

**PHYLOGENETIC ANALYSIS AND TAXONOMIC REVISION OF THE NEOTROPICAL
GENUS ARGENTINOMYIA LYNCH ARRIBÁLZAGA, 1891 (DIPTERA: SYRPHIDAE)**

by

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ABSTRACT

The genus *Argentinomyia* Lynch Arribálzaga, 1891 (Syrphidae: Syrphinae: Bacchini), was taxonomically revised and a phylogenetic analysis was conducted. The monophyly and internal phylogenetic composition of *Argentinomyia* and related taxa were reconstructed, based on adults morphologic characters. The in-group includes 26 available species of *Argentinomyia*. Fourteen species of *Melanostoma*, *Platycheirus*, *Tuberculanostoma*, *Talahua* and *Xanthandrus* (all Bacchini) were used as out-groups. *Trichopsomyia antillensis* Thompson (Pipizini) was selected to root the phylogeny. The analysis of 70 phylogenetically informative characters produced one most parsimonious cladograms (L=120 steps, CI=65, RI=90) within the in-group topology (*A. altissima*, (*A. rex*, (*A. browni*, (*A. bolivariensis*))), (*A. octomaculata*, (*A. tropica*, *A. luculenta*)), (*A. opaca*, *A. rugosonasa*, ((*A. crenulata*, *A. testaceipes*))), (*A. nigrans*, (*A. lineata*, (*A. neotropica*, *A. pollinosa*))), ((*A. currani*, *A. maculata*), (*A. praeusta*, *A. jamaicensis*))), (*A. catabomba*, *A. lanei*)), (*A. scitula*, *A. columbiana*, *A. fastigata*, *A. thiemei*, (*A. longicornis*, *A. peruviana*))). *Argentinomyia* is placed in the tribe Bacchini, subtribe Melanostomatina. According to the strict consensus and preferred character state optimizations, *Argentinomyia* is a monophyletic group with *Melanostoma* as the sister genus. There are several synapomorphies for *Argentinomyia*, although all show reversals in at least a few species: 1) a bare area under the antenna; 2) elongated antenna, with scape much longer than wider, basoflagellomere usually elongated; 3) female front with a pollinose pattern; 4) face with transverse grooves, sometimes broadly punctuate and with iridescent reflections; 5) male genitalia with surstyli generally widened and apically irregular. At least seven well-recognizable species groups are characterized: *browni*, *tropica*, *crenulata*, *neotropica*, *maculata*, *lanei* and *longicornis*. A new key to all species is provided. New diagnosis, detailed distributional data, notes on the biology of some species, and illustrations of critical characters (photographs and drawings) are included to assist the identification.

RESUMEN

El género *Argentinomyia* Lynch Arribálzaga, 1891 (Syrphidae: Syrphinae: Bacchini), se revisó taxonómicamente y se condujo un análisis filogenético. La monofilia y composición filogenética interna de *Argentinomyia* y taxa relacionadas son reconstruidas basado en caracteres morfológicos de los adultos. El grupo interno incluyó 26 especies disponibles de *Argentinomyia*. Catorce especies de *Melanostoma*, *Platycheirus*, *Tuberculanostoma*, *Talahua* and *Xanthandrus* (todos Bacchini) fueron usadas como grupo externo. *Trichopsomyia antillensis* Thompson (Pipizini) fue seleccionada para enraizar la filogenia. El análisis de 70 caracteres filogenéticamente informativos produjo un único cladograma más parsimonioso (L=120 pasos, CI=65, RI=90) con la siguiente topología para el grupo interno (*A. altissima*, (*A. rex*, (*A. browni*, (*A. bolivariensis*))), (*A. octomaculata*, (*A. tropica*, *A. luculenta*)), (*A. opaca*, *A. rugosonasa*, ((*A. crenulata*, *A. testaceipes*))), (*A. nigrans*, (*A. lineata*, (*A. neotropica*, *A. pollinosa*))), ((*A. currani*, *A. maculata*), (*A. praeusta*, *A. jamaicensis*))), (*A. catabomba*, *A. lanei*)), (*A. scitula*, *A. columbiana*, *A. fastigata*, *A. thiemei*, (*A. longicornis*, *A. peruviana*))). *Argentinomyia* se ubica en la tribu Bacchini, subtribu Melanostomatina. De acuerdo con el consenso estricto y la optimización de caracteres, *Argentinomyia* es un grupo monofilético con *Melanostoma* como género hermano. Hay varias sinapomorfias para *Argentinomyia*, a pesar de que todas muestran reversiones en al menos pocas especies: 1) un área desnuda debajo de la antena; 2) antena elongada, con el escape más largo que ancho, basoflagelómero usualmente elongado; 3) frente de las hembras con un patrón de pollinosidad; 4) cara con ranuras transversales, algunas veces ampliamente puntuada y con reflexiones laterales iridiscentes; 5) genitalia del macho con el surstilo generalmente ancho e irregular apicalmente. Al menos siete grupos de especies bien

reconocibles fueron caracterizados: *browni*, *tropica*, *crenulata*, *neotropica*, *maculata*, *lanei* and *longicornis*. Una nueva clave para todas las especies es provista. Para ayudar en la identificación, se han provisto: una nueva clave, diagnosis, datos detallados de distribución, notas sobre la biología de algunas especies, e ilustraciones de caracteres críticos (fotografías y dibujos).

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If you trust in Nature, in the small Things that hardly anyone sees and that can so suddenly become huge, immeasurable; if you have this love for what is humble and try very simply, as someone who serves, to win the confidence of what seems poor: then everything will become easier for you, more coherent and somehow more reconciling, not in your conscious mind perhaps, which stays behind, astonished, but in your innermost awareness, awakeness, and knowledge.

Rainer Maria Rilke, 1903

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Phylogenetic Analysis and Taxonomic Revision of the Neotropical Genus *Argentinomyia*

Lynch Arribálzaga, 1891 (Diptera: Syrphidae)

1. Introduction

1.1. The Family Syrphidae

The flower flies are one of the most speciose families of Diptera. The greatest species richness is in the Neotropical Region with about 1800 described to date, and a high number waiting to be discovered and described (Thompson *et al.* 1976, Thompson 1981, 1999b; Thompson *et al.* 2010; Montoya *et al.* 2012). Despite the high biodiversity, the fauna remains poorly known due to the absent of an adequate and comprehensive taxonomic treatments as well as the lack of phylogenetic analyses for most taxa.

Adults of most species are associated with flowers, feeding on nectar and pollen, and playing an important role as pollinators. The larvae exhibits a wide spectrum of feeding habits, including species phytophagous, saprofagous or entomophagous. Current classifications recognize 3 subfamilies and 14 tribes (Thompson & Rotheray 1998; Thompson *et al.* 2010). Recent studies of molecular and morphology evidence have supported the monophyly of Microdontinae and Syrphinae, whereas the monophyly of Eristalinae has been questioned (Rotheray & Gilbert 1999; Skevington & Yeates 2000; Ståhls *et al.* 2003; Hippa & Ståhls 2005).

Syrphinae comprises ~1800 species in more than 50 genera (Rojo *et al.* 2003). Adults are conspicuous and visit a variety of plants, without particular specificity. The larvae are mostly predaceous of Hemipteran pest (see Rojo *et al.* 2003 for a review). However, some species have subaquatic predator larvae, feeding on immature arthropods in bromeliads (Rotheray *et al.* 2000). Other groups are phytophagous and secondary leaf miners (Nishida *et al.* 2002), stem borers

(Zuijlen & Nishida 2009) or pollen feeders (Reemer & Rotheray 2005; Weng & Rotheray 2009). These associations are often so specialized and are thought to have promoted the group diversification and radiation.

In a recent molecular analysis the monophyly of the Syrphinae tribes was tested (Mengual *et al.* 2008) and the tribe Bacchini was resolved into several different clades. *Argentinomyia* was resolved as a sister group of the genus *Melanostoma* and *Xanthandrus* and formed a separate clade of the other Melanostomatini (Hull 1949a, b). The other members of Bacchini formed two resolved clades, which include *Platycheirus* Lepelletier & Serville 1828, *Syrphocheilosia* Stackelberg 1964, *Rohdendorfia* Smirnov 1924 and *Pyrophaena* Schiner 1860. The genus *Baccha* Fabricius 1805, the type genus of Bacchini, appears by itself as a sister group of the tribe Pipizini. This classification is followed and used as a guide for selecting out-groups taxa. In our analysis, we include species of the genera *Talahua* Fluke 1945 and *Tuberculanostoma* Fluke 1943 to infer the relationships with *Argentinomyia* and allied genera.

1.2. Taxonomic History of the Genus *Argentinomyia*

The genus *Argentinomyia* Lynch Arribálzaga, 1891 (Diptera: Syrphidae: Syrphinae: Bacchini) is a distinctive Neotropical group, and constitutes a diverse array of species with 31 described to date (Thompson *et al.* 1976; Thompson 1999b). Many species are distributed from Northern Mexico and the West Indies to Northeastern Argentina, and are present mostly throughout the high altitudes (elevations 1600-3600 masl), except in the Chilean subregion (Fluke 1945; Thompson *et al.* 2010).

