of distance to vertex; upper 2/3 of frontal vitta obliterated; gena with horizontal row of stout brown setae midway, otherwise with sparsely scattered small, dark setae; postgena with pale tomentum and golden setae; occiput with heavy pale yellow tomentum and dark yellow setae; median occipital sclerite shiny orange; proximal 1/3 of arista orange, distal 2/3 tan; palpus typical; eye with median facets about 2x size of lateral facets; ocellar triangle medium-sized, anterior ocellus about 2x size of posterior ocelli; short row of orange supravibrissal setae ascending about 1/6 of distance to antennal base.

Thorax. Dorsum yellow-brown with pale tomentose stripes, pleura orange with pale tomentum; chaetotaxy: ac 0:2, dc 2:3, ia 0, ph 1, ppn 2x2, kat 1:1, meral setae fine and weak, typical, 1 pair of parallel ap, sa and lat absent, 1 bas, 1 weak pb, 1 disc; subscutellum weakly developed; spiracles small, yellow; fore leg entirely orange, mid- and rear tibiae and tarsi tan. Wing faintly infuscated from costa to vein R_{1+2}; subcostal sclerite with weak pubescence only; basicosta and tegula orange; section IV 0.22 of section III; upper and lower calypters pale orange; rim of upper calypter dark with short yellowish setae, rim of lower calypter pale with long, yellow setae.

Abdomen. Varying from blue to purple, sometimes reddish. T1+2–5 with purple bands at rear margin, bands on T1+2 and T5 often narrow, bands on T3–4 broader; disc of T5 with dense, medium-long, fine setae only. *Terminalia* in lateral view with surstylus curved sharply backward (Fig. 73); in posterior view, base of cercus broad with uniform taper to tip, tip of surstylus sharply curved, almost at 90° angle (Fig. 74); phallus in lateral view with moderate epiphallus, curved posteriorly (Fig. 163); in dorsal view, hypophallic lobes wide midway, with fine serrations (Fig. 164); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 224; ST2–5 slender, as in Fig. 267.

Female. Similar to male except frons 0.266 (0.26–0.27/5) of head width at narrowest. T6 of OV shape; T7 continuous with suture midway; T8 as separate sclerites (Fig. 311); ST6–8 and hypoproct as in Fig. 355; spermathecae filiform (Fig. 396). ST2–5 as in Fig. 440.

Material examined. Brazil, **Bahia.** 1 ♂*, Alcobaça, [located around17°31′08″S 39°11″45′W, on east coast], ii.1971, P.C. Elias (NHMUK). **Rio de Janeiro.** 1 ♂*, 1 ♀, Tingua, Est. Rio., vi.1940, R.C. Shannon (USNM); 1 ♂♦ (TLW393), nr Desengano State PK, site #2, 6–10.v.1999, 200 m, B.V. Brown (LACM). **Rondônia.** 1 ♀♦ (TLW394), 62 km, SE Ariquemes, 15–22.iii.1981, W. Hanson, G. Bohart (LACM). **São Paulo.** 1 ♂, 1 ♀*, Registro, 2.xii.1965, R. Inoue (CNC).

Distribution. Brazil. Marinho *et al.* (2017) listed Colombia.

Remarks. No barcodes were obtained from specimens of this species in this study. Marinho *et al*. (2017) argued that the subspecific taxon *Eumesembrinella cyaneicincta pauciseta* Guimarães, 1977 should be treated as a separate, valid species and that it would be treated as such in a forthcoming paper. We have not seen sufficient material to be able to comment on this issue.

Mesembrinella flavicrura Aldrich, 1925

(Figs 1, 75–76, 165–166, 225, 268, 312, 356, 397, 441, 475, 488)

Mesembrinella flavicrura Aldrich, 1925: 16. Holotype male (USNM), examined photographically. Type locality: La Suiza de Turrialba, Costa Rica.

Mesembrinella flavicrura: Peris & Mariluis (1984: 261); Mariluis (1987: 112); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Marinho *et al.* (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized fly averaging 10.2 mm (9–11/5) in length. A dark, metallic purple-blue fly, ppn normally with 3x3 setae, 2x2 in a few specimens; stem vein bare; wing hyaline; ppn and femora orange; subcostal sclerite with fine pubescence only; thoracic spiracles and basicosta yellow-orange. Epandrium, cerci and surstyli as in Figs 75–76. Female terminalia as in Fig. 312.

Redescription. *Male.* Head. Frons 0.024 (0.02–0.03/5) of head width at narrowest, about half width of anterior ocellus; fronto-orbital, parafacial, gena and postgena orange with pale yellow tomentum, frontal vitta dark orange, frontal setae ascending about halfway to vertex, where frontal vitta is obliterated; gena golden with faint yellowish tomentum a horizontal row of stout, dark setae midway and a scattering of pale and dark setae; postgena with pale tomentum and fine golden setae; occiput with heavy silvery tomentum and fine golden setae; median occipital sclerite shiny orange; antenna: pedicel and first flagellomere orange, arista brown; palpus typical; eye with median facets about 3x size of lateral facets; facial ridge with only a few brown, fine supravibrissal setae at base of facial ridge.

Thorax. Dorsum shiny purple-blue with whitish tomentum, pleura mostly purple, postpronotum and anterior spiracle orange; chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 1, ppn 3x3, kat 1:1, meral setae typical, 1 pair converging ap, sa absent, 1 lat, 1 bas, 1 weak pb, 1 disc; subscutellum weakly developed; spiracles medium, yellow-orange; legs: coxae, trochanters and femora yellow, tibiae and tarsi brown. Wing hyaline, subcostal sclerite with weak pubescence; basicosta and tegula orange; section IV 0.15 of section III; discs of upper and lower calypters reddish-tan; rim of upper calypter dark with dark setae, rim of lower calypter pale with long pale setae.

Abdomen entirely purple-blue with whitish tomentum [some poorer specimens with color washed out, tan]; T1+2–4 with pairs of dorsolateral marginal setae, rear margin of T4 with row of stout setae, rear of T5 with some weaker marginal setae, disc of T5 with scattering of relatively weak setae, which could be confused with those in the *M. aeneiventris* species-group, but setae are much weaker and not in a distinct row. *Terminalia* in lateral view with surstylus curved backward at base then straight, cercus long and slender, curving forward (Fig. 75); in posterior view, cerci gradually tapered from base to tip (Fig. 76); phallus in lateral view with short, stout epiphallus (Fig. 165); in dorsal view, hypophallic lobes narrow (Fig. 166). T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 225; ST1–5 as in Fig. 268.

Female. Similar to male except frons 0.236 (0.22–0.25/5) of head with at narrowest. T6 of FU shape; T7 broad and continuous, narrowed midway; T8 as separate sclerites (Fig. 312); ST6–8 and hypoproct as in Fig. 356; spermathecae of unusual bulbous shape, as in Fig. 397; and ST1–5 as in Fig. 441.

Type material examined. HOLOTYPE ♂ (Costa Rica, **Cartago**; USNM; examined photographically: Fig. 475), labeled: La Suiza / de Turrialba / COSTA RICA / Pablo Schild; Mesembrinella / flavicrura / Ald.; AL Melander / Collection / 1961; Type / 26800 / No. / U.S.N.M. [red label]; USNMENT / 01295432.

Additional material examined. Costa Rica, **Alajuela.** 2 ♀♀♦ (TLW266, TLW344), San Ramón, Villa Blanca, 1115 m, 18.ix.2008, R. Rojas-Velásquez (INBIO); 1 ♀♦ (TLW267), Z.P. Arenal Monteverde, Res. Biol., Monteverde Eladio's, 830 m, 26–28.x.2006, J. Azofiefa, M. Morgana, M. Solis, B. Gamboa (INBIO); 1 ♂, R. San Lorencito, R.F. San Ramón, 5 km N de Colonia Palmarena, 900 m, 13–18.vi.1993, I Curso Scarabaeidae, L_N_244500 470700 (INBIO); 1 ♂, 20 km S Upala, 12.viii.1991, F.D. Parker (LACM); 1 ♂, same data except Bijagua Alb. Heliconias, 700 m, 11–26.i.2000, J.D. Gutierrez, Agua Miel, L_N_299800 423800 #56263 (INBIO); 1 ♀, same data except 700 m, 17–21.vi.2000, Manual, D. Bricefio, L_N_299100 422600 #56784 (INBIO); 1 ♀, Pque Nal Arenal, Sector Cerro Chato, 1100 m, 18.x–1.xi.1999, Manual, J.D. Gutierrez, L_N_269500 460900 #57265 (INBIO); 1 ♂, P.N. Volcan Teuorio, Estación Pilon, 1.5 SO C. Carmela, 700–800 m, 5.vii–17.viii.2006, Malaise trap, J.A. Azofeifa, L_N_298212 427913 #86941 (INBIO); 1 ♀, same data except 9.ix.2008, Tp. Amarillo, #94957 (INBIO); 1 ♀, same data except 9.x–11.xi.2006, Tp. Malaise, #87466 (INBIO); 1 ♀♦ (TLW456), P. Teuorio, sector El N. Volcan Pilon, El Mirador, 800 m, 18.vi.2004, J. Azofeifa (INBIO); 1 ♂, San Cristobal, 600–620 m, x–xi.1997, F.A. Quesada, L_N_318056 383200 #48934 (INBIO). **Cartago.** 1 ♀♦ (TLW269), P.N. Barbilla, Turrialba, Tayutic, Campamento 2, 1200 m, 5–9.v.2005, Libre, L_N_213371 600782, D. Briceño, M. Morgana (INBIO); 1 ♂, Monumento Nacional Guayabo, A.C.A.C. Amistad, 1100 m, vii.1994, G. Fonseca, L_N_217400 570000 #3126 (INBIO); 1 ♂, same data except vii.1994, #2989 (INBIO); 1 ♂*, 2 ♂♂, same data except Turrialba, xii.1994, L_N_217200 570300 #3202 (INBIO); 1 ♂*, 1 ♂, same data except xii.1994, #3287 (INBIO); 2 ♂♂, same data except 1100–1200 m, 7–8.v.2007, Tp. Luz, M. Moraga, J.A. Azofeifa, R. Gonzalez, F. Navarro, L_N_217200 570300 #91200 (INBIO); 1 ♀, same data except 8–13.v.2007, Tp. Frutas, M. Moraga, J.A. Azofeifa, R. Gonzalez, F. Navarro, L_N_217200 570300 #91206 (INBIO). **Guanacaste.** 1 ♀* Tierras Moreas, camino a Alto Masfs., 1045 m, 1.vi.2001, M. Solis (INBIO); 1 ♂, Estación Pitilla 700 m, 9 km, S Santa Cecilia, P.N., xii.1992, P. Rios, L_N_330200 380200 (INBIO); 1 ♀♦ (TLW371), Pitilla Bio. Sta., 830 m, 11.ii.1995, L. Macher (CNC); 1 ♂, same data except Sendero Tanque Agua, 700 m, x.1993, L_N_330200 380200 #2487, Malaise, [no collector] (CNC); 2 ♀♀, same data except 2–19.iii.1992 (CNC); 1 ♀, same data except 4–25.xii.1991 (CNC); 1 ♀, same data except xii.1994, #4366 (CNC); 1 ♀, Macizo Miravalles, Estación Cabro Muco, 1100 m, 23–28.ix.2003, Tp de Luz, J. Azofeifa, L_N_299769 411243 #75484 (INBIO); 1 ♀, Tilaran, P.N.V. Tenorio, Send. Rancho Capu, Cerca Torres Electricas, 740 m, 23.xi.2000, Manual, J. Gutierrez, L_N_428401 284482 #60989 (INBIO); 1 ♀, 3 km SE R. Naranjo, 14.xi.1991, F.D. Parker (LACM); 1 ♀, same data except xii.1991 (LACM); 1 ♀, same data except 21–30.ix.1992 (LACM). **Heredia.** 1 ♀, Estación Biológica La Selva, 10°26′N 84°01′W, iii.1993, [no collector], #149 (INBIO). **Limón.** 1 ♀, R.B. Hitoy Cerere, Talamanca, Cerro Bitarkara, 1025 m, 15–17.x.2004, M. Moraga, Libre, L_S_398841 558082 #78499 (INBIO). **San José.** 1 ♀, Estación Carrillo, 700 m, P.N. Braulio Carrillo, 15–17.ii.1993, C. Hymenoptera, L_N_236700 541800 (INBIO). Panama, **Cocle.** 1 ♀, El Valle, 800–900 m, 3–5.i.1988, MacDonald & Schiefer (MEM).

Distribution. Costa Rica, Panama.

Remarks. Seven specimens (TLW266–269, TLW344 and TLW456) were barcoded, and grouped together (Fig. 488). Bonatto (2001) moved this species to *Huascaromusca* (= *M. aeneiventris* species-group in the present paper), but it lacks a row of stout setae on T5. This placement was made in his dissertation and was never formally published. We believe that this species belongs in the *M. bicolor* group despite the unusual bulbous shape of its spermathecae (Fig. 397), more similar to those of *Souzalopesiella facialis*.

Mesembrinella longicercus Whitworth, sp. nov.

(Figs 77–78, 167–168, 226, 269, 313, 357, 398, 442, 476, 488)

Diagnosis. A small blue-black fly averaging 9.3 mm (9–10/3) in length; ppn 3x3; stem vein bare; wing hyaline; ppn and pleura bluish; T5 with long, slender, dense setae in both sexes. Male frons narrow, 0.04 of head width at narrowest; terminalia with cercus much longer than surstylus (Figs 77–78); phallus in dorsal view exceptionally narrow (Fig. 168). Female terminalia as in Fig. 313.