Argentinomyia was described by Lynch Arribálzaga (1891) to accommodate the species *Argentinomyia testaceipes* and *A. grandis* (= *R. longicornis* Walker 1837), both from Argentina. His concept of the new genus was "...*Corpus angustum, elongatum, caput thorace paulo latius, pedes breves; antennae porrectae elongatae, alae fere omnino ut Pipizae*" which roughly translates to "narrow, elongated body; head and thorax of the same size; short legs; elongated antenna, wings almost as in *Pipiza*". Thus the new genus was characterized by elongated antennae. "The name *Argentinomyia*," must likely refers to silver flies or the Argentinian flies, in allusion to the author's country.

In his description, Lynch Arribálzaga noted differences between *Chrisotoxum* Meigen, 1803 (pedicel very short and the submarginal rib on abdomen straight) and *Paragus* Latreille, 1804 (eyes pilose and scape greatly elongated). He defined that the body size is similar to *Paragus* and the wings almost like in *Pipiza* Fallén, 1810 (Pipizini), but differing in the antennae shape. Lynch Arribálzaga recognized his new genus as member of the Tribe Psarini. However, for Hull's classification (1949a), *Argentinomyia* had inconsistent position within Bacchini, and proposed an apparent affinity to *Paragus* or close related to *Chrysotoxum*. Curran (1937), Fluke (1945, 1957) and Thompson *et al.* (1976) placed *Argentinomyia* in Melanostomatini.

Following Lynch Arribálzaga's (1891-1892) publications, and partly due to the lack of a precise definition, many species of *Argentinomyia* were described in different genera. Species belonging to *Melanostoma* Schiner, 1860 had short antennae, perpendicular or slightly protruding face, and narrower abdomen (Curran, 1937: 1; Fluke 1945: 11). *Rhysops* was established by Williston (1907: 2) for his species previously described in *Melanostoma* (*Melanostoma scitulum, rugosonatus, melanocerum*). His *Rhysops* was characterized by an

elongated antenna, with a pedicel longer than wider, scape and basoflagellomere also elongated, face with transverse ridges and grooves (Williston 1907: 2; Curran, 1937: 1; Fluke 1945: 2). In 1910, Coquillett selected *R. rugosus* Williston as the *Rhysops* genotype. "The name, *Rhysops*, "... was given in allusion to the peculiar transverse grooves of the typical species *R. rugosus* Williston (now *A. rugosus*) (Fluke 1945: 2). Subsequently, Curran (1925: 252) proposed *Braziliana* for *Melanostoma longicornis*, a species with elongated antennae but lacking well defined transverse facial grooves. The name *Braziliana* also includes *B. colombiana*, *B. vittitorax* (now *A. longicornis*), *B. peruviana* and *B. thiemei*. Finally, the name *Allograptina* Enderlein (1938: 226) was assigned to a single new species, *Allograptina octomaculata* from Mexico, characterized by a partially orange face, with the scutellum and the lateral margins to scutum yellow orange. Vockeroth (1969: 138) treated *Allograptina* as unrecognized genera, probably referable to Syrphini. Thompson *et al* (1976: 39) included it in unplaced species of Melanostomatini. The Species *Incertae Sedis* status (a Latin term meaning "of uncertain seat or affinity; used as a category of uncertain taxonomic position") was given by Thompson (1999a) to the genus group name *Allograptina*, because it was not placed in any tribe within the Syrphinae. Thompson (1999b: 338) after the examination of holotype of *A. octomaculata* concluded that head structure is clearly the typical of *Argentinomyia* species.

Curran (1937: 1-4) presented the first key to *Argentinomyia* and furthermore described new two species. His concept of *Rhysops* and *Melanostoma* was invariant from that of Williston's, Schiner's and Coquillett's. In his key, he used for the first time characters of antenna length and abdomen shape to separate *Rhysops*, *Xanthandrus* and *Melanostoma*.

In 1945, Fluke presented one of the most outstanding contributions regarding the *Argentinomyia*'s taxonomy. In the first part, he provided a new key to the genera and subgenera of Melanostomatini including new characteristics. Fluke separated *Melanostoma* subgenus *Carposcalis* Enderlein (now *Platycheirus*) by the presence of strong bristle on male pro-tibiae and the *Melanostoma* subgenus *Talahua* (Fluke 1945) by the large male genitalia, with surstyles and elongated cerci, nearly as long as the fourth tergite (Fluke 1945; 1957). Fluke noted particular variations in habitus and facial characteristics of some species, and therefore divided it into two species groups: *Rhysops* and *Melanostoma*. The *Rhysops* include species with elongated antenna, with a longer than wider pedicel, scape also elongated, usually as long as, and sometimes much longer than the basoflagellomere; the face often showed faint transverse grooves. Under *Melanostoma*, Fluke grouped species with a shorter antenna, short pedicel, and wider than longer; face at most with parallel sides or widened below. The species *Argentinomyia altissima*, *A. bolivariensis*, *A. browni*, *A. rex*, *A. luculenta* and *A. tropica* were included in this group (Fluke 1945: 11). Fluke's contribution greatly expanded the number of species included in *Argentinomyia* from 20 to 29, providing a key to 25 of them.

Curran and Fluke agreed that "the line that separate *Rhysops* and *Melanostoma* based on the antennal characteristics is not as well marked as one would like although there is no doubt that *Rhysops* can be kept as distinct from *Melanostoma*" and would have eventually a subgenus value (Fluke, 1957: 261). It is clear that the weak definition of both groups resulted in confusion, producing misidentification of species as the Curran's *Rhysops neotropica* and the subsequent description of *Melanostoma columella* by Fluke 1945 (Fluke 1957: 261). In order to delimit these groups, Fluke (1957) proposed a study based on male genitalia to clarify the generic concept of the Melanostomatini genera. Unfortunately for *Argentinomyia*, he left many

Melanostoma species without transversal grooves in the *Rhysops* group; consider only *A. rex* as member of *Melanostoma* (group 1). His concept of *Rhysops* grouped species with genitalia somewhat variable but with non-forked surstylus, generally short and triangular to rectangular superior lobes, often irregular in shape but never sickle-shaped.

A great contribution was made by Andersson (1970), who used for the first time the character of the greatly reduced metasternum (Fig. 2P), the thin and straight surstyles, and the squarish and not recurved superior lobes to separate *Melanostoma sensu lato* from the other Bacchini genera (2L). He also notes that in *Platycheirus*, the metasternum is fully developed, the male pro-tibiae are ornamented with strong bristles (Fig. 1F), and surstyles are bicornuate (Fig. 1J).

This new concept of *Melanostoma* was crucial to the new classification of Melanostomatini in accordance with that previously proposed by Wirth *et al.* (1965) and Vockeroth (1969) who considered Bacchini as a monogeneric tribe for *Baccha elongata* Fabricius 1805, with Melanostomatini comprising the other genera previously treated by Fluke (1945; 1957). In their book, the *Classification of the Central European Syrphinae*, Dusek and Laska (1967) included all these genera under Melanostomatini. Later, following Fluke's studies of male genitalia, Thompson (1972) and Shatalki (1975) proposed to divide Melanostomatini in two subtribes: Melanostomina and Platycheirina. Thompson includes *Argentinomyia* (as *Rhysops*) in Melanostomina. Rotheray and Gilbert (1989), considered *Baccha*, *Sphaerophoria*, *Platycheirus* and *Pyrophaena* as members of Bacchini, while Melanostomatini was formed only by *Melanostoma* and *Xanthandrus*. This group was supported by the larval analyses of Rotheray and Gilbert (1989, 1999), who suggested the tribe Melanostomatini for both genera.

In 1976, Thompson considered *Argentinomyia* as the senior synonym for *Aristosyrphus* Curran (Microdontinae) with *A. testaceipes* and *A. grandis* included in it as subgenus (Thompson *et al.* 1976: 57). The remaining *Argentinomyia* species were included in Melanostomatini (as *Rhysops*); (Thompson *et al.* 1976, Thompson 1981). Later, Thompson (1999b: 338) re-examined the type of *A. grandis*, and found it to be a synonym of *A. longicornis* (Walker, 1837) and also determined *A. testaceipes* Lynch to be the senior synonym of *Rhysops lopesi* (Fluke, 1945). This led him to reconsider the obviously erroneous synonymy *Argentinomyia* with *Aristosyrphus*. As a result, the species previously described in *Rhysops* and some of *Melanostoma* were transferred to *Argentinomyia*, the senior synonym.

Up to the date, *Argentinomyia* has received very poor taxonomic attention in the last fifty decades, with the most important contribution by Fluke (1945, 1957). The only available key to species is incomplete and descriptions for some species are lacking of sufficient details (Thompson 1981: 105). In addition, the numerous undescribed species and morpho-species identified from recent fieldwork works makes the genus highly problematic and reflects the urgent need for a revision (eg. Jorge *et al.* 2007; Thompson *et al.* 2010).

The available species of *Argentinomyia* are thus revised and the phylogenetic relationships among its species are reconstructed based on adults' morphology. According to the the resulting hypotheses, this study aims to define recognizable monophyletic groups on related genera, and to present a key for their identification. Redescriptions for 24 *Argentinomyia* species are given in this paper.