Description. *Male.* Head. Frons 0.043 (0.035–0.050/2) of head width at narrowest, about twice width of anterior ocellus; fronto-orbital moderately broad, orange, with golden tomentum, frontal setae ascending about halfway to vertex; frontal vitta orange, broad below, obliterated midway above; parafacial orange, upper half with yellow pubescence, lower half bare; anterior 2/3 of gena orange, posterior 1/3 dark silvery; stout row of black setae extending horizontally across gena; postgena dark silvery with silky, golden setae; occiput with silvery tomentum and golden

setae, cuticle shiny black below and behind edge of postoccipital row; median occipital sclerite shiny black; palpus typical; antenna orange except tip of arista dark brown; eye with median facets about 2x size of lateral facets; ocellar triangle medium-sized, anterior ocellus slightly larger than posterior ocelli; supravibrissal setae black and ascending about 1/5 of distance to antennal base.

Thorax. Dorsum and pleural area blue-black with weak pale tomentum; chaetotaxy: ac 2:1, dc 2:3, ia 0, ph 1 ppn 3x3, kat 2:1; meron with vertical row of stout black setae, horizontal section composed of only 1–2 setae, 1 pair converging ap, 1 weak sa, 1 lat; 1 stout bas, 1 pb, 1 disc; subscutellum moderately developed; spiracles moderate in size, brown; legs entirely dark brown except apices of femora orange. Wing hyaline except veins in base of wing darkened; subcostal sclerite with heavy pubescence; tegula and basicosta dark brown; section IV 0.24 of section III; disc of upper calypter tan, rim dark with short dark setae; disc and rim of lower calypter dark brown, rim with long dark setae.

Abdomen. T1+2–4 shiny blue with thin tomentum, T5 with heavier tomentum. T4 with stout posterior row of erect, black setae; disc of T5 with sparse, long, fine setae. *Terminalia* distinctive, in left lateral view surstylus long and straight, cercus even longer and also straight (Fig. 77); in posterior view, surstylus much shorter than cercus, curved outward at tip, cerci broader at base, moderately narrowing to tips (Fig. 78); phallus in lateral view with epiphallus slender and only slightly curved backward (Fig. 167); in dorsal view, phallus very narrow, much narrower than in other species of this group, basiphallus with wing-like expansions (Fig. 168). T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 226; ST1–5 broad, as in Fig. 269.

Female [a single specimen]. Similar to male except frons 0.23 of head width at narrowest. T6 of OV shape; T7 narrowed midway with suture; T8 as two broad sclerites nearly touching midway (Fig. 313); ST6–8 and hypoproct as in Fig. 357; spermathecae filiform (Fig. 398); ST1–5 as in Fig. 442.

Type material. HOLOTYPE ♂♦* (TLW299) (Bolivia, **La Paz**; USNM; Fig. 476), labeled: BOLIVIA: Depto. La Paz / 8 km S. Chulumani, Apa Apa / ex: malaise trap, 1950–2100 m / 16°22′S 67°30.4′W / 24 - iii - 2001, S.D. Gaimari; HOLOTYPE / Mesembrinella / longicercus / T.L. Whitworth.

ALLOTYPE ♀♦* (TLW300): same data as holotype except 23.iii.2001 (USNM).

PARATYPE: Bolivia, **La Paz.** 1 ♂♦* (TLW298), Coroico, Cerro Uchumachi, 16°12′43″S 67°42′49″W, 2550 m, 16.iv.2001, cloud forest, S.A. Marshall (UGG). **Chapare.** 1 ♀, Chochabamba, 1100 m, iii.1962, F.H. Walz (CNC).

Distribution. Bolivia.

Remarks. Three specimens (TLW298–300) were barcoded; they clustered together close to *M. decrepita* (Fig. 488). This species also has a long, straight surstylus like most species in the *M. aeneiventris* group. However, the lack of a row of well defined, stout setae on the disc of T5 led us to conclude it should be placed in the *M. bicolor* group. Like *M. bullata* **sp. nov.**, this species needs further study for a better definition of its taxonomic position.

Etymology. The name *longicercus* is derived from the Latin *longus* (meaning long) and *cercus*, and refers to the exceptionally long male cerci of the species.

Mesembrinella peregrina Aldrich, 1922

(Figs 79–80, 169–170, 227, 270, 314, 358, 399, 443, 477)

Mesembrinella peregrina Aldrich, 1922: 22. Holotype male (USNM), examined. Type locality: Espirito Santo, Brazil. [NB: the specimen is labeled as "*Mesembolia peregrina*" (see Fig. 477).]

Mesembrinella peregrina: Peris & Mariluis (1984: 262); Toma & Carvalho (1995: 136); Marinho *et al.* (2012: 142); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Marinho *et al.* (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized fly averaging 10.6 mm (10–11/5) in length. Stem vein setose dorsally; wing yellowish along costa; subcostal sclerite bare; facial ridge with short row of dark brown supravibrissal setae at base. Male frons narrow, 0.01 of head width at narrowest; epandrium, cerci and surstyli as in Figs 79–80. Female T6 of WV shape (Fig. 314).

Redescription. *Male.* Head. Frons narrow, 0.016 (0.01–0.02/5) of head width at narrowest. Fronto-orbital, parafacial, gena and postgena golden when viewed from above, orange when viewed from below; frontal vitta orange when viewed from above, with golden streaks when viewed from below; fronto-orbital broader below, narrowing to thin line at about 1/3 of its length, frontal vitta obliterated; gena and lower parafacial with horizontal row of stout dark setae; antenna pale yellow; occiput with heavy whitish tomentum and fine, pale setae; median occipital

sclerite shiny dark orange; eye with median facets about 4x size of lateral facets; ocellar triangle small, anterior ocellus slightly larger than posterior ocelli; facial ridge with few short, stout, dark brown supravibrissal setae at base.

Thorax orange-brown with whitish tomentose stripes; pleural area orange with whitish tomentum; chaetotaxy: with ac 2:2, dc 2:3, ia 1, ph 1, ppn 3x3, kat variable 1:1 or 1:2, meral setae typical, 1 pair converging ap, 1 sa, 1 lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum prominently developed; spiracles yellow, medium-sized; legs entirely orange. Wing with anterior edge along costa and veins faintly yellowed, area around crossvein r-m with dark macula; subcostal sclerite orange with dense pubescence; basicosta and tegula orange; stem vein with row of fine, tan setae above; section IV 0.56 of section III; upper calypter pale with dark rim and tan setae; lower calypter tan disc and pale rim with fringe of long pale setae.

Abdomen. T1+2 with anterior half yellow, posterior half yellow-orange; T3–5 purple-orange with whitish tomentum. T1+2 and T3 each with two pairs of small lateral marginal setae; T4 with posterior row of stout setae, disc of T5 only with sparse, scattered, short to medium-long, fine setae. *Terminalia* in lateral view with surstylus curved slightly backward, cercus with apical hook (Fig. 79); in posterior view cerci with narrow base, broader midway then tapered to blunt tip (Fig. 80); phallus in lateral view with medium-long, stout epiphallus with slight backward curve (Fig. 169); broad in dorsal view, with circular hypophallic lobes and an apical fork on acrophallus (Fig. 170); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 227; ST1–5: ST3–4 narrowed, as in Fig. 270.

Female. Similar to male except frons 0.246 (0.24–0.26/5) of head width at narrowest. T6 of FU shape, nearly flat; T7 with wide and deep indentation on anterior edge; T8 as pair of sclerites (Fig. 314); ST6–8 and hypoproct as in Fig. 358; spermathecae filiform (Fig. 399); ST1–5 as in Fig. 443.

Type material examined. HOLOTYPE ♂ (Brazil, **Espririto Santo**; USNM; Fig. 477), labeled: Espirito Santo / Brazil.; Mesembolia / peregrina / Ald.; Type No. / 25887 / U.S.N.M. [red label]; USNMENT01288288.

Additional material examined. Brazil, **Paraná.** 1 ♂, Piraguard, Mananciais da Serra, 25°25′S 49°03′W, 9.iii.2003, Malaise, A.J.C. Agular (USNM). **Rio de Janeiro.** 1 ♂, Serviço Febre Amarela, ix.1938, M.E.S. Bras (USNM); 1 ♂, Petrópolis E de Rio Le Vallon Alt Mosella, 24.i–23.ii.1959, D'Albuquerquea, R.P. Mello (CNC). **Santa Catarina.** 2 ♀♀, Nova Teutônia, 27°11′S 52°23′W, 23.xi.1936, F. Plaumann (NHMUK); 1 ♀, same data except 27°11′S 52°23′W, 19.v.1964, F. Plaumann (CNC). **São Paulo.** 1 ♂*, 1 ♀*, 1 ♀, Estação Biológica de Boracéia Salesópolis, 14–19.x.1970, J.H. Guimarães, J.W. Boyes (CNC); 1 ♂, same data except #FN49 (CNC); 1 ♂*, same data except #FN35 (CNC); 1 ♀, same data except #FN32 (CNC); 1 ♀, same data except iii.1992, J.H. Guimarães (USNM); 1 ♂, Casa Grande Boracéia Field Station, Grid 23 kmp092837, 19–26.ii.1975, T.E. Rogers (FSCA).

Distribution. Brazil.

Remarks. No specimens were barcoded.

Mesembrinella pictipennis Aldrich, 1922

(Figs 81–82, 171–172, 228, 271, 315, 359, 400, 444, 478, 494)

Mesembrinella pictipennis Aldrich, 1922: 11. Lectotype male (NHMUK), here designated. Type locality: Yungas de La Paz, Bolivia.

Mesembrinella pictipennis: Peris & Mariluis (1984: 259); Wolff (2013: 121); Kosmann *et al.* (2013: 78); Marinho *et al.* (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A large fly, averaging 16.7 mm (16–17/3) in length. Wing pattern distinctive: anterior half infuscated, posterior half darkened around veins (Fig. 494); abdomen without tomentose pits; supravibrissal setae brown or black, ascending about 1/2 of distance to antennal base; subcostal sclerite with long, stout brown setae; scutellum with discal setae; palpus yellow; section IV of wing 0.51 of section III.

Redescription. *Male*. Head. Frons narrow, 0.015 of head width at narrowest [only lectotype was measured], eyes almost touching; fronto-orbital reddish with pale tomentum; frontal setae ascending about 60% of distance to vertex; frontal vitta orange, obliterated in upper 2/3; parafacial yellow in upper 1/3, orange with whitish tomentum in lower 2/3; gena orange with silvery tomentum and horizontal row of stout setae midway; postgena orange with pale tomentum and long golden setae; occiput with dense silvery tomentum on orange cuticle, with golden setae; median occipital sclerite shiny dark brown; antenna: pedicel orange, first flagellomere brown, arista orange with tan setae; eye with median facets about 3x size of lateral facets; ocellar triangle small, supravibrissal setae dark brown, ascending about 1/2 of distance to antennal base.

Thorax. Dorsum reddish-brown with four pale tomentose stripes, pleura yellow-orange; chaetotaxy: ac 1:1, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae long and fine, 1 pair converging ap, 1 weak sa, 1 weak lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles yellow, medium-sized; legs dark orange. Wing with strong, dark infuscation on anterior half, only areas around veins infuscated on posterior half (Fig. 494); subcostal sclerite with long reddish setae, basicosta dark reddish, tegula lighter red; section IV 0.51 of section III; discs of upper and lower calypters reddish-brown; rim of upper calypter dark brown with reddish setae, rim of lower calypter mostly pale with long reddish setae.

Abdomen. T1+2 and T3 more or less tan, T4–5 shiny blue; rear margin of T4 with row of stout setae; disc of T5 with dense, short, sparse, fine setae only. *Terminalia* in lateral view with surstylus curved sharply backward (Fig. 81); in posterior view, cerci with broad base, gradually tapering to blunt tip (Fig. 82); phallus in lateral view with long, slender epiphallus with slight backward curve (Fig. 171); in dorsal view, hypophallic lobes narrow (Fig. 172); T6, STS7+8, pre- and postgonite as in Fig. 228; ST5 as in Fig. 271 [lectotype missing ST2–4].

Female. Similar to male except frons 0.26/2 of head width at narrowest. T6 wide and deep, of OU shape; T7 in broad arc nearly separated midway; T8 as pair of small slender sclerites; epiproct divided (Fig. 315); ST6–8 and hypoproct as in Fig. 359; spermathecae filiform (Fig. 400); ST1–5 as in Fig. 444.

Type material examined[1]. LECTOTYPE ♂ (Bolivia, **La Paz**; NHMUK; Fig. 478), here designated, labeled: Yungas de la Paz, / Bolivia / 1000 m / Purchd. from / H. Rolle / 1904–117; LECTOTYPE ♂ / Mesembrinella / pictipennis / Aldrich, 1922 / Designated by / Dear and Pont. [red border]; Mesembrinella / pictipennis / Type Ald.; LECTO- / TYPE [round label with purple border].

PARALECTOTYPE: ♀, same locality as lectotype (NHMUK) [with handwritten label "Mesembrinella pictipennis Allotype Ald.", paralectotype label (des. Dear & Pont) and round paralectotype label with light blue border].

Remarks. Dear and Pont selected a lectotype for *Mesembrinella pictipennis* Aldrich, 1922, without publishing the designation. The same specimen (in NHMUK) is here formally designated as the lectotype of this nominal species. The paralectotype is conspecific with the lectotype (N. Wyatt, pers. comm.).

Additional material examined. Bolivia, **La Paz.** 1 ♀, Coroico, 1200 m, [no date], Fassi (NHMUK); 1 ♀, Rio Songo, 750 m, [no date], Fassi (NHMUK). Ecuador, **Napo.** 2 ♀♀, Tiputini Biodiversity Stn., 0°36′50″S 76°9′1′W, V.2011, S.A. Marshall (UGG). **La Paz.** 2 ♂♂, Heath River Wildlife Centre, 21 km SSW Puerto Heath, 12°40′S 68°42′W, 29.iv–12v.2007, S.A. Marshall (UGG).

Distribution. Bolivia, Ecuador. Marinho *et al.* (2017) also listed it from Colombia and Costa Rica.

Remarks. No specimens were barcoded.

Mesembrinella quadrilineata (Fabricius, 1805)

(Figs 83–84, 173–174, 229, 272, 316, 360, 401, 445, 488)

Musca quadrilineata Fabricius, 1805: 286. Holotype female (NMW), not examined. Type locality: America Meridionals [= South America].

Mesembrina quadrilineata: Townsend (1892: 34).

Eumesembrinella quadrilineata: Peris & Mariluis (1984: 263); Toma & Carvalho (1995: 127); Marinho *et al.* (2012: 142); Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 866); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 108).

Mesembrinella quadrilineata: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A large fly averaging 12.6 mm (12–13/5) in length. Postpronotal setae 2x2; wing with base yellowish and anterior margin infuscated from costa to vein R_{2+3}; T3–4 concolorous, without distinct posterior bands; posterior row of stout marginal setae on T4; posthumeral seta absent.

Redescription. *Male.* Head. Frons broad, 0.108 (0.10–0.12) of head width at narrowest, about equal to width of parafacial at level of lunule. Fronto-orbital broad, pale orange when viewed from below and yellowish when viewed from above with faint yellowish tomentum, sclerites almost touching midway; frontal setae ascending about 60% of distance to vertex; frontal vitta dark orange, broad below, narrowed, almost obliterated midway but broader above, ascending to base of ocellar triangle; parafacial pale orange; gena orange with silvery tomentum, horizontal row of stout, dark setae midway, and scattered dark setae except for a few pale setae near posterior margin; postgena orange

1 Paralectotype not examined directly; information provided by N. Wyatt (NHMUK).

with silvery tomentum and fine golden setae; occiput dark with silvery tomentum and fine golden setae, median occipital sclerite shiny dark brown; antenna: pedicel, first flagellomere and base of arista orange, setae on arista brown; palpus typical; eye with median facets 2x size of lateral facets; ocellar triangle moderate, anterior ocellus slightly larger than posterior ocelli; supravibrissal setae short and dark, ascending about 1/6 of distance to antennal base.

Thorax. Dorsum dark brown to black with 4 pale tomentose stripes; pleura orange; chaetotaxy: ac 0:1, dc most 2:3, some 3:3, ia 0, ph 0, ppn 2x2, kat 1:1, meral setae typical, 1 pair parallel or slightly diverging ap, sa and lat absent, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles medium-sized, pale orange; legs orange except mid and hind tibiae and tarsi brown. Wing yellowish with anterior edge infuscated from costa to about midway between veins R_{2+3} and R_{4+5}; subcostal sclerite orange and bare; basicosta and tegula orange; section IV 0.21 of section III; discs of upper and lower calypters pale orange; rims of upper and lower calypters pale, both with long orange setae.

Abdomen. T1+2 orange, T3 sometimes with anterior edge orange, remaining portions of T3–5 shiny metallic blue, usually only T1+2–3 with whitish tomentum; T1+2–3 with dorsolateral marginal setae, posterior margin of T4 with row of stout setae; disc of T5 with fairly dense, medium-long setae only. *Terminalia* in lateral view with surstylus weakly curved backward (Fig. 83); in posterior view, cerci with broad base tapered distally to rounded tips (Fig. 84); phallus in lateral view with epiphallus of moderate length and curvature (Fig. 173); in dorsal view, hypophallic lobes expanded posteriorly (Fig. 174). T6, STS7+8, pre- and postgonite, ST6 and hypandrium as in Fig. 229; ST1–5 very narrow, as in Fig. 272.

Female. Similar to male except frons 0.274 (0.24–0.29/5) of head width at narrowest. T6 of WU in shape; T7 with suture midway; T8 as two sclerites, epiphallus bilobed (Fig. 316); ST6–8 and hypoproct as in Fig. 360; spermathecae filiform (Fig. 401); ST2–5 as in Fig. 445.

Material examined. Bolivia, **Santa Cruz.** 1 ♂ (TLW280), Potrerillos de Guenda, 17°40.9′S 63°27.6′W, 4–7.iv.1998, B.D. Gill (CNC). Brazil, **Amazonas.** 1 ♀, Manaus, vii.1935, G.V. Vredenburg (LACM). **Rondônia.** 1 ♂, 1♀*, 1 ♀♦ (TLW394), 62 km SE Ariquemes, 15–22.iii.1991, W. Hanson, G. Bohart (LACM); 2 ♀♀, same data except 8–20.xi.1994, W.J. Hanson (LACM); 1 ♂, 62 km SW Ariquemes, nr Fzda. Rancho Grande, 3–15.xii.1996, fish carrion pitfall, J.E. Eger (FSCA); 2 ♀♀♦ (TLW278–TLW279), same data except 4–16.xi.1997 (FSCA); 1 ♀, same data except 17–24.iii.1989, S.W. Dunkle (FSCA); 1 ♀, same data except 10°32′S 62°48′W, 29.ix–10.x.1992, 165 m, D.W. Colby (LACM); 1 ♀, 160–350 m vic. Caucalândia, 10°32′S 62°48′W, 10–11.x.1991, pitfall trap baited with human feces, J. MacDonald (MEM); 1 ♀, same data except 12–13.X.1991 (MEM). **Roraima.** 1 ♀, Boa Vista, Fordlândia, R Tapajos, 15.vii, C.H.T. Townsend (USNM); 1 ♀, same data except James' Camp, vii.1918. Ecuador, **Napo.** 1 ♂, 1 ♀, Jatun Sacha Biol. Res., 6 km E Misahualli, 1°4′S 77°37′W, 450m, 3.v.2002, O. Lonsdale (UGG); 1 ♂, same data except 30.iv–8.v.2002, S.M. Paiero (UGG); 1 ♀, same data except 6.v.2002, M. Buck (UGG). **Orellano.** 1 ♀, Yasuni Natl. Pk., Yasuni Research Stn., 0°40′50″S 76°24′2″W, 250 m, 28.iv–8.v.2009, S.A. Marshall (UGG). Guyana, **Cuyuni-Mazaruni.** 1 ♂, Kartabo, ix.1922, M.D. Haviland (LACM). Peru, **Cusco.** 1 ♂, 1 ♀*, 2 ♀♀, Pilocapata, Villa Carmen Biológica Sta., 12°53′S 71°24′W, i–iii.2013, E. Rodriguez (FSCA); 1 ♀, same data except v.2014, multilure trap, M. Choque (FSCA); 1 ♀, Rio Tambopata, 60 km S Puerto Maldonado, Madre de Dios, 28.x.1999, D. & J. Lindsley (LACM). **Junin.** 1 ♀♦* (TLW276), La Merced, Fundo Genova, 9.vii.2008, [no collector] (MJMO). **Pasco.** 1 ♂*, 3 km N Puerto Bermudes, 200 m, jungle, 27.vi.1980, D. Baumgartner, B. Greenberg (BG). Venezuela, **Bolivar.** 1 ♀, Caura Val., 1961. A.L. Melander Collection (USNM).

Distribution. Bolivia, Brazil, Guyana, Peru, Venezuela. Guimarães (1977) lists French Guiana. Marinho *et al.* (2017) also listed it from Colombia and Ecuador.

Remarks. Five specimens from Bolivia (TLW280), Brazil (TLW278–279) and Peru (TLW276–277) were barcoded, and three GenBank sequences from Brazil (JQ246687, KR820730, KR820731) were added to the analysis. They formed a distinct group with some genetic variation between sequences. The genetic distance between sequences within Brazil was less than 2%, whereas between Brazil and Bolivia, it was 2.3% and between Brazil and Peru it was around 3.5% (Fig. 488). Morphologically, all these variants appear very similar, and further molecular and morphological studies are needed to determine if any cryptic species can be found within them.

***Mesembrinella randa* (Walker, 1849)**
(Figs 85–86, 175–176, 230, 273, 317, 361, 402, 446, 479, 488)

Dexia randa Walker, 1849: 852. Lectotype female (NHMUK), here designated. Type locality: Brazil.
Eumesembrinella randa: Peris & Mariluis (1984: 263); Toma & Carvalho (1995: 142); Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 866); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 108).
Mesembrinella randa: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A large fly averaging 12 mm (11–13/5) in length. Postpronotal setae 2x2; base of wing mostly hyaline; anterior margin of wing infuscated from costa to vein R_{2+3}; T3–4 concolorous, without distinct posterior bands; posterior edge of T4 lacking marginal setae dorsally; posthumeral seta present, often reduced; rim of upper calypter dark.

Redescription. *Male.* Head. Frons broad, 0.078 (0.07–0.09/5) of head width at narrowest, slightly narrower than width of parafacial at level of lunule; fronto-orbital, parafacial, gena and antenna pale golden, frontal vitta darker orange; frontal setae ascending about 60% of distance to vertex; frontal vitta obliterated midway, gena with typical horizontal row of stout setae midway, otherwise with scattered weak tan setae; posterior margin with few golden setae; postgena orange with pale tomentum and golden setae; occiput dark orange with silvery tomentum and golden setae; median occipital sclerite shiny dark brown; antenna pale gold except brown setae on arista; palpus typical; ocellar triangle medium-sized, anterior ocellus about 2x size of posterior ocelli; supravibrissal setae short and brown, in short row, ascending about 1/10 of distance to antennal base.

Thorax. Dorsum dark orange midway, with 4 broad golden tomentose stripes, lateral presutural areas pale orange; pleural area orange; chaetotaxy: ac 0:1, dc 2:3, ia 0, ph 1, often somewhat reduced, ppn 2x2, kat 1:1, meral setae typical, 1 pair of ac parallel or slightly converging, sa and lat absent, bas typical, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles orange, medium-sized; legs: femora orange, tibiae and tarsi tan to brown. Wing with anterior edge infuscated from costa to R_{2+3}; subcostal sclerite orange and bare; basicosta and tegula orange; section IV 0.30 of section III; discs of upper and lower calypters reddish; rim of upper calypter dark with long pale setae, rim of lower calypter pale with long reddish setae.

Abdomen. Dorsum of T1+2–3 orange, T4–5 shiny blue; T3–4 with dorsolateral pair of marginal setae; rear margin of T4 without marginal setae; disc of T5 with dense, short, fine setae only. *Terminalia* in lateral view: surstylus with moderate backward curve [sharper than in *M. quadrilineata*], cercus with apical hook (Fig. 85); in posterior view, cerci broad at base, then tapering gradually to tip (Fig. 86); phallus in lateral view with epiphallus of moderate length and with slight backward curve (Fig. 175); in dorsal view, hypophallus rounded with fine serrations, as in Fig. 176; T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 230; ST1–5 very narrow, as in Fig. 273.

Female. Similar to male except frons 0.278 (0.25–0.30/5) of head width at narrowest. T6 of FU shape; T7 continuous, darkened midway, pale laterally; T8 as separate sclerites; epiproct divided midway (Fig. 317); ST6–8 and hypoproct as in Fig. 361; spermathecae filiform (Fig. 402); ST1–5 as in Fig. 446.

Type material examined. LECTOTYPE ♀ (Brazil; NHMUK; Fig. 479), here designated, labeled: Brazil. / Pres. by the / Entomological / Club / 44.12; LECTOTYPE ♀ / Dexia / randa / Walker, 1849 / Designated by / Dear and Pont. [red border]; SYNTYPE ♀ / Dexia / randa Walker / 1849, List Dipt. / Brit. Mus., 4: 852 [red border]; LECTO-/ TYPE [round label with purple border]; Dexia / Type / randa / Walk. [round label with green border]; Ent. Club. / 44-12.

Remarks. *Dexia randa* was described based on at least two specimens from Brazil (Walker 1849: 853), but only one of these type specimens is currently housed in NHMUK (N. Wyatt, pers. comm.). Dear and Pont selected and labeled this specimen as a lectotype for this species, without publishing the designation. The same specimen is here formally designated as the lectotype of this nominal species. The lectotype has a frons to head width of 0.30 at narrowest, 1 small ph and no presutural ia. It is significantly damaged, with 5 legs missing (only left mid leg attached) and the left wing broken off, kept in a vial pinned below the specimen; the macula on the wing is faint and faded.

Additional material examined. Bolivia, **Tumupasa.** 1 ♀, Mulford Biol. Expl 1921–1922. Xii, W.M. Mann (LACM). Brazil, **Rondônia.** 1 ♂*, 4 ♀♀♦ (TLW281–TLW284), 19 ♀♀, 62 km SW Ariquemes, nr Fzda. Rancho Grande, 4–16.xi.1997, Fish Carrion Pitfall, J.E. Eger (FSCA); 1 ♀, same data except 6–15.xii.1990, D.A. Rider & J.E. Eger (FSCA); 1 ♀, same data except 17–24.iii.1989, 180 m, W.J. Hanson (LACM). Colombia, **Caqueta.** 1 ♂*, 1 ♂, Rio Orteguaza, nr. Rio Peneya, 14–18.i.1969, Duckworth & Dietz (LACM). Peru, **Cusco.** 1 ♂, 1 ♀, Pilocapata, Villa Carmen, 12°53′S 71°24′W, v.2014, Multilure trap, M. Choque (FSCA). **Lorenzo.** 1 ♂*, 2 ♂♂, Boqueron, 30.vi.1965, J. Schunke (LACM); 1 ♀, same data except 9.vii.1965 (LACM); 1 ♀, same data except 4.vii.1965 (LACM); 1 ♀, same data except 500 m, 14.vii.1965 (LACM); 1 ♀, same data except 22.iii.1964 (LACM); 2 ♀♀,

160 km NE Iquitos, Explornapo Camp, 2 km from Rio Napo on Rio Sucusari, 27–31.viii.1992, human dung trap, J. Castner & Skelley (FSCA). **Pasco.** 2 ♂♂, 1 ♀*, 3 km N. Puerto Bermudes, 200 m, jungle, 27.vi.1980, fish bait, D. Baumgartner, B. Greenberg (BG); 1 ♀, no other data (CEUA).