2. Material and Methods

2.1. Morphological Characters and Taxonomic Description

The descriptive approach and the morphological terminology employed throughout this study follows Vockeroth (1969; 1990); Speight (1987); Thompson (1972, 1999b); Hippa & Ståhls (2005); Mengual *et al.* (2009); Morales & Marinoni (2009); Cumming & Wood (2009), and Thompson *et al.* (2010). For specific structures such as head, thorax, wings, abdomen and male genitalia we adopted the terminology proposed by Fluke (1945, 1957), Thompson (1999b) and Cumming & Wood (2009). Synonymies in full, citations and other references are given in the description section follow the standards used by the BioSystematic Database of World Diptera (see Thompson 1999a).

External morphological characters were illustrated and measurement of specimens were completed at various magnifications using Leica MS5 and MZ16 stereomicroscopes (magnification 10-64x and 7-115x, respectively) equipped with an ocular graticule. Body length was measured from the front of the head (excluding antennae) to the tip of the abdomen. The wing was measured from the alar sclerites to the apex of the wing. The male genitalia were examined in an Olympus BX41 compound microscope (magnification 20-400x). Images of the habitus and specific structures were performed with a BK Lab System (Visionary Digital, Palmyra, VA, USA) imaging system using a Canon EOS-7D camera. Composite images were assembled using an Helicon Focus 4.16 (Helicon Soft Ltd @2007). Line drawings of internal structures were traced either from digital images taken through the Olympus BX41 compound microscope or from sketches produced with a *Camera Lucida* attached to it. Manual drawings were redrawn as a vector image using Adobe Illustrator (version CS3).

Male genitalia were dissected and cleared in a heated lactic acid solution (approximately 85%) for 10 to 15 minutes (Skevington & Marshall 1998). The clearing process was neutralized with glacial acetic acid, washed with alcohol (70%), and distilled water. The removed parts were rinsed in distilled water and then transferred to glycerin for examination under an optical microscope. All dissected parts were stored in plastic micro vials containing glycerin and attached to the pin supporting the remainder of the insect specimen.

Latin names of new taxa were derived using Brown (1956) and following International Commission on Zoological Nomenclature (ICZN 1999). Label data from each specimen were recorded and listed alphabetically according to country, state or province, and specific locality. As available, date of collection, collector, sex, and specimen depository were listed. The general localities are indicated in our distribution statement. Maps were generated from this data using Adobe Illustrator and Google Earth.

2.2. Examined Taxa

Twenty-seven described species of *Argentinomyia* were distinguished through the application of the phylogenetic species concept (*sensu* Wheeler and Platnick 2000). These species were included as the in-group taxa and are summarized in Table 1. In accordance with Nixon & Carpenter (1993) a broad representation of putative sister group taxa (out-groups) were selected following Thompson & Rotheray (1998); Mengual *et al.* (2008). Taxon sampling included 7 out of 12 Bacchini genera, with 14 species: *Baccha* Fabricius 1775, *Leucopodella* Hull 1949, *Melanostoma* Schiner 1860, *Platycheirus* Lepeletier & Serville 1828, *Talahua* Fluke 1945,

Tuberculanostoma Fluke 1943 and *Xanthandrus* Verrall 1901. *Melanostoma* represents the close relative of *Argentinomyia* according to Mengual *et al.* (2008). From the tribe Pipizini: *Trichopsomyia antillensis* Thompson, 1981 was selected to root the phylogeny.

2.3. Specimen Material

Specimens were obtained and examined from the following collections (abbreviations follow Thompson, 1999a):

AMHN - American Museum of Natural History, USA (David Grimaldi); BMNH - Natural History Museum [formerly the British Museum (Natural History)], UK (Nigel Wyatt); CEUA – Colección de Entomología de la Universidad de Antioquia, Colombia (Marta Wolff); CNC - Canadian National Collection of Insects, Arachnids and Nematodes, Canada (Jeff Skevington); ECO-TAP-E – Entomological Collection of the Unit San-Cristobal-de-las-Casas from El Colegio de la Frontera Sur, Mexico (Rémy Vandame and Philippe Sagot); FSCA - Florida State Collection of Arthropods, USA (Paul Skelley and Robert Woodruff); ICN – Instituto de Ciencias Naturales, Universidad Nacional de Bogotá, Colombia (Carlos Sarmiento); INBio - Instituto Nacional de Biodiversidad de Costa Rica, Costa Rica (Manuel Zumbado); MEPB - Museo Entomológico Piedras Blancas, Universidad de Antioquia, Colombia (Marta Wolff); MENT-UT - Museo de Entomología Universidad del Tolima, Colombia (Pedro Edgar Galeano); QCAZ - Museum of Zoology: Invertebrates, Ecuador (Alvaro Barragán); UNAB - Museo Entomológico de la Facultad de Agronomía, Universidad Nacional de Colombia, Colombia (Francisco Serna and Erika Vergara); UPRM - Invertebrate Collection, University of

Puerto Rico at Mayagüez, Puerto Rico (Carlos Santos). USNM - National Museum of Natural History [formerly United States National Museum], Smithsonian Institution, Washington, District of Columbia, USA (Wayne N. Mathis); WIRC – Wisconsin Insect Research Collection, Department of Entomology, University of Wisconsin -Madison, USA (Steven Krauth); ZMHB - Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (Joachim Ziegler).

2.4. Character Selection.

Seventy characters were obtained based on external morphology. The analyses included adult morphological characters previously published in literature as well as a number of newly recognized characters for *Argentinomyia* and other Bacchini. The characters included integument coloration, presence and attributes of hairiness, and structural characters of male genitalia. Characters of potential taxonomic importance within *Argentinomyia* were included to infer the relationships of the genus (Fluke 1945, 1957; Thompson 1972; Shatalki 1975; Speight 1987; Vockeroth 1990; Hippa and Ståhls 2005). The logical structure of characters follows Sereno (2007).

Table 1. List of 41 taxa (14 out-group, 27 in-group) included in the cladistic analysis of Bacchini, following classification proposed by Thompson *et al.* (1976) and Mengual *et al.* (2008) for genus- and species-level concepts and nomenclature.

Taxon	Taxon
Tribe Pipizini	Subtribe Melanostomina (continued)
<i>Trichopsomyia</i> Williston, 1888: 259	<i>Argentinomyia rugosonasa</i> Williston, 1891: 13
<i>Trichopsomyia antillensis</i> Thompson, 1981: 117	<i>Argentinomyia scitula</i> Williston, 1888: 264
Tribe Bacchini	<i>Argentinomyia testaceipes</i> Lynch Arribálzaga, 1891: 199
Subtribe Melanostomina	<i>Argentinomyia thiemei</i> Enderlein, 1938: 201
<i>Argentinomyia</i> Lynch Arribálzaga 1891: 199	<i>Argentinomyia tropica</i> Curran, 1937: 3
<i>Argentinomyia altissima</i> Fluke, 1945: 20	<i>Baccha</i> (Fabricius, 1775)
<i>Argentinomyia bolivariensis</i> Fluke, 1945: 19	<i>Baccha elongata</i> (Fabricius, 1775: 768)
<i>Argentinomyia browni</i> Fluke, 1945: 18	<i>Leucopodella</i> Hull 1949
<i>Argentinomyia catabomba</i> Williston, 1891: 12	<i>Leucopodella delicatula</i> (Hull, 1943)
<i>Argentinomyia columbiana</i> Enderlein, 1938: 202	<i>Leucopodella gracilis</i> (Williston, 1891)
<i>Argentinomyia crenulata</i> Williston, 1891: 12	<i>Melanostoma</i> Schiner 1860
<i>Argentinomyia currani</i> Fluke, 1937: 8	<i>Melanostoma mellinum</i> (Linnaeus, 1758)
<i>Argentinomyia fastigata</i> Fluke, 1945: 4	<i>Melanostoma scalare</i> (Fabricius 1794)
<i>Argentinomyia lanei</i> Fluke, 1936: 61	<i>Talahua</i> Fluke 1945: 22
<i>Argentinomyia lineata</i> Fluke, 1937: 9	<i>Talahua fervida</i> Fluke, 1945: 23
<i>Argentinomyia longicornis</i> Walker, 1836: 343	<i>Talahua</i> sp1. ALM
<i>Argentinomyia luculenta</i> Fluke, 1945: 17	<i>Xanthandrus</i> Verrall 1901: 53
<i>Argentinomyia maculata</i> Walker, 1852: 220	<i>Xanthandrus bucephalus</i> Wiedemann, 1830: 126
<i>Argentinomyia neotropica</i> Curran, 1937: 4	<i>Xanthandrus nitidulus</i> Fluke, 1937: 7
<i>Argentinomyia nigrans</i> Fluke, 1945: 8	Subtribe Platycheirina
<i>Argentinomyia octomaculata</i> Enderlein, 1938: 226	<i>Platycheirus</i> Lepeletier & Serville 1828:
<i>Argentinomyia opaca</i> Fluke, 1945: 10	<i>Platycheirus ecuadoriensis</i> (Fluke 1945)
<i>Argentinomyia peruviana</i> Shannon, 1927: 7	<i>Platycheirus scutatus</i> (Meigen, 1822)
<i>Argentinomyia pollinosa</i> Hull, 1942: 10	<i>Tuberculanostoma</i> Fluke 1943: 425
<i>Argentinomyia praeusta</i> Loew, 1866: 155	<i>Tuberculanostoma antennatum</i> Fluke 1943: 426
<i>Argentinomyia rex</i> Fluke, 1945: 21	<i>Tuberculanostoma browni</i> Fluke, 1943: 429

2.5 Phylogenetic Analysis.

The matrix data was constructed in ASADO version 1.85 (Nixon, 2008). The character matrix was compiled, edited and refined using the matrix and tree interfaces in ASADO (Nixon, 2008). The characters were numbered based on their sequence of appearance in the taxonomic descriptions. Some characters were coded as inapplicable entries ("–") for the out-group because they were informative and restrictive to particular species groups. Additive multistate coding was preferred only for states that appeared to represent an evolutionary transformation series (Lipscomb, 1992). Lastly, species level autapomorphies were excluded from the matrix (though see Yeates, 1992).

The most parsimonious cladogram and character state optimizations were identified in a comprehensive search strategy using the parsimony ratchet (Nixon, 1999) as implemented in TNT (Goloboff *et al.* 2008) and spawned out of ASADO, based on the following commands: (1) ratchet settings – 200 iterations per replication, 4% up-/down-weighted; (2) drift settings – 100 iterations per replication; (3) tree fusion settings – 10 rounds, 200 MB max RAM; (4) general settings – 1000 tree to hold; (5) analyses – ratchet, drift, sectorial search, tree fusion, TBR-max; and (6) xmult settings – 3 hits, and 5 consensus. The results were identical to those of a more traditional ratchet parsimony island search (Maddison, 1991; see also Franz, 2006). The resulting cladograms, and character state transformations were examined in ASADO under various optimization schemes. After the analysis, if more than one parsimonious cladogram was found, a strict consensus cladogram (Nelsen) was generated and saved with the resulting cladograms. Bremer branch support values (Bremer, 1994; Brower, 2006) were calculated in NONA (Goloboff, 1999) with the commands hold 25000, suboptimal 15, and bsupport 15.

3. Systematics of the Neotropical Tribe Bacchini (Diptera: Syrphidae: Syrphinae)

Members of Bacchini are defined within the Syrphinae by 1) black face and scutellum; 2) a short, rather simple unsegmented aedeagus, with the basal portion bearing a strong swelling posterior process; and a tube-like on the apical portion (Dusek & Laska 1967; Thompson 1972; Shatalki 1975; Vockeroth 1990; Young *et al.* in preparation). The aedeagus in species of other Syrphinae tribes are clearly unsegmented or, if it is unsegmented, it is complex, as in the Syrphini (Vockeroth 1969).

The tribe species may be defined as follows: Syrphidae with bare postpronotum, with the 5 tergite visible in dorsal view of the male, parallel-sided or narrowly oval abdomen. If there is an petiolate abdomen (basally slender and distinctly broadened apically) then there is an anterior flat part of the anepisternum without erect fine hairs (as in *Leucopodella*); notopleura generally with a prominent tubercle (except in *Tuberculanostoma*); abdomen with a variable set of orange or white metallic maculae; wings with vein R4+5 straight, without a distinct loop into cell r4+5; metafemur without spinose setae (Vockeroth 1990). The cross vein (r-m) well before the middle of discal cell, calypter and plumule well developed, wings generally hyaline or tinged brownish or with faint clouds at cross veins or at the apex (Fluke, 1945; Thompson 1972).

The variable structure male genitalia in Bacchini has resulted in incorrect interpretation and a broadened taxonomic concept of this tribe. Thus, the tribe has been synonymized with Melanostomatini but has also been treated as a separate tribe (Williston 1887; Hull 1949a; Dusek & Laska 1967; Vockeroth 1969; Thompson 1972; Shatalki 1975; for a complete revision see Mengual *et al.* 2008). Vockeroth (1969) discussed a classification with a union of the two tribes or perhaps a division of Bacchini into several tribes.

Based on Fluke's study (1957), Thompson (1972) divided Melanostomatini into two genera groups: the *Melanostoma* group was characterized by the triangular or quadrate superior lobes, no sickle-shaped; elongated, usually no forked surstyli and simple male legs. The group includes the genera *Melanostoma* Schiner, *Rhysops* Williston, *Xanthandrus* Verral, *Talahua* Fluke and *Tuberculanostoma* Fluke and *Pyrophaena* Schiner (part *granditarsus* Forester). Under his *Platycheirus* group, Thompson included species with a sickle-shaped superior lobes, forked surstyli, and modified male protibia. This group comprised *Platycheirus* Lepeletier and Serville, *Carposcalis* Enderlein (a *Platycheirus* subgenus) and *Pyrophaena* Schiner (part *rosarum* Fabricius). *Leucopodella* Hull was not included in either group.

Using male genitalia characters, Shatalkin (1975) suggested two subtribes for Melanostomatini (Melanostomina and Platycheirina) and placed *Baccha elongate* (Fabricius, 1775) as the unique member of Bacchini. The main characteristics he found to define Bacchini were: simple (without capsule) aedeagus; superior lobes with a massive tooth oriented ventrally on the posterior margin (probably homologous to that in *Melanostoma*); hypandrium double-sectioned incision, similar to those of *Melanostoma* and *Leucopodella*; complete or sclerotized postmetacoxal bridge (a character shared with some *Leucopodella* species).

According to Shatalki (1975), Melanostomina are characterized by a narrow hypandrium, and an erect superior lobe directed towards the opening of the aedeagus (Dusek & Laska 1967); the superior lobes are triangular or quadrate, not sickle-shaped; elongated surstyli, usually not forked; and simple male legs. In addition, the hypandrium has a tooth on the inner surface oriented dorsally; the basal part of aedeagus with two sclerites, which however, did not undergo

independent development into the capsule. Melanostomina comprises *Leucopodella* Hull, *Melanostoma* Schiner, *Tuberculanostoma* Fluke and *Xanthandrus* Verral.

Subtribe Platycheirina comprises species with a wide hypandrium and the sabre-shaped superior lobe directed from the aedeagus and opening posteriorly, a thickened and often hood-shaped aedeagus (Dusek & Laska 1967); forked surstyles; lingula present in most species; simple aedeagus or with distinctive a capsule. Platycheirina thus includes *Platycheirus*, *Pseudoplatycheirus* Doesburg, *Pyrophaena* Schiner, *Rohdendorfia* Smirnov and *Spathiogaster* (= *Spazigaster*) Rondani.

Andersson (1970) made important contributions to the definition of *Melanostoma sensu lato*. He found that metasternum is greatly reduced in *Melanostoma* (Fig. 2P), while in *Platycheirus* it is fully developed. These characters as well as the male pro-tibiae ornamented with strong bristle (Fig. 1F) and surstyle bicornuate were determinant to differentiate *Platycheirus* (Fig. 1J). This new concept of *Melanostoma sensu lato* was crucial to the new Melanostomatini classification.

In the revision of the Nearctic species of *Platycheirus*, Vockeroth (1990) considered the species of *Carposcalis* as synonym of *Platycheirus* and suggested that the Neotropical genus *Tuberculanostoma* Fluke 1943 should perhaps be included in *Platycheirus*. Young *et al.* (in preparation) formally synonymized *Tuberculanostoma* under *Platycheirus* based on molecular analysis and the overall morphological similarity between the two genera, as noted by Vockeroth (1990).

Leucopodella is a Neotropical genus containing ten described species. The last revision of Hull (1949a: 101-104, couplets 8-9, 12-28) includes a key to all the species under *Baccha* (mostly *Ocyptamus*). The large number of *Ocyptamus* species (222 out 300) together with *Leucopodella* result in bad interpretations and difficulties in the species identification due to numerous errors in the key. A new key to described species in addition to five undescribed was given by Thompson (1981: 193). The use of characteristics such as micotrichia on wing, alula size and the level of postmetacoxal bridge sclertization were considered by him as “of great specific vaule”. *Leucopodella* was included in Melanostomatini by Thompson *et al.* (1976) and posterior in Bacchini by Thompson (1981: 103). Alberto Carvalho, UFPR (in preparation) is currently conducting a phylogentic analysis of *Leucopodella*.

In his review of *Xanthandrus*, Fluke (1937), presented the first key including characters of facial shape, abdominal pattern and shape. In a more recent study, a new diagnosis for *Xanthandrus* was provided: species with a larger body size, elliptic, wide and flat abdomen (Verral 1901), confluent antennal cavity, a bare arista, central portion of the epistoma moderately prominent (Lundbeck 1916), face narrow (Curran 1937) and longer and wider surstyles (Fluke 1958). This paper includes a new key, diagnosis, illustrations, and characters of female and male genitalia (Borges & Pamplona 2003). In addition, *Xanthandrus biguttatus* (Hull, 1945) was synonymized under *A. longicornis* (Walker, 1837).