Distribution. Bolivia, Brazil, Colombia, Peru. Guimarães (1977) listed it from Guyana, Marinho *et al.* (2017) also listed it from French Guiana and Venezuela.

Remarks. Four specimens (TLW281–284) were barcoded and formed a distinct group close to *M. benoisti* (Fig. 488).

Mesembrinella semihyalina Mello, 1967

(Figs 87–88, 177–178, 231, 274, 318, 362, 403, 447, 488)

Mesembrinella semihyalina Mello, 1967: 73. Holotype male (FIOC), not examined. Type locality: Parque Sooretama, Espirito Santo, Brazil.

Mesembrinella semihyalina: Toma & Carvalho (1995: 138); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Marinho *et al.* (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized fly averaging 12.2 mm (11–13/5) in length. Wing infuscated; supravibrissal setae brown; subcostal sclerite setose; wing with section IV 0.23 of section III; male phallus in dorsal view with weak serrations (Fig. 178); legs entirely orange. Male frons about 0.06 of head width at narrowest; epandrium, cerci and surstyli as in Figs. 87–88. Female T6 of WU shape (Fig. 318).

Redescription. *Male.* Head. Frons 0.063 (0.06–0.07/3) of head width at narrowest. Fronto-orbital and parafacial pale silvery when viewed from above, pale orange when viewed from below; frontal setae ascending halfway to vertex; frontal vitta dark orange, obliterated midway; gena pale orange with horizontal row of few dark setae anteriorly, otherwise with small dark setae; postgena pale yellow with fine yellow setae; occiput with pale yellow tomentum and yellow setae; median occipital sclerite shiny black; antenna orange, first flagellomere with pale tomentum, arista dark orange; palpus typical; eye with median facets 3x size of lateral facets; ocellar triangle medium-sized, anterior ocellus 2x size of posterior ocelli; short row of tan supravibrissal setae on facial ridge ascending, about 1/6 of distance to antennal base.

Thorax. Dorsum with alternating dark brown areas with yellowish tomentose stripes; pleura dark orange with whitish tomentum; spiracles small, pale orange; chaetotaxy: ac variable, 2:1or 2:2, sometimes one or more setae missing, dc 2:3, ia 1, ph 1, ppn 3x3, kat 1:1, meral setae typical, 1 pair of parallel ap, sa and lat absent, 1 bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles medium-sized, pale yellow; legs entirely orange. Wing faintly infuscated along distal 2/3 of costa through R_{2+3} and along veins; basicosta and tegula pale orange; section IV 0.23 of section III; upper calypter with pale disc and dark rim with reddish setae; lower calypter with pale disc and rim, rim with long pale setae.

Abdomen. T1+2 dark orange; T3–T5 shiny blue with patchy white tomentum; rear margins of T4–5 with stout setae; disc of T5 with dense, medium-long, fine setae only. *Terminalia* in lateral view with surstylus broad, with gradual backward curve, cercus with apical hook (Fig. 87); in posterior view, base of cerci broad, relatively short and stout, narrowing apically to chisel-like tip (Fig. 88); phallus in lateral view with epiphallus short and stout with slight backward curve (Fig. 177); in dorsal view, hypophallic lobes slightly rounded with shallow, moderate serrations (Fig. 178). T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 231; ST2–5 as in Fig. 274.

Female. Similar to male except frons 0.248 (0.23–0.26/5) of head width at narrowest. T6 of WU shape; T7 continuous; T8 narrowed midway; epiproct divided midway (Fig. 318); ST6–8 and hypoproct as in Fig. 362; spermathecae filiform (Fig. 403); ST1–5 as in Fig. 447.

Type material examined. PARATYPE: Brazil, **Distrito Federal.** 1 ♂, Parque Sooretama (Cupido), E. Santo, L. Travis, H. Travis, II/III-948 (CNC).

Additional material examined. Brazil, **Alagoas.** 1 ♀♦ (TLW392), Murici, 26–30.vii.2012, S.S. Nihei, P.G. Dias, D.M. Alcantara, C.S. Costa (NHMUK); 1 ♂♦, same data except (TLW392) (NHMUK). **São Paulo.** 1 ♂*, 11.ii.1923, L.G. Saunders (NHMUK). **Rio de Janeiro.** 1 ♂*, Angra dos Reis, E. de Rio (CNC); 1 ♀, Angra do Reis, 29.v.1972, H.S. Lopes (CNC). **Rondônia.** 1 ♀*, 3 ♀♀, Caucalândia, 10°32′S 62°48′W, 21.x.1991, 1 ♀♦ (TLW432), J. McDonald (MEM); 1 ♀*, 62 km, SW Ariquemes nr Fzda. Rancho Grande, 6–15.xii.1990, D.A. Rider, J.E. Eger (FSCA).

Distribution. Brazil.

Remarks. Bonatto (2001) argued that this species is a synonym of *M. abaca* [here considered a synonym of *M. socors*], but *M. semihyalina* has a distinct, dark infuscation in cells r_1 and r_{2+3}, while *M. socors* has, at most, a faint yellowing in the r_1 cell along the costa. The known range of *M. semihyalina* is Brazil, whereas *M. socors* is known only from Central America. Two specimens of *M. semihyalina* (TLW392 and TLW432) were barcoded; they clustered together, close to *M. anomala* and distant from *M. socors* (genetic distance 12%) (Fig. 488), supporting the morphological differentiation between these two species.

Mesembrinella serrata Whitworth, sp. nov.

(Figs 89–90, 179–180, 232, 275, 319, 363, 404, 448, 480)

Diagnosis. A small fly averaging 9.2 mm (8–10/5) in length. Wing with section IV 0.44 of section III; distal 2/3 of wing along costa faintly infuscated; subcostal sclerite with long tan setae; abdomen bluish with faint white tomentum; usually kat 1:1. Male: epiphallus of normal length (Fig. 179); hypophallic lobes broad, pear-shaped in dorsal view, with coarse serrations (Fig. 180). Female T6 of WV shape (Fig. 319), with suture midway.

Description. *Male.* Head. Frons 0.028 (0.025–0.030/2) of head width at narrowest. Fronto-orbital, parafacial and gena yellow-gold; frontal vitta dark red; frontal setae ascending about 30% of distance to vertex, to where frontal vitta is obliterated; gena with horizontal row of brown setae midway, otherwise with small, scattered brown setae; postgena yellow with fine yellow setae; occiput dark with pale yellow tomentum and fine yellow setae; median occipital sclerite shiny dark brown; antenna entirely orange with whitish tomentum, arista tan; palpus typical; eye with median facets 4x size of lateral facets; ocellar triangle small, anterior ocellus 2x size of posterior ocelli; row of long tan supravibrissal setae ascending about 1/8 of distance to antennal base.

Thorax. Dorsum dark brown with golden brown tomentum and a pair of brown lateral tomentose stripes with presutural stripe midway; pleura mostly orange with golden tomentum; chaetotaxy: ac 2:1, dc 2:3, ia 1, ph 1, ppn 3x3, kat 1:1, rarely 2:1, meral setae typical, 1 pair of converging ap, sa and lat absent, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles orange, medium-sized; legs: femora orange, tibiae and tarsi brown. Wing with distal 2/3 of costa faintly infuscated; subcostal sclerite with long tan setae; basicosta and tegula orange; section IV 0.44 of section III; disc of upper calypter pale with brown rim and short tan setae; lower calypter with yellowish disc and dark brown rim with long tan setae.

Abdomen. T1+2–3 mostly dark orange, rear of T3 bluish; T4–5 shiny blue with faint white tomentum; rear margins of T4 and T5 with stout marginal setae dorsolaterally, no setae mid-dorsally; disc of T5 bare. *Terminalia* in lateral view with surstylus as in Fig. 89; in posterior view, cerci very robust, pear-shaped, narrowed above, broadest midway and tapering distally to broad tips (Fig. 90); phallus in lateral view with medium-long, slender epiphallus with small backward curve (Fig. 179); in dorsal view, hypophallic lobes broad, pear-shaped, with coarse serrations along edge (Fig. 180). T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 232; ST2–5 as in Fig. 275.

Female. Similar to male except frons 0.238 (0.28–0.29/3) of head width at narrowest. T6 of WV shape with suture midway; T7 divided midway; T8 as separate sclerites (Fig. 319); ST6–8 and hypoproct as in Fig. 363; spermathecae filiform (Fig. 404); ST1–5 as in Fig. 448.

Type material. HOLOTYPE ♂* (Peru, **Madre de Dios**; CNC; Fig. 480), labeled: Avispas [= Avispa], Madre / de Dios, PERU / 20 - 30.IX.1962 / L. Pena. 400m.; HOLOTYPE / Mesembrinella / serrata / T.L. Whitworth.

ALLOTYPE ♀: Peru, **Madre de Dios.** Avispas [= Avispa], 20–30.ix.1962, 400 m, L. Pena (CNC).

PARATYPES: Peru, **Madre de Dios.** 1 ♂, 1 ♀*, Avispas [= Avispa], 20–30.ix.1962, 400 m, L. Pena (CNC); 1 ♀, same data except 1–15.x.1962 (CNC).

Distribution. Peru.

Remarks. No specimens were barcoded.

Etymology. The species name *serrata* is derived from the Latin *serra* (= saw), and refers to the distinctive serrations along the edge of the hypophallic lobes.

***Mesembrinella socors* (Walker, 1861).**
(Figs 14, 91–92, 181–182, 233, 276, 320, 364, 405, 449, 481–482, 488, 493)

Calliphora socors Walker, 1861: 311. Holotype female (NHMUK), examined. Type locality: Mexico.
Huascaromusca abaca Hall, 1948: 68. Holotype male (USNM), examined photographically. Type locality: Barro Colorado Island, Canal Zone, Panama. **Syn. nov.**
Mesembrinella abaca: Peris & Mariluis (1984: 260); Vargas & Wood (2009: 1301); Kosmann *et al.* (2013: 77); Wolff & Kosmann (2016: 868); Marinho *et al.* (2017: tab. 1); Cerretti *et al.* (2017: tab. 2).

Diagnosis. A medium-sized bluish fly averaging 10.4 mm (8–13/5) in length. Postpronotal setae 3x3; wing hyaline; ppn and femora orange; subcostal sclerite setose; section IV of wing 0.24 of section III; dorsum of thorax brown with four pale tomentose stripes; male with T1+2–3 orange, T4–5 more or less shiny blue with streaky tomentum, T3 with a triangle of bluish cuticle from hind margin to point in middle of tergite (Fig. 493). Epandrium, cerci and surstyli as in Figs 91–92. Female with only T1+2 orange; terminalia as in Fig. 320.

Redescription. *Male.* Head. Frons broad, 0.078 (0.07–0.09) of head width at narrowest, about equal to width of parafacial at level of lunule; fronto-orbital broad, silvery-orange, with frontal setae stout below to short and weak above, starting about midway and extending to ocellar triangle; frontal vitta obliterated midway, orange below; parafacial silvery when viewed from above; gena orange with silvery tomentum and horizontal row of stout, black setae along lower margin across lower parafacial to vibrissa; postgena orange with long yellow setae; occiput silvery with weak, orange setae; median occipital sclerite shiny black; palpus typical; antenna typical; eye with median facets 2x size of lateral facets; ocellar triangle small, anterior ocellus slightly larger than posterior ocelli; supravibrissal setae on facial ridge dark brown, ascending about 1/6 of distance to antennal base.

Thorax. Dorsum with heavy grayish tomentum and three pale tomentose stripes; pleura with grayish tomentum and mostly weak yellow setae; chaetotaxy: ac 2:2 or 2:3, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae typical, 1 pair converging ap, 1 stout bas, 1 weak pb, sa and lat absent, 1 disc; subscutellum moderately developed; spiracles small, pale orange; legs: femora orange, fore tibia and tarsus orange, mid and hind tibiae and tarsi brown. Wing hyaline with faint darkening along all veins; basicosta pale, tegula orange; subcostal sclerite setose; section IV 0.24 of section III; disc of upper calypter pale, rim sooty with pale setae; lower calypter wholly pale with long pale setae (Fig. 14).

Abdomen. T1+2–3 orange; T4–5 polished blue with streaky tomentum, T3 with a triangle of bluish cuticle from hind margin to point in middle of tergite (Fig. 493); rear margin of T3 with 2x2 lateral marginal setae; rear of T4–5 each with row of stout setae on posterior margins; disc of T5 with dense, short, fine setae only. *Terminalia* in lateral view with surstylus curving sharply backward, cercus with an apical hook (Fig. 91); in posterior view, cerci short and stout with chisel-like tips (Fig. 92); phallus in lateral view with short, stout epiphallus (Fig. 181); in dorsal view, hypophallic lobes rectangular with coarse serrations (Fig. 182); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 233; ST1–5 as in Fig. 276.