Talahua Fluke 1945 was described as subgenus of *Melanostoma* considered distinctive within his genus concept by the large male genitalia; elongate surstyles and cerci, nearly as long as the fourth tergite (Fluke 1945; 1957). Later Thompson *et al.* (1976) and Thompson (1999b)

gave *Talahua* the full generic status. Material obtained from recent expeditions suggests that the genus include undescribed species and consequently it is not monotypic.

In the neotropics, larvae of *Platycheirus* (*Carposcalis*) sp. have been reported as predators of aphids *Diuraphis noxia* (Kurdjumov), (Rojo *et al.* 2003), while *Xanthandrus bucephalus* (Wiedemann, 1830) has been reported to feed on larvae of Lepidopterans *Altinote ozomene nox* (Bates, 1864), (Duque *et al.* 2011). *Melanostoma mellinum* (Linnaeus 1758), the unique member of *Melanostoma* in the Neotropical region has been considered as an important aphidophagous agent in Europe (Rojo *et al.* 2003). However, records of plesiomorphic larvae of *Melanostoma* and some *Platycheirus*, have suggested a preference to be generalized predators in the leaf litter rather than specific aphid predators (Rotheray and Gilbert 1989).

Lima (1946) recorded *Argentinomyia berthae* Lima 1946 feeding on eggs of *Centrolenella eurygnatha* Lutz (Anura: Hylidae). However, no hosts are known for the others *Argentinomyia* species as well as for *Leucopodella*, *Tuberculanostoma* and *Talahua*. Key for immature states is only available for *Melanostoma*, *Platycheirus* and *Xanthandrus* (Rotheray and Gilbert 1989, 1999; Thompson *et al.* 2010).

A key to Adults of the Neotropical genera of Bacchini is provided. Type's species-group names are given below.

3.1. Key to the Neotropical Genera of Bacchini

Adapted from original description according to Fluke (1945, 1957); Vockeroth (1990); Thompson (1999b; 2008); Marinoni *et al.* (2007); Thompson *et al.* (2010).

1. Abdomen distinctly petiolate, petiolate much narrower than thorax (Fig. 2E); face with an indistinct tubercle, flat (Fig. 2A), postmetacoxal bridge complete (Fig. 2M)..... ***Leucopodella***

Hull, 1948e: 94. Type species, *Baccha lanei* Curran, 1936, original designation.

- Abdomen parallel-sided or narrowly oval (Figs. 1E, H; 2F-G); face with tubercle (Figs. 1B-D; 2B-C), postmetacoxal bridge incomplete, with a membranous area ventro-posterior to metacoxal base..... 2

2. Antennal cavity confluent (Fig. 2N); metathoracic pleuron with fine subappressed pile ventral to spiracle; katapisternum with pile patches continuous anteriorly; metacoxa with tuft of a few hairs at posteromedial apical angle (Fig. 2R)..... ***Xanthandrus***

Verral, 1901:316. Type-species, *Musca comptus* Harris designated by Coquillett, 1910a: 62.

- Antennal cavity separated (as in Figs. 1A-D; 2A, C-D); metathoracic pleuron bare; katapisternum with pile patches usually broadly separated throughout..... 3

3. Metasternum greatly reduced, with deep posterior incisions lateral so that sclerotized portion consists of a median diamond-shaped area with narrow anterior and lateral strips (Fig. 2P); face not produced below, straight with small tubercle; facial pruinosity neither punctate nor rippled (Fig. 2D); male legs slender, without bristles, hair tufts or modified hairs; surstyles generally straight, ejaculatory hood funnel-shaped (Fig. 2L)..... ***Melanostoma***

Schiner, 1860: 213. . Type-species, *Musca mellina* Linnaeus, 1758, original designation.

- Metasternum no greatly reduced, with median portion broadly joined to lateral arms; face variable, almost straight in profile with weak tubercle or moderately to strongly produced

forward ventrally, sometimes with pruinescence forming punctate or rippled pattern (fig. 1B); male legs sometimes modified, with special bristles, pile tufts of modified hairs (fig. 2F); surstyles generally straight, ejaculatory hood funnel-shaped (Figs. 1J, K, M)..... 4

4. Face greatly produced anteriorly, with a very prominent and abrupt tubercle, sparsely pollinose and without punctate shiny (bare) maculae; head as long as or longer than high; posterior tubercle with plumose-like bristles (fig. 1C); surstyles crescent-shaped, ejaculatory hood elongate and knobbed at apex (Fig. 1K); small species, entirely dark, 7 mm or less..... *Platycheirus (Tuberculanostoma)*

Fluke, 1943:425. Type-species, *Tuberculanostoma antennatum* Fluke, 1943, original designation.

- Face straight or slightly produced anteriorly, with a low and indistinct tubercle, frequently densely pollinose and with small shiny punctate-like bare maculae (fig. 1B); head higher than long (fig. 1B); posterior tubercle with simple bristles; frequently medium to large flies, with pale colored markings (fig. G)..... 5

5. Face frequently produced anteriorly, densely pollinose and sometimes with pruinosity forming a punctate or rippled pattern; antenna always short, scape never more than twice as long as broad (Figs. 2B); male legs at least with strong black setae on protibia (fig. 1F); abdomen with silvery-grey pollinose maculae; superior lobes crescent-shaped (fig. 1J-M)..... *Platycheirus (Carposcalis)*

Enderlein, 1938, 199. Type-species, *Syrphus stegnus* Say, 1829, original designation.

- Face straight in profile, not produced anteriorly, usually uniformly pollinose, rarely with shiny (bare) punctate maculae (fig. 2C; 5A-L); antenna frequently long, with scape much longer than broad (Fig. 2C; 5A-L); male legs simple; abdomen frequently with pale-colored maculae (fig. 2G)..... 6

6. Antennae shorter, the scape broader than long, basoflagellomere also short and slightly oval (fig. 2C); arista bare; scutellum with a deep groove next to the rim (emarginate) (Fig. 2S); metacoxa with pile posteromedially on apical angle (fig. 2O); male genitalia large, with the superior lobes elongate and surstyles three to four times longer than wide (fig. 2K); large species, 11 to 12 mm..... ***Talahua***

Fluke, 1945: 22. Type-species: *Talahua fervidum* Fluke, 1945, original designation.

- Antenna frequently long, with scape much longer than broad (Fig. 5A-L), basoflagellomere usually elongate; arista with pile evident, sometimes bare; scutellum without a deep groove next to the rim (no emarginate) (Fig. x); metacoxa bare posteromedially (fig. x); superior lobes triangular to irregular in shape (fig. x)..... ***Argentinomyia***

Lynch Arribálzaga, 1891: 199 (40). Type-species, *Argentinomyia testaceipes* Lynch Arribálzaga, 1981, monotypy.

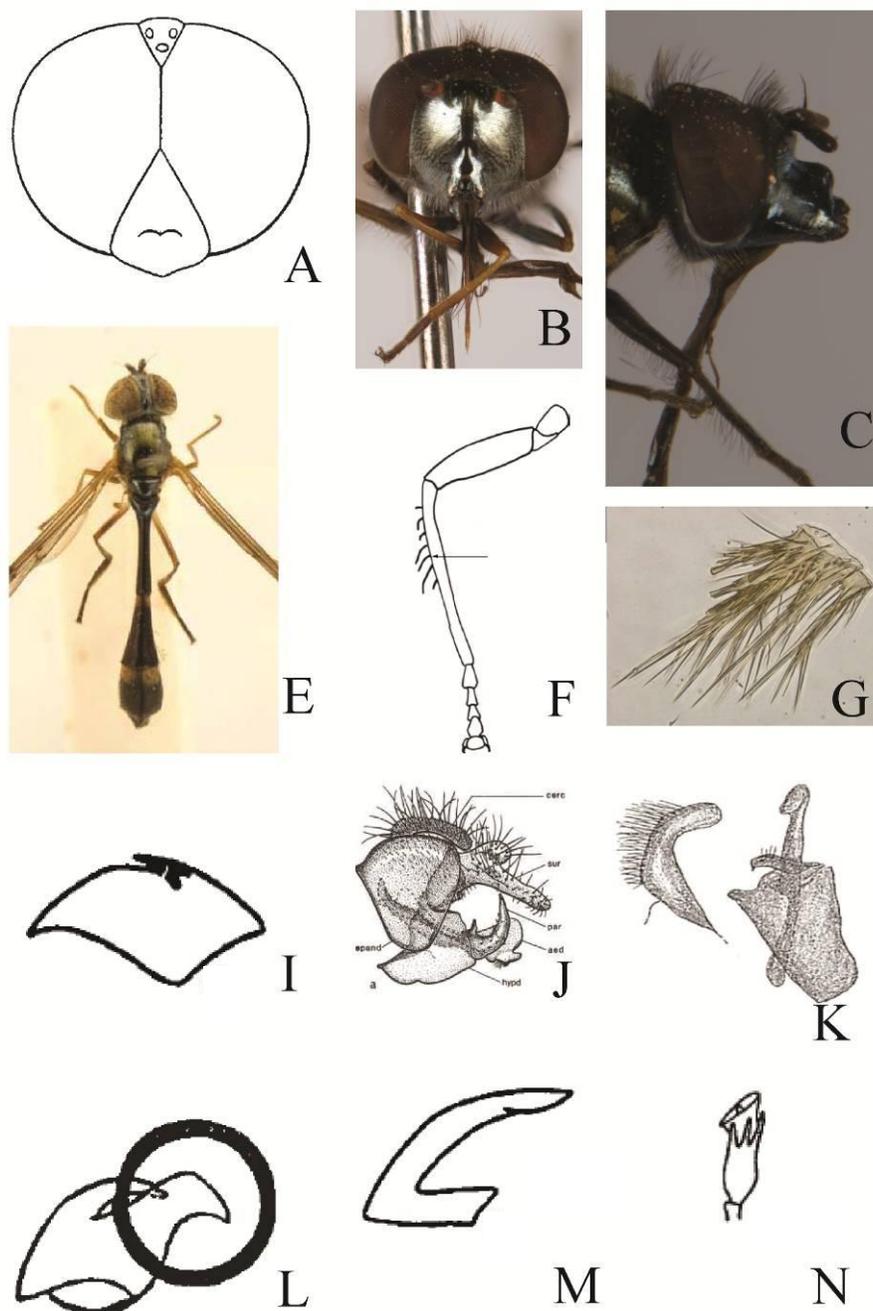


Figure 1. Selected out-group genera. *Baccha*: A. Head frontal view; E. Habitus of male; I. Male genitalia L. Surstylus. *Platycheirus*: B. Head frontal view; F. Male anterior leg; J. Male genitalia; M. Surstylus. *Tuberculanostoma*: C. Head lateral view; G. Posterior thoracic tubercle with plumose-like bristles; K. Male genitalia; N. Aedeagus. Figures A, L from Coe (1953: 9, fig. 3A, 3C); F from Marinoni et al. (2006: 157, fig. 39); J from Vockeroth (1969: 765, fig. 83); K from Fluke (1957: 278, figs. 124-125); I, M, N from Shatalkin (1975: 118, fig. 12, 120, fig. 18-17).

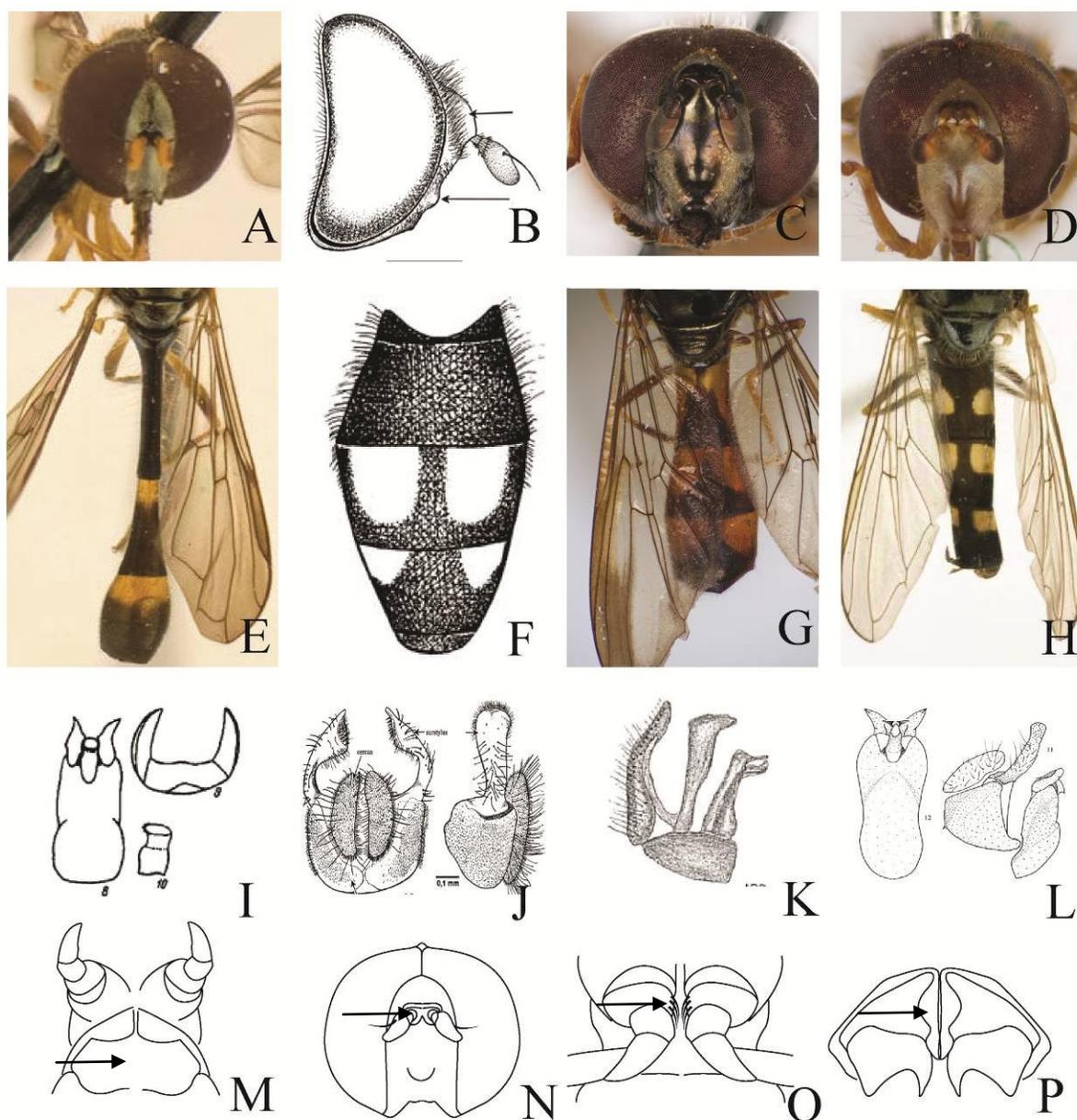


Figure 2. Selected out-group genera. *Leucopodella*: A. Head frontal view; I. Male genitalia; M. Postmetacoxal bridge completely esclerotized; Q. Head lateral view. *Xanthandrus*: B. Head lateral view; F. Abdomen dorsal view; J. Male genitalia; N. Antennal cavity confluent; R. Katepisternum with pile patches continuous anteriorly; S. Scutellum with a deep groove next to the rim. *Talahua*: C. Head frontal view; G. Abdomen dorsal view; K. Male genitalia; O. Metacoxa with pile posteromedially on apical angle. *Melanostoma*: D. Head frontal view; H. Abdomen dorsal view; L. Male genitalia; P. Metasternum greatly reduced. Figure I from Shatalkin (1975: 118, fig. 8-10), J from Borges & Pamplona (2003: 159, figs. 12-13), K from Fluke (1957: 278, figs. 123).

4. Results.

4.1. Redescription of *Argentinomyia* Lynch Arribálzaga 1891.

Argentinomyia Lynch Arribálzaga 1891: 199 (40). Type-species: *A. testaceipes* Lynch Arribálzaga 1891 by monotypy. Fluke 1945: 1-30 (key reference, description, distribution); Fluke, 1957: 261-279 (male genitalia); Thompson *et al.* 1976: 46 (catalogue), Thompson, 1981: 105 (desc. notes, distribution); Thompson, 1999b: 325 (key to *Argentinomyia sensu lato*), 327 (key to *A. octomaculata*), 338 (status notes); Marinoni *et al.* 2007: 149-150 (descript., key, illustrations); Mengual *et al.* 2009: 3, 5, 13, 15, 18 (citation, morphological characters, phylogenetic analysis); Thompson *et al.* 2010 (key reference, description, distribution).

Rhysops Williston, 1907: 2. Type-species: *Melanostoma rugosonatus* Williston, by subsequent designation (Coquillet 1910: 610). Proposed for "... *Melanostoma scitulum*, *rugosonatus*, *melanocerum*, etc.". Thompson 1999b (synonyms).

Braziliana Curran, 1925: 252. Type-species: *Melanostoma longicornis* Williston by original designation = *Pipiza longicornis* Walker 1836. Enderlein, 1938: 201 (catalogue).