Female. Similar to male except frons 0.26 (0.24–0.27/5) of head width at narrowest and color pattern of abdomen different, normally with only T1+2 orange, T3 shiny blue and without triangular projection. T6 of OV shape; T7 continuous with posterior edge recessed midway; T8 as separate sclerites; epiproct as two sclerites (Fig. 320); ST6–8 and hypoproct as in Fig. 364; spermathecae filiform (Fig. 405); ST1–5 as in Fig. 449.

Type material examined. HOLOTYPE ♀ (Mexico; NHMUK; Fig. 481), labeled: Mexico / Ex Coll. / W.W. Saunders. / 68.4; Calliphora / Type / Socors / Walk. [round label with green border] / HOLOTYPE ♀ / Calliphora / socors Walker / 1861, Trans. ent. Soc. / Lond. (2) 5: 311 [red border]; Holo- / type [round label with red border]; 68.4; Mex.

Huascaromusca abaca Hall, 1948: HOLOTYPE ♂ (Panama; USNM; examined photographically: Fig. 482), labeled: Barro / Colorado Isl / CZ VIII-IX-36; Jas Zetek / No 3749; Huascaromusca / abaca / Hall / det / DG Hall; USNMENT / 01295436.

PARATYPES: Panama, **Canal Zone.** 2 ♂♂, Barro Colo IS [= Colorado Island], CZ [= Canal Zone], xi.17.39, fruit fly trap, Jas Zetek, No. 4594, Paratype No 53112 (USNM); 1 ♀, same data except i.9.1929, C.H. Curran (USNM).

Remarks. The holotype female of *Mesembrinella socors* was examined and is in only fair condition. It is dirty and covered with fungal hyphae (Fig. 481). Guimarães (1977) listed this species as a synonym of *M. bicolor* following Hall 1948, but the setose subcostal sclerite clearly separates it from that species, which has a bare subcostal

sclerite. The holotype is very similar to the holotype male of *Mesembrinella abaca* (Hall), which was also examined. Since the type of *M. socors* is a female, it was compared to several female specimens we had previously identified as *M. abaca.* Specimens of both species key to *M. socors* using the key provided herein, we have concluded they are a single species. Shared characters include postpronotal setae 3x3; stem vein bare; wing with faint yellow tinge along costa and around some veins; ppn and femora orange; subcostal sclerite setose. We conclude that *M. abaca* is a synonym of *M. socors*. Hall (1948) listed *M. abaca* from Costa Rica, Ecuador, Guatemala, Panama and Nicaragua; in the current study specimens of *M. socors* were found from all these countries except Nicaragua.

Additional material examined. Colombia, **Meta.** 1 ♀, 2.3 km NW Villavicencio, Qbda. Susamaco, 1000 m, 5.iii.1972, Ber. 234 for litter, S. & J. Peck (CNC). Costa Rica, **Alajuela.** 2 ♂♂, 20 km S Upala, 11–20.iv.1991, F.D. Parker (LACM); 1 ♀*, same data except 6.i.1991 (LACM); 1 ♀, Guaruso, Sitio Catarata Rio Buenavista, 700–800 m, 23.iii.2007, Tp. Luz, L_N_298474 428857 #91074, J.A. Azofeifa (INBIO); 1 ♂♦ (TLW195), Bijagua, P.N. Volcan Teurio, Albergue Heliconias, Send. Heliconias 680 m, 1.ii.2008, Tp. Luz, L_N_299100 422600 #94184, A. Zumbando (INBIO). **Cartago.** 1 ♂*, Turrialba, M.N. Guayabo, 1100–1200 m, 8–13.v.2007, M. Moraga, R. Gonzáles, E. Navarro (INBIO). **Heredia.** 1 ♀, Estación Biológica la Selva, 10°26′N 84°01′W, iii.1993, #149, [no collector] (INBIO). **Puntarenas.** 1 ♂, Rancho Quemado, 200 m, Península de Osa, vii.1992, L_S_292500 511000, A. Marín (INBIO); 1 ♂, same data except v.1992, F. Quesada & G. Varela (INBIO); 1 ♂*, same data except K. Flores(INBIO); 1 ♂, same data except Península de Osa A.C., 4–21.i.1994, #2570, H. Gutierrez (INBIO); 1 ♀, same data except ix.1991, F. Quesada (INBIO); 1 ♂, 1 ♀, Estación Sirena, P.N. Corcovado, 1–100 m, ii.1993, L_S_270500 508300 #1805, G. Fonseca (INBIO); 1 ♂, same data except 0–100 m., vi.1990, F. Quesada (INBIO); 1 ♂, same data except 0–100 m, vi.1990, G. Maass: 1 ♀, same data except Golfito, S. Corcovado 0 m, 9.xi.2000, manual, L_S_507400 270400 #61788, K. Caballero (INBIO); 1 ♀, same data except ix.1993, #2362; 3 ♂♂, P.N. Corcovado Estación Sirena, Send. Olla., 10 m, 26.iv.2001, L_S_270500 508300 #63082, Manual, K. Caballero (INBIO); 4 ♀♀, Osa Península 2.5 mil. SW Rincón, 08°42′N 83°29′W, 8–12.iii.1967, OTS Adv. Zoo Course, [no collector] (LACM); 1 ♀*, same data except 21–28.ii.1967 (LACM); 1 ♀, Golfito, Jimenéz, P.N. Corcovado, Estación Los Patos, Send. Guaymi, 140 m, 29.i.2002, Libre, L_S_280925 515150 #66731, K. Caballero (INBIO); 1.♀, R.F. Golfo Dulce, P.N. Corcovado Estación Agujas, 300 m, 10.xi–10.xii.2006, Malaise trap, L_S_276750 526550 #90271, J.A. Azofeifa (INBIO); 1 ♀, same data except Golfito, 250–350 m, 12.v.2006, Manual, #56763, K. Caballero (INBIO); 3 ♀♀, Monteverde, 1500 m, 25–30.viii.1991, D.M. Wood (CNC); 2 ♀♀, same data except 20–25.viii.1991 (INBIO); 1 ♀, R.V. S. Golfito, Estación Naranjales, 64 m, 22–26.iv.2004, Tp. Frutas, L S 289900_ 553450 #76862, B. Gamboa, D. Briceño, M. Moraga, W. Porras (INBIO); 1 ♀, Rincón de la Osa, 26.vii.1966, D. Veirs (LACM); 1 ♀, same data except vicinity of Rincón, 14.iii.1967, D.R. Paulson (FSCA); 1 ♀*, 2.♀, 10 km NE Quepos RioSPAraiso, 15.ii.2003, G. & M. Wood (CNC); 1 ♀, P.N. Corcovado, Cerro Brujo, Hito., 617 m, 5.xi.2002, Manual, L_S_289100 507325 #72432, K. Caballero (INBIO); 1 ♀, P.N. Corcovado, Sector La Leona, Cerro Puma, 100–300 m, 17.ix–5.x.2003, Libre, L_S_267700 518900 #75585, K. Cabellero (INBIO). **San José.** 1 ♂♦*, Tarrazu San Carlos Reserva Rios, Paraisa Alberque Pecari, 406 m, 30.iv–4.v.2006, B. Gamboa, M. Moraga (INBIO); 1 ♀, San Isidro General, ii.1993, F.D. Parker (LACM). Ecuador, **Imbabura.** 1 ♂*, 1 ♂♦ (TLW419), 1 ♀♦ (TLW420), Lita, 12.iv.2016, Trap 4, P. Ponce (FSCA). **Pichincha.** 1 ♂, E. Sto Domingo, 8–14.v.1988, Hanson & Bohart (LACM). Guatemala, **Quetzaltenango.** 1 ♂, 1 ♀♦ (TLW455), 14.4 km SW Zunil., 14.77°N. 91.55°W, 1340 m, 20.vi.1993, human feces, F. Genier (LACM). **San Marcos.** 1 ♂♦ (TLW197), 1 ♀♦ (TLW196), Bojoual 1600 m, 2.vii.2011, F. Camposeco (WSU). **Suchitepéquez.** 1 ♀♦ (TLW418), Univ. Guatemala Res. Station, 14°32′88″N 91°11′62″W, 1550 m, 19.vi.2011, F. Carillo (WSU). Panama, **Colon.** 2 ♂♂, Barro Colorado Island CZ, 17.xi.1939, Fruit fly trap, No. 4594, JasZetek (LACM); 1 ♀, same data except 9.i.1929, C.H. Curran (LACM); 1 ♀, same data except 27.i.1955, #780, C. Rettenmeyer (LACM); 1 ♂, 1 ♀♦ (TLW417), C.Z., Gatun Ridge Road, 8–9.iv.1987, J.R. MacDonald (MEM); El Valle, Cocle, 800–850 m, 8.i.1986, J. & S. MacDonald (MEM).

Distribution. Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Panama. Hall (1948) also listed Nicaragua (as *Huascaromusca abaca*). Bonatto (2001) also listed it from Brazil (as *M. abaca*).

Remarks. Seven specimens (TLW195–197, TLW418–420 and TLW455) were barcoded, and clustered together (Fig. 488). These were specimens from several countries including Ecuador, Costa Rica and Guatemala. TLW455 was a typical *M. socors* but only had 2x2 postpronotal setae rather than the normal 3x3; this variation was not seen in other specimens of this species.

Mesembrinella townsendi Guimarães, 1977

(Figs 93–94, 183–184, 234, 277, 321, 365, 406, 450, 483, 488, 495)

Mesembrinella townsendi Guimarães, 1977: 31. Holotype male (NHMUK), examined. Type locality: Fundo Chela, Peru.
Mesembrinella townsendi: Peris & Mariluis (1984: 260); Kosmann *et al.* (2013: 78); Wolff (2013: 121); Wolff & Kosmann (2016: 870); Marinho *et al.* (2017; tab. 1) Cerretti *et al.* (2017: tab 2).

Diagnosis. A medium-sized fly averaging 11.4 mm (11–12/5) in length. Wing infuscated from where subcostal vein meets costa to where vein R_1 meets costa, and extending from costa to vein R_{2+3} (Fig. 495); abdomen without pale tomentose pits; supravibrissal setae brown; subcostal sclerite with brown setae; abdomen shiny blue with streaky pale tomentum; wing with section IV 0.24 of section III; mid and hind tibiae and tarsi brown. Epandrium, cerci and surstyli as in Figs 93–94. Female terminalia as in Fig. 321.

Redescription. *Male.* Head. Frons 0.015 (0.01–0.02/5) of head width at narrowest. Fronto-orbital, parafacial, gena, and postgena orange with sparse pale tomentum; frontal setae ascending about 30% of distance to vertex; frontal vitta dark orange, obliterated at about 1/3 of length; gena with horizontal row of dark brown setae midway, from posterior margin to vibrissa, otherwise with scattered brown setae; postgena with orange setae and sparse pale tomentum; occiput dark brown with heavy dark gold tomentum and fine golden setae, median occipital sclerite shiny with unusual area of pale cuticle above and dark brown cuticle below; antenna entirely orange except apical half of arista brown; palpus typical; eye with median facets about 2x size of lateral facets; ocellar triangle small, anterior ocellus about 2x size of posterior ocelli; supravibrissal setae brown, ascending about 1/6 of distance to antennal base.

Thorax with four pale stripes (as in Fig. 493); pleura orange with pale tomentum; spiracles pale yellow; chaetotaxy: ac 2:2, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meral setae fine, tan, with short horizontal section, 1 pair converging ap, 1 weak sa, 1 weak lat, 1 stout bas, 1 pb, 1 disc; subscutellum weakly developed; spiracles of moderate size, pale yellow; legs: femora orange, tibiae and tarsi more or less dark brown. Wing infuscated from where subcostal vein meets costa to where vein R_1 meets costa and from costa to vein R_{2+3} (Fig. 495); subcostal sclerite setose with dark brown setae (similar to Fig. 490); basicosta tan to dark brown, tegula orange; section IV 0.24 of section III; disc of upper calypter tan, rim dark with short dark setae; disc of lower calypter brown, rim pale with long pale setae.

Abdomen. T1+2 yellowish, T3 yellowish to shiny blue, T4–5 shiny blue with pale tomentum, T4 with row of stout marginal setae, T5 with posterior row of weak marginal setae; disc of T5 with dense, short, fine setae only. *Terminalia* in lateral view as in Fig. 93; in posterior view as in Fig. 94; phallus in lateral view as in Fig. 183; in dorsal view, hypophallic lobes of unusual shape with shallow, coarse serrations along edge (Fig. 184); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 234; ST1–5 as in Fig. 277.

Female. Similar to male except frons 0.282 (0.26–0.29/5) of head width at narrowest. T6 of OV shape; T7 broad, divided midway; T8 as separate sclerites (Fig. 321); ST6–8 and hypoproct as in Fig. 365; ST7 distinctive, narrowed in anterior third and expanded in posterior 2/3; spermathecae filiform (Fig. 406); ST1–5 as in Fig. 450.

Type material examined. HOLOTYPE ♂ (Peru; NHMUK; Fig. 483), labeled: PERU / Fundo Chela / 4.vi.1964 / 1100m. J. Schunke; B.M. 1964-686; Holo- / type [round label with red border]; Mesembrinella / townsendi G. / J. H. Guimarães det.

PARATYPE: Peru. 1 ♂*, over Monzon River, 19.vi.1964, 860 m, J. Schunke (NHMUK).