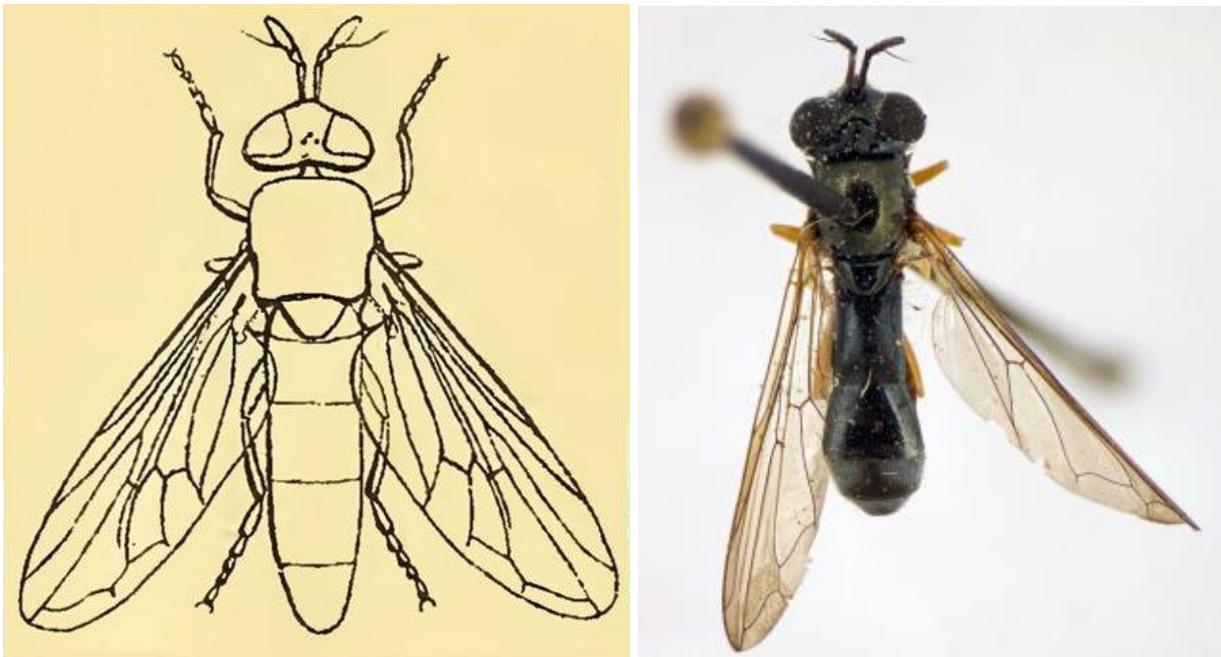
Allograptina Enderlein, 1938: 226. Type-species: *Allograptina octomaculatus* Enderlein by original designation. Vockeroth 1969: 138 (catalogue); Thompson *et al.* 1976: 39 (catalogue); Thompson 1999b: 338 (status notes); Thompson *et al.* 2010, 779, couple 84 (key to *A. octomaculata*).

Length from 4.9 mm to 10.5 mm.

Description (Adapted from Fluke 1945: 2)

Male. *Head.* Medium, as wide as the thorax and abdomen; face black, straight, sometimes slightly produced below, usually with yellowish or whitish pollinosity, densely pollinose or sometimes with pruinosity forming a punctuate pattern with iridescent to coppery

reflections; tubercle small, only slightly prominent, generally low, with a bare and shining area below the antennal cavity (Figs. 5 & 6), face often with transverse grooves (Figs. 5J-V & 6I-X); gena narrow; front not swollen, in female with pollinosity above antennal insertion sometimes forming a complete transversal fascia or two rounded spots; antennal cavity separated; eye bare; holoptic in male, with eyes contiguity as long as ocellar triangle; antenna partially yellow, at least below the basoflagellomere (except completely black in *A. crenulata*, *A. opaca* and *A. rex*), antenna generally long, with scape much longer than wide, pedicel wider than long; basoflagellomere slightly elongate, generally longer than the pedicel (Fig. 5I, S-V, 6 J-K, V-X); arista dorso-basal, bare or with some microscopic pubescence.



Figures 3-4. *Argentinomyia testaceipes* Lynch Arribálzaga habitus, dorsal. From Lynch Arribálzaga (1891: 269, Plate, fig. 4).

Thorax. Postpronotum bare, mesonotum black to brown, without any yellowish lateral region (except in *A. octomaculata*); scutum black, usually shining or subshining, covered with green coppery to blue pollen, hairs on thorax blackish or yellowish; notopleura generally with a prominent tubercle; scutellum black, subtriangular, apice rounded, without a deep emargination, but with about three to four transversal rugose lines, sometimes with longer black setae in the posterior margin; subscutellar fringe present; pleura usually lightly pollinose; katepisternal pile patches broadly separated throughout; metathoracic pile patch absent; metasternum bare and fully developed; postmetacoxal bridge incomplete; legs simple; plumula simple, short. *Wing.* Hyaline, sometimes with a transverse brown-tinted bands on the anterior half, membrane entirely microtrichose or partly bare on basal portion of wing (extensively bare basally in *A. catabomba*), alula narrow, about as wide as cell CuP.

Abdomen. Nearly parallel-sided to scapulated in male, slightly oval in female; maculae on tergum vary in size and shape between tergites, usually with 1-5 pairs of yellowish or occasionally bluish metallic maculae, tergum II about two times longer than wide, generally with lateral long yellow pile (Figs. 7-10); sterna no reduced, usually the 6th tergum golden in male.

Male genitalia. Usually short reaching the posterior margin of 5th sternum; typical syrphine form; cercus slightly elongate, and apically widened; surstylus short, no more than two times longer than wide (except longer in *A. rex*), narrow basally, generally widened apically; lingula absent; aedeagus unsegmented, generally swollen ventrally toward tip; superior lobe variable, triangular to irregular in shape, with a pair of tooth in the inner surface, oriented dorsally in addition to a ventral extension; eyaculatory apodeme spades suit-shape (Figs. 11-12).

Etymology. *Argentinomyia* is derived from the Latin *argentinus* referring of silver, silvery or probably it refer to the country's name where the type-genus species was collected, Argentina, and the Latin suffix *myia*, denoting fly (Brown 1956: 45, 543). It refers to the silver flies or the Argentinian flies. Thus the name likely refers to the country's author where the holotype was collected. According to the article 30.1.3 of the International Code of Zoological Nomenclature (ICZN 2000), *Argentinomyia* must be treated as feminine, thus all new names derived from it are feminine.

Comparative diagnosis. Normal sexual dimorphism in *Argentinomyia* includes the male being holoptic, having a black front with tawny pollinose or white, with a more linear to scapulated abdomen; female eyes are dichoptic, having a broad, shiny black median vitta on the frons varied from a complete transversal black fascia or two black brownish rounded maculae or non, abdomen generally oval.

Argentinomyia is a genus of relatively medium sized (4.9 - 10.5 mm), recognized among the syrphines (subfamily Syrphinae, tribe Bacchini) by this combination of characters: 1) a bare area under the antenna; 2) elongated antenna, with scape much longer than wide, basoflagellomere usually elongate; 3) female front with a pollinose pattern; 4) face usually with transverse grooves, sometimes broadly punctate and with iridescent reflections; 5) male genitalia with surstyles generally widen and irregular apically (Fluke 1957). While a few species lack pollinose pattern in the female front as in *browni* clade, when is present the patterns show a complete transversal black fascia or two black brownish rounded maculae.

Species of *Argentinomyia* may resemble those of *Melanostoma* Schiner, 1860, but in *Melanostoma* the antenna is short, with scape and basoflagellomere as long as wide; female front

without a pollinose pattern (Figs 2D, H, L, P); metasternum greatly reduced (Andersson 1970; Vockeroth & Thompson 1987); female sternum 1-5 with a black median line; male genitalia with surstyles generally thin, straight and uniform (Fluke 1957)

Argentinomyia is similar to *Talahua*, but can be distinguished by the presence of low tubercle with a bare area below the lunula; facial carine sometimes with transversal grooves (Fig. x); scutellum without a deep groove next to the rim (emarginated in *Talahua*); metacoxa bare posteromedially (pilose in *Talahua*); abdomen with parallel sides to scapulated, usually black with distinct paired of yellow, orange or metallic maculae (fig. x). Abdominal maculae of *Talahua* are generally broad (Figs 2 C, G, K, O, S).

Biology. Although the natural history of *Argentinomyia* is not well known, Lima (1946) recorded *Argentinomyia berthae* Lima 1946 feeding on eggs of *Centrolenella eurygnatha* Lutz (Anura: Hylidae). However, given that this species was not found in the collections consulted (Depositary institution: Coleção da Escola Nacional de Agronomia, Rio de Janeiro, Brazil) and the observation of larval habitus has not been corroborated, it could not be the real larval habitat of the genus and they would be probably aphids predators as the other related genera. Dr. Wirth in 1958 collected larva of *A. longicornis* on *Chamaedorea elegans* leaf (Arecaceae), probably the host plant of its prey. No other biological details have been recorded about *Argentinomyia* larval habits.

In Colombia and Ecuador, adults of *Argentinomyia* have been collected visiting flower of "lion's tooth" *Taraxacum officinale* Weber ex F. H. Wigg (Asteraceae), *Buddleja coriacea* J. Rémy (Scrophulariaceae) and *Baccharis* sp (Asteraceae), *Aloysia triphylla* Paláu (Verbenaceae). All species recorded in altitudes above 2900masl.

Distribution. *Argentinomyia* is distributed from northern Mexico and the West Indies to northeastern Argentina, at elevations ranging from 500 m to over 3600 m, except in the Chilean subregion (Fluke 1945; Thompson *et al.* 2010). Most species occur in forest, with some species common in open habitats, and some species in open páramo. The highest diversity is in Nova Teutonia, Brazil, where at least 13 species are known (Fig. 15.). However, this region has had extensive sampling effort (Marinoni & Thompson 2003), and the true diversity in poorly sampled areas such as the Ecuadorian, Peruvian and Colombian Andes are probably higher than current records suggest. In recent years, expeditions conducted in Costa Rica and the Andes of South America have revealed the existence of at least 20 undescribed species.