Additional material examined. Bolivia, **La Paz.** 1 ♀, Mapiri Arroyo Tuhiri, 15.28°S 68.25°W, 10.iv.2001, B. Brown, G. Kung (LACM). Peru, **Cusco.** 4 ♂♂, 1 ♀*, 13 ♀♀, Pilocapata, Villa Carmen, 12°53′S 71°24′W, v.2014, multilure, 1 ♀♦ (TLW450), M. Choque (FSCA); 2 ♀♀♦ (TLW449–TLW451), Villa Carmen Biol. Sta., 12°54′08″S 71°24″38″W, i–iii.2013, E. Rodriguez (FSCA); 2 ♂♂*, 3 ♂♂♦ (TLW316–TLW318), 1 ♂, 1 ♀*, 2 ♀♀♦ (TLW319–TLW320), 2 ♀♀, Estación Biológica, Villa Carmen 12°54′08″S 71°24″38″W, 718 m, 16–26.xi.2012, J.K. Alvarez (USNM); 2 ♂♂, same data except Trail 8, 700 m (FSCA); 1 ♂, same data except Trail 8 mark 8-1654, 12°54′09″S 71°24′321″W, 707 m, 27.xi.2012–20.i.2013, VC-ML-14, A.L. Norrbom, E. Rodriguez, G.J. Steck, B.D. Sutton (FSCA); 1 ♂, 2 ♀♀, same data except 721 m, 20–26.i.2013, A.L. Norrbom, E. Rodriguez, G.J. Steck, B.D. Sutton (USNM). **Huanuco.** 1 ♂*, Monson River [over the river], 860 m, 19.vi.1964, J. Schuke (NHMUK); 1 ♀, vic. Tingo Maria, 1–6.vi.1999, W. Hanson, S. Keller (LACM). **Junin.** 2 ♂♂*, 4 ♀♀, 16 km W San Ramón, 1433 m, 21.vi.1980, M. Szyska (BG). **San Martin.** 1 ♀, Moyabamba, Vic. Ecológico "Rumipata", 06°04′32.0″S 76°58′07.5″W, 970 m, 13–18.x.2012, UV light, J.E. Eger (FSCA); 1 ♀, 1–13 km from Tarapoto Urimaguas Rd., 650–800 m, 10.xii.1991, R. MacDonald (MEM).

Distribution. Bolivia, Peru. Marinho *et al.* (2017) also listed it from Brazil and Colombia.

Remarks. Eight specimens were barcoded and one external sequence from Colombia was included in the analysis. Two independent clusters were recovered. The first one includes five specimens (TLW316–320) of the typical *M. townsendi* from Peru and the Colombian sequence (KR820723). The second cluster includes the other three specimens (TLW449–451), from a group of eight females also from Peru (Fig. 488). These females keyed to *M. townsendi* but showed some variation, including a consistently smaller size and the lack of tomentum on T4–5, whereas the specimens in the first cluster all had streaky tomentum on T4–5. The genetic distance between the two clusters is 5%, which suggests they may belong to different species. A female from the second group was dissected and the terminalia and sternites were very similar to those of confirmed *M. townsendi* specimens. If males matching these females are found, they should be studied in detail to confirm whether they belong to a separate species; however, for now we consider them as *M. townsendi*.

Mesembrinella umbrosa Aldrich, 1922

(Figs 95–96, 185–186, 235, 278, 322, 366, 407, 451, 484, 488)

Mesembrinella umbrosa Aldrich, 1922: 12. Holotype male (USNM), examined photographically. Type locality: Tucurrique, Costa Rica.

Mesembrinella umbrosa: Peris & Mariluis (1984: 259); Kosmann *et al.* (2013: 78); Wolff 2013: 121; Wolff & Kosmann (2016: 870); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 109): Cerretti *et al.* (2017: tab. 2).

Diagnosis. A large fly averaging 14.2 mm (13–15/5) in length. Thorax reddish with bright bluish-purple abdomen; wing yellowish, anterior margin from costa to vein R_{2+3} darker yellow; section IV of wing 0.69 of section III; scutellum without discal setae; subcostal sclerite setose. Epandrium, cerci and surstyli as in Figs 95–96. Female terminalia as in Fig. 322.

Redescription. *Male.* Head. Frons 0.025 (0.02–0.03/5) of head width at narrowest. Fronto-orbital and parafacial yellow with whitish tomentum; frontal setae ascending about 60% of distance to vertex; frontal vitta dark red, obliterated midway; gena dark orange with pale tomentum and a horizontal row of stout, black setae on ventral margin, otherwise with scattered tan setae; postgena orange with silvery tomentum and fine golden setae; occiput with dark cuticle covered with heavy silvery tomentum and fine golden setae, tomentum absent along upper margin and midway; median occipital sclerite shiny dark orange; antenna orange, first flagellomere with heavy pale tomentum; palpus typical; eye with median facets 4x size of lateral facets; ocellar triangle medium-sized, anterior ocellus 2x size of posterior ocelli; supravibrissal setae short, brown, forming a dense patch ascending 1/4 of distance to antennal base.

Thorax. Dorsum orange with streaky stripes of irregular, whitish tomentum; pleura orange with pale tomentum; chaetotaxy: ac 2:2 or 2:3, dc 2:3, ia 1, ph 1, ppn 3x3, kat 2:1, meron with very fine setae in an inverted L, 1 slightly convergent ap, sa and lat absent, 1 stout bas, 1 pb, 0 disc; subscutellum prominently developed; spiracles large, orange; legs entirely orange. Wing entirely yellow, anterior edge from costa to R_{2+3} darker, middle of cell r_{4+5} hyaline; subcostal sclerite setose; basicosta and tegula orange; section IV 0.69 of section III; discs of upper and lower calypters reddish; rim of upper calypter dark with short reddish setae, rim of lower calypter pale with long reddish setae.

Abdomen. T1+2 yellowish with whitish tomentum, T3–5 more or less metallic, gleaming blue; T4 with row of marginal setae, T5 with row of short marginal setae; disc of T5 with dense, short, fine setae only. *Terminalia* in lateral view with surstylus curved backward, cercus with apical hook (Fig. 95); in posterior view, cerci broad basally and gradually narrowing to tips (Fig. 96); phallus in lateral view as in Fig. 185; in dorsal view, hypophallic lobes rectangular with moderate serrations (Fig. 186); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 235; ST1–5 broad, as in Fig. 278.

Female. Similar to male except frons 0.263 (0.24–0.28) of head width at narrowest. T6 of WV shape; T7 continuous, thin, narrowed midway; T8 as separate sclerites (Fig. 322); ST6–8 and hypoproct as in Fig. 366; spermathecae filiform (Fig. 407); ST1–5 as in Fig. 451.

Type material examined. HOLOTYPE ♂ (Costa Rica, **Cartago**; USNM; examined photographically: Fig. 484), labeled: Tucurrique / Costa Rica; CollSchild / &Burgdorf; Mesembrinella / umbrosa / Ald.; Type No. / 25246 / U.S.N.M. [orange label]; USNMENT / 01295435.

Additional material examined. Costa Rica, **Alajuela.** 1 ♀*, 1 ♀, San Ramón, Villa Blauca, 1115 m, 18.xi.2008, Tp. Frutas, L_N_242482 483371 #95287, R. Rojas Vasquez (INBIO). **Cartago.** 1 ♂, Grano de Oro, 1120 m, Chirripo, Turrialba, xi.1992, L_N_200250 595900, P. Campos (INBIO); 1 ♂, La Suiza de Turrialba, 9.x.1921, P. Schild (USNM); 1 ♀, P.N. Tapanti, 1150 m, vii.1993, L_N_194000 559800 #2801, G. Mora (INBIO); 1 ♀♦ (TLW338), P.N. Barbilla, Turrialba, Tayutic, Campamento 2, 1200 m, 6–9.v.2005, Libre, L_N_213371 600782 #80273, J.D. Gutierrez (INBIO). **Guanacaste.** 1 ♂, Macizo Miravalles, Estación Cabro Muco., 1100 m, 27.vi–2.vii.2003, L_N_299769 411243 #74526, Tp de Luz, B. Hernández (INBIO); 1 ♂, same data except 24.ix–5.x.2003, Libre, #75498 (INBIO). **Puntarenas.** 2 ♂♂*, 2 ♂♂, Monteverde, 25–30.viii.1991, 1500 m, D.M. Wood (CNC); 1 ♂, same data except 18–24.viii.1987 (INBIO); 1 ♂, same data except San Luis, 1040 m, 24.viii–15.ix.1992, L_N_250850 449250, F.A. Quesada (INBIO); 1 ♀, same data except 14–20.v.1990, D.M. Wood (CNC); 1 ♀♦ (TLW370), same data except 20–22.viii.1993 (INBIO); 1 ♂*, Est. Pittier, PILA-ACLA, 1670 m, 5–18.1995, L_N_330900 577400 #4437, R. Villalobos (INBIO); 1 ♂, same data except 4–22.i.1996, L_S_220900 577400 #6813, E. Navarro (INBIO); 1 ♂, Send. a Cerro Pittier, 600 m, NO. de la Estación, 1750 m, 18–24.xii.1995, L_S_331250 577150 #7401, on excrement, M. Moraga (INBIO); 1 ♂, Estación Agujas. Rio Agujas. Send. Zamia., 300 m, 14–24.viii.1996, L_S_276750 526550 #8477, A. Azofeifa (INBIO); 1 ♀, Est. La Casona, Res. Biológica, Monteverde, 1520 m, x.1990, L_N_253250 449250, N. Obando (INBIO). **San José.** 1 ♀*, Zurquí de Moravia, 1600 m, 21.x.2012, #105240, Bait trap with human dung, ZADBI (LACM); 1 ♀♦ (TLW342), same data except 24.ix.2012, #105110 (LACM); 1 ♀♦ (TLW341), same data except 6–12.ix.2012, #105003, Malaise trap #1 (LACM); 1 ♀♦ (TLW340), same data except 22.x–1.xi.2012, #105314, Malaise trap #1 pan (LACM); 1 ♀, 5400 ft., HWY 2, N of San Isidro, 6.vi.1988, [no collector] (LACM). Ecuador, **Pastaza.** 1 ♀, Napa Sarayacu, 29.x.2015, 1312 m, M. Domínguez (FSCA).

Distribution. Costa Rica, Ecuador. Marinho *et al.* (2017) also listed it from Colombia and Panama.

Remarks. Five specimens (TLW338, TLW340–342 and TLW370) were barcoded, and grouped together close to *M. apollinaris* (Fig. 488).

Mesembrinella velasquezae Whitworth, sp. nov.

(Figs 97–98, 187–188, 236, 279, 323, 367, 408, 452, 485)

Diagnosis. A large fly averaging 15.2 mm (14–16/5) in length. Stem vein bare; distal 2/3 of wing infuscated from costa to vein R_{4+5} and also around vein M; dorsum of abdomen without pale tomentose pits; section IV of wing 0.63 of section III; supravibrissal setae bright orange and in a broad cluster ascending about 40% of distance to antennal base; all legs reddish; subcostal sclerite with long, pale setae. Epandrium, cerci and surstyli as in Figs 97–98. Female terminalia as in Fig. 323.

Description. *Male.* Head. Frons narrow, 0.018 (0.015–0.020/5) of head width at narrowest. Frons, parafacial, pedicel, first flagellomere and gena orange with pale whitish tomentum; frontal setae ascending about 40% of distance to vertex; frontal vitta obliterated at about 40% of distance to vertex; gena orange with pale tomentum and horizontal row of stout, dark setae at ventral edge, otherwise with few weak, reddish setae; postgena orange with fine golden setae; occiput with dense yellowish tomentum and pale setae; median occipital sclerite shiny dark orange; antenna entirely orange; palpus typical; eye with median facets about 2x size of lateral facets; ocellar triangle small, anterior ocellus about 2x size of posterior ocelli; supravibrissal setae bright orange, forming broad cluster over about 1/2 of distance to antennal base.

Thorax. Dorsum dark orange with four irregular pale tomentose stripes; pleura orange; chaetotaxy: ac 2:1, dc 2:3, ia 0 in most specimens, sometimes a small seta present, ph 1, ppn 3x3, kat 2:1, meron with long, slender orange setae in form of an inverted L, 1 pair converging ap, sa and lat absent, 1 stout bas, 1 weak pb, 1 disc; subscutellum moderately developed; spiracles large, pale yellow; legs entirely orange. Wing with dark infuscation from costa to vein R_{4+5} and around vein M; subcostal sclerite setose; basicosta and tegula orange; section IV 0.63 of section III; discs of upper and lower calypters faintly orange; rim of upper calypter dark with short pale orange setae, rim of lower calypter pale with long pale orange setae.

Abdomen. T1+2 and anterior 2/3 of T3 yellow-orange with whitish tomentum, rear margin of T3 blue-black, dorsum of T4 blue-black, T4yellow orange laterally; T5 entirely blue-black; rear of T4 with row of stout marginal setae, posterior margin of T5 with row of short, fine setae; disc of T5 with dense, medium-long, fine setae only. *Terminalia*. Surstylus in lateral view with slight backward curve, cercus with apical hook (Fig. 97); in posterior view,

bases of cerci broad, then gradually narrowing to tip (Fig. 98); phallus in lateral view as in Fig. 187; in dorsal view, hypophallic lobes narrow (Fig. 188); T6, STS7+8, pre- and postgonite, ejaculatory sclerite and ST6 as in Fig. 236; ST2–5 broad, as in Fig. 279.

Female. Similar to male except frons 0.25 (0.24–0.26/5) of head width at narrowest. T6 of OV shape, posterior edge with an inverted V incision midway; T7 narrowed midway with suture; T8 as separate sclerites; epiproct divided (Fig. 323); ST6–8 and hypoproct as in Fig. 367; spermathecae filiform (Fig. 408); ST1–5 as in Fig. 452.

Type material. Venezuela, **Lara.** HOLOTYPE ♂* (MJMO; Fig. 485), labeled: VENEZUELA, Edo. Lara / PN Yacambú-El blanquito / 11-16/03/02 / Leg: -; HOLOTYPE / Mesembrinella / velasquezae / T.L. Whitworth.

ALLOTYPE ♀: Venezuela, **Trujillo.** P.N. Guaramacal, 09°19′02″N 70°15′48″W, 1480 m, 14–20.ii.2002, R. Briceñò, A. Chacán, J. Clavijo, F. Díaz, R. Paz., E. Arcaya, L. Joly, Proyecto S1–2000000479 (INBIO).

PARATYPES: Venezuela, **Lara.** 1 ♂, PN Yacambu, El Blanquito, 11–16.iii.2002, R. Briceño, A. Chacón, J. Clavijo, F. Díaz, R. Paz., E. Arcaya, L. Joly, Proyecto S1–2000000479 (MJMO). **Trujillo.** 1 ♂*, 1 ♀*, 1 ♀, P.N. Guaramacal, 09°19′02″N 70°15′48″W, 1480 m, 14–20.ii.2002, R. Briceño, A. Chacán, J. Clavijo, F. Díaz, R. Paz., E. Arcaya, L. Joly (MJMO); 1 ♀*, 1 ♀, P.N. Guaramacal, 15–20.x.2001, [no collector] (MJMO); 2 ♂♂, Barinis, San Isidro, 14 km Sur La Soledad, 1500 m, 30–31.v.1975, R.E. Dietz (MIZA).

Distribution. Venezuela.

Remarks. Amplification of barcodes was attempted for six specimens, but failed for all.

Etymology. The species name *velasquezae* was chosen in honor of Yelitza Velásquez, a Venezuelan entomologist who provided much of the material from Venezuela examined for this project.

Mesembrinella anomala species-group

Recognition. The *M. anomala* group includes two species, *M. andina* and *M. anomala*. Both are medium-sized, blue-black flies (9–11 mm in length), with row of postocular setae not reaching gena, discal scutellar setae absent and T5 elongate, 1.5–2 times length of T4 in male. Male with surstylus broad and cercus sinuous (Figs 99–100) (see Wolff *et al*. 2014: figs 22–23); phallus distinctive; epiphallus long and slender (*M. anomala*, Figs 189–190) or short and slender (*M. andina*) (see Wolff *et al*. 2014: figs 20–21).

Key to species of the *M. anomala* species-group

[Males only, adapted from Wolff *et al*. (2014).]

1 T5 about twice as long as T4 (Fig. 496); fore femur brown; ac usually 0:1, rarely 0:0; epandrium with an anteroventral extension (Fig. 99); epiphallus long, slender and sharply curved backward (Fig. 189); [known from Venezuela; Bonatto (2001) also listed it from Ecuador; Marinho *et al*. (2017) also listed it from Bolivia] . . . . . ***M. anomala***

\- T5 about 1.5x as long T4; fore femur orange with dark apices dorsally; ac 0:0; epandrium without an anteroventral extension (Wolff *et al*. 2014: fig. 22); epiphallus short, with only a slight curve (Wolff *et al*. 2014: fig. 20); [known only from Colombia] . . . . . ***M. andina***

Mesembrinella andina (Wolff, Bonatto & Carvalho, 2014)

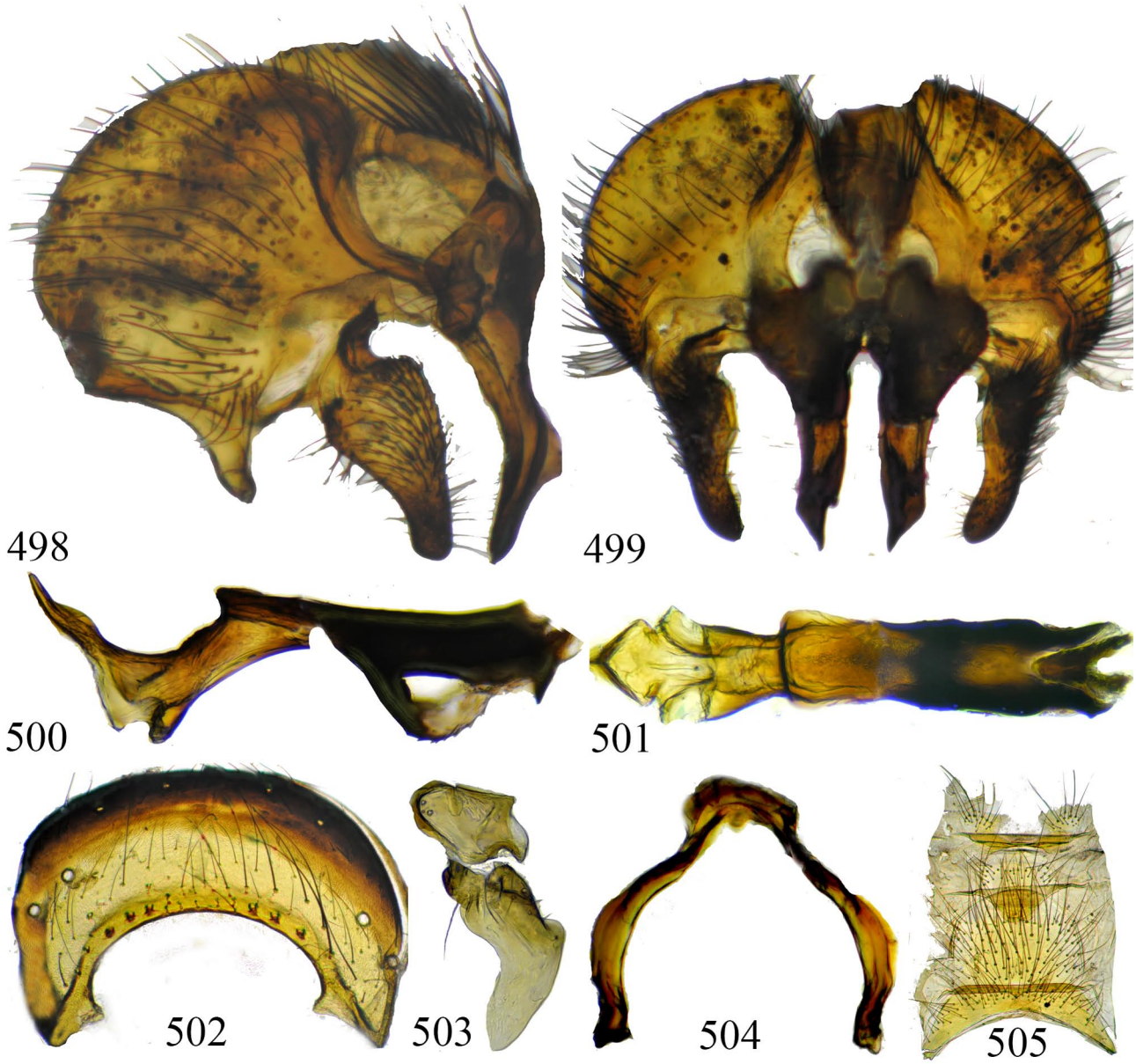
(Figs 498–505)

Thompsoniella andina Wolff *et al.*, 2014: 323. Holotype male (CEUA), not examined. Type locality: Andes, Antioquia, Colombia.

Thompsoniella andina: Wolff & Kosmann (2016: 870); Marinho *et al.* (2017: tab. 1).

Mesembrinella andina: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A small fly, the lone male specimen examined is 10 mm long. Similar to *M. anomala* except male with T5 about 1.5x as long as T4; coxae, trochanters and femora orange with dark apices dorsally; ac 0:0. Terminalia with epandrium lacking an anteroventral extension, unique shape easily separated from *M. anomala* (Fig. 498–499); epiphallus short, with only a slight curve in lateral view (Fig. 500).



FIGURES 498–505. Epandrium, cerci and surstyli of *Mesembrinella andina* (Wolff *et al.*). **498.** Epandrium, cerci and surstyli in left lateral view. **499.** Epandrium, cerci and surstyli in posterior view. **500.** Phallus in left lateral view. **501.** phallus in dorsal view. **502.** T6 and STS7+8. **503.** Pre- and postgonite. **504.** Hypandrium. **505.** ST1–5.

Redescription. *Male*. Frons broad, 0.14 of head width at narrowest. Fronto-orbital broad below, narrowing above, black with silvery tomentum; stout black frontal setae ascending about 1/3 of distance to vertex; frontal vitta broad and black with silvery tomentum extending to base of ocellar triangle; parafacial with lower half yellow-orange and upper half gray; gena orange with a short vertical row of stout black setae and scattered short brown setae; postgena orange to gray with long, silky yellow setae; occiput with short row of black postoccipital setae ending 1/3 of way from outer margin of eye; occiput black with silvery tomentum, lower 2/3 with silky, yellow setae; median occipital sclerite subshining black; antenna: pedicel brown, first flagellomere grey arista with short fine setae; palpus typical; eye with median facets about 2x size of lateral facets; median ocellus 2x size of posterior ocelli; facial ridge with short black supravibrissal setae over about 1/10 of distance to antennal base.

Thorax. Dorsum black with blue-gray tomentum; pleura blue-gray except orange around anterior spiracle; chaetotaxy: ac 0:0, dc 2:2, ia 0:2, ph 0, ppn 2x2, kat 1:1; meral setae fine, in a short vertical row with a couple of short horizontally-arranged setae, 1 pair crossing ap, 1 stout bas, 0 disc, 0 pb; subscutellum moderately developed; spiracles orange and medium-sized; legs: femora orange except apices brown dorsally, tibiae and tarsi brown. Wing

hyaline, faintly darkened along costa, subcostal sclerite with heavy pubescence, basicosta and tegula brown, section IV 0.16 of section III; upper calypter with tan disc and black rim with reddish-brown setae, lower calypter with reddish-brown disc, rim and setal fringe.

Abdomen. T1+2 with anterior 2/3 orange, posterior 1/3, T3–5 shining blue with pale tomentum, T5 1.5x as long as T4. *Terminalia* in lateral view with short surstylus, broad at base and narrowed distally, curving forward, cercus large, curved forward (Fig. 498); in posterior view as in Fig. 499; knob-like bases of surstyli exposed at tip of abdomen, similar to *M. anomala* (see Fig. 497); phallus in lateral view with epiphallus short and sinuous (Fig. 500); in dorsal view broad, hypophallic lobes with fine serrations (Fig. 501); T6, STS7+8 as in Fig. 502; pre- and postgonites as in Fig. 503; hypandrium as in Fig. 504; sternites short and broad, as in Fig. 505.

Female. Unknown.

Material examined. Ecuador, **Pichincha.** 1 ♂, Bellavista Reserve, 0°0′54″S 78°40′56″W, 2200 m, v.2011, A.D. Young, debu 00339815 (UGG).

Distribution. Colombia, Ecuador.

Remarks. No specimens were barcoded.

Mesembrinella anomala (Guimarães, 1977)

(Figs 99–100, 189–190, 237, 280, 324, 368, 409, 453, 488, 496–497)

Thompsoniella anomala Guimarães, 1977: 54. Holotype male (MZSP), not examined. Type locality: San Diego, Venezuela.
Thompsoniella anomala: Toma & Carvalho (1995: 139); Kosmann *et al.* (2013: 78); Wolff *et al.* (2014: 321); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 109).
Mesembrinella anomala: Cerretti *et al*. (2017: tab. 2).

Diagnosis. A medium-sized fly with subshining blue thorax and abdomen, averaging 10.8 mm (10–12/5) in length. Anterior thoracic spiracle with broad oval opening above (see Fig. 5). Postpronotal setae 2x2; wing with faint yellowish infuscation on distal 2/3 along costa; scutellum without discal setae; gena with some pale orange setae; fore femur brown; ac usually 0:1, rarely 0:0; male with T5 about 2x as long as T4 (Fig. 496); epandrium with a pair of knob-like anteroventral projections (Fig. 99, 497); epiphallus long, slender and sharply curved backward (Fig. 189).

Redescription. *Male.* Frons broad, 0.096 (0.09–0.10/5) of head width at narrowest. Fronto-orbital and parafacial silvery when viewed from above and orange when viewed from below; frontal setae ascending halfway to vertex; frontal vitta broad, extending to ocellar triangle, orange below and black above; gena pale orange with whitish tomentum a short horizontal row of 2–3 stout setae, and pale orange setae; postgena and occiput with silvery tomentum and long pale setae; median occipital sclerite shiny black with faint whitish tomentum; antenna: pedicel orange: base of first flagellomere orange, tip with tan tomentum; base of arista dark orange, tip black; palpus typical; eye with median facets 3x size of lateral facets; ocellar triangle small, anterior ocellus 2x size of posterior ocelli; facial ridge with short black supravibrissal setae ascending about 1/10 of distance to antennal base.

Thorax. Dorsum subshining blue with pale tomentum; pleura silvery-orange; chaetotaxy: ac 0:1, rarely 0:0, dc 2:2, ia 0, ph 0, kat 1:1, ppn 2x2, meral setae typical, with short horizontal section, 1 pair crossed ap, 1 stout bas, 1 sa, 1 lat, 1 pb, 0 disc; subscutellum moderately developed; spiracles orange and medium-sized; legs: fore femur brown, mid femur brown to orange, hind femur orange, tibiae and tarsi brown. Wing: distal 2/3 along costa with faint yellowish infuscation; subcostal sclerite pubescent; basicosta and tegula brown; section IV 0.19 of section III; discs of both calypters pale; rims tan with tan setae.

Abdomen entirely blue with whitish tomentum; T5 2x as long as T4 (Fig. 496); T4 with row of marginal setae; pairs of lateral marginal setae on T4 and T5; disc of T5 with dense, medium-long, fine setae only. *Terminalia* in lateral view with exceptionally broad surstylus and tiny cercus (Fig. 99); in posterior view as in Fig. 100; T6, STS7+8 and epandrium fused into broad plate at tip of abdomen (Fig. 497); knob-like bases of surstylus also visible at tip of abdomen (Fig. 497); phallus in lateral view with epiphallus exceptionally long and curving at 90° angle, directed backward (Fig. 189); in dorsal view, hypophallic lobes extremely narrow with coarse serrations (Fig. 190); T6, STS7+8, pre- and postgonite and ejaculatory sclerite as in Fig. 237; sternites of very unusual shape (Fig. 280).

Female. Similar to male except frons 0.187 (0.18–0.19/3) of head width at narrowest. T6 of FU shape, divided midway; condition of T7 unclear, possibly fused with T6; ST8 as separate sclerites (Fig. 324); ST6–8 and hypoproct as in Fig. 368, ST8 with pair of stout setal clusters; spermathecae as in Fig. 409; ST1–5 as in Fig. 453.

Material examined. Venezuela, **Aragua.** 1 ♂*, 1 ♀, Marcai, Choroni Pass, 1100 m, 26.ii.1971, G. & M. Wood (CNC); 1 ♂, 1 ♀, 11 km N Rancho Grande, 1100 m, 25.ii.1971, G. & M. Wood (CNC); 1 ♂, Parque Nac., Avila, 28.ii.1971, G. & M. Wood (CNC); 1 ♂, Rancho Grande, 6–7.xii.1976, J. Robertson (LACM); 1 ♀♦ (TLW458), Cocorote, Sector Candelo, 10°36′89″N 66°82′63″W, 1600 m, 15–21.x.2001, R. Briceño, A. Chacán, J. Clavijo, F. Díaz, R. Paz, E. Arcaya L. Joly (MJMO). **Miranda.** 1 ♂♦ (TLW198), San Antonio de los Altos, IV, IC, 10°24′N 66°58′W, 1680 m, iv. 2003, Y. Velásquez (MIZA).

Distribution. Venezuela. Bonatto (2001) also listed it from Ecuador. Marinho *et al*. (2017) also listed it from Bolivia.

Remarks. Two specimens (TLW198 and TLW458) were barcoded and grouped together near *M. semihyalina* (Fig. 488).

Subfamily Souzalopesiellinae Guimarães, 1977

Genus *Souzalopesiella* Guimarães, 1977

Souzalopesiella Guimarães, 1977: 55. Type species: *Mesembrinella facialis* Aldrich, 1922: 17, by original designation.

Souzalopesiella facialis (Aldrich, 1922)

(Figs 101–102, 191–192, 238, 281, 325, 369, 410, 454, 486, 488)

Mesembrinella facialis Aldrich, 1922: 17. Holotype female (USNM), examined photographically. Type locality: Higuito, Costa Rica.

Souzalopesiella facialis: Vargas & Wood (2009: 1301); Kosmann *et al.* (2013: 78); Wolff & Kosmann (2016: 870); Marinho *et al.* (2017: tab. 1); Velásquez *et al.* (2017: 109).

Mesembrinella facialis: Cerretti *et al.* (2017: tab. 2).

Diagnosis. A large fly with a robust shiny dark brown abdomen, averaging 14 mm (13–15/5) in length. ST2–4 wider than long with two rows of stout dark setae (Fig. 281). Wing entirely faint yellowish with darker yellow infuscation along anterior margin of wing from costa to vein R_{2+3}.

Redescription. *Male.* Head. Frons 0.02/5 of head width at narrowest. Fronto-orbital and parafacial pale yellow with silvery tomentum, frontal setae ascending about halfway to vertex; frontal vitta dark orange, obliterated about midway; gena with very short horizontal row of stout setae beginning in anterior 1/5 and extending across lower parafacial to vibrissa, otherwise with fine dark setae; postgena, like gena, with dark setae on anterior half and orange setae on posterior half; occiput with silvery tomentum and golden setae; median occipital sclerite shiny dark orange; antenna dark orange, arista brown; palpus typical; eye with median facets 2x size of lateral facets; ocellar triangle small, anterior ocellus 2x size of posterior ocelli; supravibrissal setae dark brown in dense, broad row ascending about halfway to antennal base.

Thorax. Presutural area of dorsum with four stripes of yellowish tomentum and a pair of irregular stripes laterally; postsutural area with two irregular rows of faint stripes; pleura orange with pale tomentum; chaetotaxy: ac variable, 2:1 or 2:2, dc 2:3, ia 0, ph 1, ppn, 3x3, kat 2:1, meral setae fine, brown, in a row, 1 parallel ap, 1 sa, 1 lat, 1 stout bas, 1 weak pb, 1 disc; subscutellum prominently developed; spiracles orange, medium-sized; legs entirely orange except last tarsomeres brown. Wing faintly yellowish with anterior edge darker from costa to vein R_{2+3}; subcostal sclerite bare with yellow pubescence; basicosta and tegula orange; section IV 0.51 of section III; discs of upper and lower calypters orange; rim of upper calypter dark with short orange setae, rim of lower calypter pale orange with long orange setae.

Abdomen. T1+2 dark orange with pale tomentum, T3 dark orange laterally, brown dorsally, T4–5 dark brown; T3 with cluster of lateral marginal setae, T4–5 with posterior rows of stout dark marginal setae; disc of T5 with dense, medium-long, fine setae only. ST2–4 wider than long with two rows of stout dark setae (Fig. 281). *Terminalia* in lateral view with surstylus short and slender, parallel-sided, cercus with long, sweeping forward curve (Fig. 101); in posterior view, surstylus and cercus slender (Fig. 102); phallus in lateral view with short stout epiphallus directed forward (Fig. 191); in dorsal view, hypophallic lobes narrow with an unusual pair of lateral processes (Fig. 192); T6, STS7+8, pre- and postgonite, ejaculatory sclerite, ST6 and hypandrium as in Fig. 238; ST1–5 as in Fig. 281.

Female. Similar to male except frons 0.236 (0.22–0.24/5) of head width at narrowest. T6 of FU shape, T7 wide with deep anterior incision midway; T8 as separate sclerites (Fig. 325); ST6–8 and hypoproct as in Fig. 369; spermathecae bulbous (Fig. 410); ST1–5 as in Fig. 454.

Type material examined. HOLOTYPE ♀ (Costa Rica, **Alajuela**; USNM; examined photographically: Fig. 486), labeled: Higuito / San Mateo CR [= Costa Rica]; Pablo Schild / Coll; Mesembrin- / ella facialis / Ald.; Type No. / 25248 / U.S.N.M. [orange label]; USNMENT / 01295431.

Additional material examined. Costa Rica, **Alajuela.** 1 ♂♦ (TLW262), 1 ♂, P.N. Volcan Tenorio, Estación Pilón, La Catarata, 700 m, 26.vi–15.vii.2004, Tp. Frutas dosel, L_N_297975 428089 #77653 (INBIO); 1 ♀*, 2 km S Pital, 5–28.ix.1988, F.D. Parker (LACM). **Cartago.** 1 ♂, Grano de Oro, 1120 m, Chirripo, Turrialba, ix.1992, L_N_200250 595900, P. Campos (INBIO). **Guanacaste.** 1 ♂, Canas, P.N. Volcan Tenorio, Sector Montezuma, 1300 m, 22.vii.2002, Libre, L_N_295100 423650 #70555, J.D. Gutierrez (INBIO). **Limón.** 1 ♂, 2 ♀♀, R.B. Hitoy Cerere Send. Espavel, 560 m, 16.iii.2003, Red de Golpe, L_S_401200 569800 #73456, W. Arana, F. Rojas, B. Gamboa (INBIO); 1 ♂, Manzanillo, 0 m, RNFS Gandoca y Manzanillo, 7–19.viii.1992, L_S_398100 610600, K. Taylor (INBIO); 1 ♂, same data except 0–100 m, 4.viii–12.xii.1992, L_S_398100 610600, F. Quesada (INBIO); 1 ♀, same data except 0–100 m, 24.ix–13.x.1992, L_S_398100 610600, F.A. Quesada (INBIO). **Puntarenas.** 1 ♂, P.N. Corcovado, Estación La Leona, 0–5 m, 23.vi.2002, Libre, L_S_267250 519575 #70150, K. Caballero (INBIO); 1 ♂♦ (TLW260), Golfito, Jimenéz, PN Carcavado, Estación Los Patos, Send. Mirador, 75 m, 14.ii.2002, K. Cabellero (INBIO); 1 ♂, 1 ♀, Osa Península 2.5 mi. SW Rincón 08°42′N 83°29′W, 8–12.iii.1967, OTS Adv. Zoo Course, [no collector] (LACM); 1 ♂, 1 ♀, Monteverde, 1500 m, 20–25.viii.1991, D.M. Wood (CNC); 2 ♂♂*, same data except 25–30.viii.1991 (CNC); 1 ♀*, Golfito, Jimenéz, PN Corcovado, Estación Los Paltos, Send Guaymi, 29.i.2002, K. Caballero (INBIO); 1 ♂, Golfito, 10–11.iv.1991, Parker & Welch (LACM). **San José.** 1 ♂, Zurquí de Moravia, Creek 2 North, 19–26.vii.2013, Malaise trap #2, Zadbi (LACM); 1 ♂*, same data except 21.x.2012 (LACM); 1 ♀, same data except Tower path, 50 m, 1–7.vi.2013, emergence trap over vegetation (LACM); 1 ♀, same data except Tower path, 10.5°N 84.02°W, 1600 m, 2–9.viii.2013, fish bait trap (LACM); 1 ♀, Puriscal, P.N. La Cangreja, Send. Ecotropica, 300–400 m, 15.vii.2004, Libre, L_N_185736 496067 #77761, J. Mata (INBIO). Honduras. 1 ♂, Middlesex, 125 m, 24.iv.1965, E.C. Welling (CNC). Panama, **Colon.** 1 ♀, Canal Zone, Barro Colorado Island, 6.vi.1956, W. Carl, M.E. Rettenmeyer (LACM). **Darien.** 1 ♀, Santa Fe, 7.ii.1967, [no collector] (FSCA). Ecuador, **Napo.** 1 ♀♦ (TLW261), Misahualli, 6–19.x.2001, C. Brammer (LACM). Venezuela, **Distrito Federal.** 1 ♂, Caracas, 1938, Br. Arcthonius (USNM). **Trujillo.** 1 ♂♦ (TLW263), P.N. Guaramacal 1480 m 11–16.ii 2002, 09°19′02″N 70°15′480″W, 14–20.ii.2002. T. Amarilla, R. Briceño, J. Clavijo, F. Díaz, R. Paz, L. Joly, A. Chacán, Proyecto S1–2000000479 (MJMO). **Aragua.** 1 ♀♦ (TLW264), PN Henn Pittier-Rancho Grande, 10°21′N 67°41′W, 25.i.2007, A. Marinez (MJMO).

Distribution. Costa Rica, Panama, Ecuador, Venezuela. Bonatto (2001) listed Central America (except Mexico) and Trinidad. A single female specimen, labeled "Brazil", Santa Catarina 1 ♀, Nova Teutonia, 27°11′S 52°23′W, 300–500 m, 19.iv.1965, F. Plaumann (CNC) was examined, which clearly belongs to *S. facialis*. This is far from the known range this species and may be an example of mislabeling.

Remarks. Three specimens were successfully barcoded, from Costa Rica (TLW260, TLW262) and Venezuela (TLW264). All sequences clustered together (Fig. 488). They formed a distinct group with some genetic variation between sequences. The genetic distance between sequences from Costa Rica and Venezuela was more than 3%, whereas between the two sequences from Costa Rica it was more than 5% (Fig. 488). This species is very distinctive and no significant morphological differences were seen between specimens from different areas.

Discussion of molecular results

The barcode tree (Fig. 488) was mostly congruent with morphology at the species level. All species except *M. townsendi* were recovered in independent clusters, with bootstrap values > 90% supporting species limits. In spite of this, *M bicolor*, *M. bellardiana*, *M. quadrilineata*, *M. batesi*, *M. perisi* and *S. facialis* showed substantial genetic variation, in some cases with more than 2% genetic distance. This variation is not supported by morphology (see Remarks under these species). Thus, molecular data suggests that the diversity of Mesembrinellidae is greater than morphology can detect. Regarding genera, the topology showed several broadly separated clusters for *Mesembrinella* and *Laneella*, with very low bootstrap values (< 5). It seems that although *COI* is a good marker to identify

species of Mesembrinellidae, it works poorly at deeper nodes; therefore, assertive conclusions about relationships among the genera are not possible at this point. More studies, with inclusion of more markers (nuclear and mitochondrial), are necessary to be certain about the phylogenetic relationships within this family, and to determine whether the genetic variation found within the species mentioned above is intraspecific or representative of several cryptic species.

Corrigendum to Tantawi *et al.* (2017; *Zootaxa* 4226 (3), 301–347)

In their "Revision of the Nearctic *Calliphora* Robineau-Desvoidy (Diptera: Calliphoridae)", Tantawi and co-authors mistakenly repeated the same character in both sides of couplet 10 of their "Key to adults of *Calliphora* in the Nearctic Region" (Tantawi *et al.* 2017: 306). The first half of the couplet should read "Genal groove and lower parafacial usually reddish or orange"; the second half should read "Genal groove and lower parafacial usually blackish".

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