New diagnosis, detailed distributional data, notes on the biology of some species, and illustrations of critical characters (photographs and drawings) are included to assist the identification. A new key is proposed for the species of *Argentinomyia*. Twenty-four *Argentinomyia* species are redescribed and listed in a phylogenetic order.

4.2. Species Descriptions

Argentinomyia altissima Fluke, 1945

Figures 5A, 6A, 7A, 9A, 11A.

Melanostoma altissima Fluke, 1945: 20, holotype male – Ecuador: Imbabura, Cuicocha (AMNH). – Fluke, 1945: 20, figs. 48 & 49 (abdomen),

Rhysops altissimum Fluke 1957: 276, figs. 95 & 96 (male genitalia). **Syn. nov.**

Rhysops altissimus Thompson *et al.* 1976: 42 (catalogue). **Syn. nov.**

Differential diagnosis. Very similar to *bolivariensis*, but facial pile of male is mostly black. Legs more extensively black. Abdominal maculae are entirely different, almost as wide as long, maculae on 3rd terga of male quadrate and on female triangular.

Description. Male. Head. Face black, nearly perpendicular, tubercle low yet broad, mid-stripe broad, shining and bare; sides of face, front above shining black arc, and the narrow band below antennae mostly black, yellow only on lower slopes; gena shining black with thin, more whitish pollen, pile white; ocellar triangle black with thin yellowish pollen, pile black; occiput with yellow hairs above, long cilia black, pollen and pile paler below; antennae reddish yellow, scape darker, basoflagellomere darkened above, scape and pedicel about as long as basoflagellomere; arista long and black, pilose.

Thorax. Black, mesonotum shining obscured by brown pollen, with two median whitish pollinose vittae on anterior half, pile long and mostly black; pleura also coated with brownish pollen which is whitish posteriorly, yellow pilose; scutellum with long black hairs with some very short golden hairs intermixed, fringe long and yellow. *Wings.* Hyaline, stigma yellow; calypter whitish, border whitish, fringe yellow; plumula white; halteres yellow, knob brown.

Legs. More extensively black, protibia mostly brownish with a dark median ring, brownish pilose.

Abdomen. Abdominal maculae wider, almost quadrate, reaching less than 1/2 length of 3rd and 4th tergum; on 2nd tergum shows evidences of narrow elongate maculae; sterna yellowish, yellow pilose; pile of genitalia black, male genitalia as figured (Fig. 11A).

Female. Differs from *bolivariensis* only in the darker legs and triangular abdominal maculae; on 2nd tergum with a pair of elongate oval maculae; 3rd and 4th tergum with triangular maculae; 3rd with inner margins parallel, their outer margins converging, separated from lateral margins; smaller maculae on 5th tergum. According to Fluke (1945), maculae are quite similar to the common North American species *P. pictipes* Bigot.

Types: Holotype male, **ECUADOR:** Cuicocha, Imbabura, 0°18'26.11"N, 78°21'0.09"W, 3200m, V-27-1939, F.M. and H. Brown (AMNH). Paratypes: **ECUADOR:** Cuicocha, Imbabura, 0°18'26.11"N, 78°21'0.09"W, 3200m, V-27-1939, F.M. and H. Brown, 2♂ (AMNH).

Non-type material: **COLOMBIA:** Bogota, 4°35'34.39"N, 74°4'51.66"W, 2700m, III-25-1937, Osorno, 1♂ (in the collection of F. M. Hull). **ECUADOR:** Cotopaxi, 0°46'23.99"S, 78°32'58.84"W, 3200m, 16-1993, A. Salazar, 1♂ (QCAZ); Pichincha, Guayabamba, 0°3'33.75"S, 78°20'29.42"W, 2200m, in Asteraceae *Baccharis* sp, I-27-2000, P. Jimenez, 1♂ (QCAZ); Pichincha, Quito, Yuruqui, 0°13'53.88"S, 78°32'23.16"W, 2900m, in Asteraceae *Baccharis* sp, Gloria Correa, VI-1-1986, 1♂ (QCAZ); Quito, 0°13'53.88"S, 78°32'23.16"W, 2870m, in Scrophulariaceae *Buddleja coriacea* "Quisuar" Buddlejaceae, G. Paz & Miño, 3♂ (QCAZ); Quito, VII-8-1984, L. Coloma, 1♂ (QCAZ).

Etymology. The specific epithet is derived from the Spanish *altisima* that means very high. It refers to the high altitudes of Andes where the species is distributed.

Length. (2): body, 8.2-8.9 mm; wings, 7.7-8.1 mm.

Distribution: Colombia, Ecuador.

***Argentinomyia bolivariensis* Fluke, 1945**

Figures 5B, 6B, 7B, 9B, 11B.

Melanostoma bolivariensis Fluke, 1945: 19, holotype male – Ecuador: Bolivar, Hacienda Talahua (AMNH). – Fluke, 1945: 19, figs. 29 (head), 45 (abdomen).

Melanostoma bolivariensis Fluke, 1957: 277, figs. 97-98 (male genitalia).

Rhysops bolivariensis Fluke 1957: 266 (catalogue). **Syn. nov.**

Rhysops bolivariensis Thompson *et al.* 1976: 42 (catalogue). **Syn. nov.**

Differential diagnosis. A dark species with even brown yellowish pollen on face except near antennae. Thorax black pilose on notopleuron and in the area above postalar callus. Abdominal maculae more slender, elongate, about two and one-half times as long as wide on 3th tergum, female abdomen generally black, at most with small reddish maculae.

Description. Male. Head. Face black, nearly perpendicular, projecting forward only slightly, tubercle low but elongate, slopes evenly brown pollinose and yellow pilose, mid-stripe broad, shining and bare; sides of face, front above shining black arc, and the narrow band below antennae thickly golden pollinose, pile of face yellow; front thickly covered with brown pollen

and black pile except on shining arch above antennae; gena thinly whitish pollinose and white pilose; ocellar triangle very thinly brownish pollinose, pile black; cilia black; occipital pile and pollen yellow, becoming white below; antennae reddish, scape darker and basoflagellomere black on upper half; arista black, pilose.

Thorax. Black, mesonotum semi-shining metallic; covered with brown pollen and brownish pile of various lengths, tips black, with two median whitish pollinose vittae on anterior half; pile long and yellow becoming black along sides; pleura also coated with brownish pollen which is whitish posteriorly, yellow pilose, only black pilose on notopleuron and area above postalar callus; scutellum with long black hairs, some very short golden hairs intermixed, fringe long and yellow. *Wings.* Hyaline, stigma yellow; calypter whitish, border brown, fringe yellow; plumule white; halteres yellow, knob dark.

Legs. Pro and mesoleg brownish to black, profemora brownish basally and yellow on apical 1/2; metafemora and tibiae yellow apically; basal two segments of metatarsus and basal 1/2 of metatibia reddish to yellow, brownish pilose. In teneral specimens pro and metalegs often entirely yellow. Pile inconspicuous, long hairs yellow.

Abdomen. Narrow, black with two pairs of narrow lineal reddish side maculae; maculae on 3rd tergum reaching from base to apical 1/2, maculae on 4th tergum smaller, reaching from base to apical 1/3; white pollen on maculae; abdomen shining along sides; pile pale; sterna yellowish, with a broad, median, black vitta, yellow pilose; pile of genitalia yellow, male genitalia as figured (Fig. 11B).

Female. Similar to male but differ in the facial pollen somewhat paler; frontal pollen with a transverse band on lower 1/2, with a distinct depression, upper 1/2 nearly bare; front at vertex about two and one and a half times as wide as ocellar triangle. Mesonotal pile sparse and much shorter. Abdominal maculae often absent but when present, they show clearly reddish dashes converging posteriorly. Legs more extensively yellow, metafemur often yellow on basal 1/4.

Types: Holotype male, **ECUADOR:** Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939. F.M. & H. Brown (AMNH). Allotype, female, same data. Paratypes: **ECUADOR:** Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. & H. Brown, 22♂ and 23♀ (AMNH); Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. & H. Brown, 1♂ and 1♀ (USNM58848); Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. & H. Brown, 9♂, 9♀ (WIRC).

Non-type material. COLOMBIA: Antioquia, Belmira, Paramo de Belmira, 6°39'17.29"N, 75°40'10.99"W, 3240m, II-5- 2009, A.L. Montoya, 1♂ (CEUA)

Etymology. The specific epithet is derived from the Province's name in Ecuador where the species was collected, Bolivar, and the Latin suffix *-ensis* denoting place, locality, country, or belonging to, pertaining to (Brown 1956: 45, 303).

Length. (4): body, 7.1-8.5 mm; wings, 8.6-9.3 mm.

Distribution: Colombia, Ecuador.

***Argentinomyia browni* Fluke, 1945**

Figures 5C, 6C, 7C, 9C, 11C.

Melanostoma browni Fluke, 1945: 18, holotype male – Ecuador: Bolivar, Hacienda Talahua (AMNH). – Fluke, 1945: 18, figs. 27 (antenna), 28 (head), 44 (abdomen).

Melanostoma browni Fluke, 1945: 18.

Rhysops browni Fluke 1957: 266 (catalogue). **Syn. nov.**

Rhysops browni Thompson *et al.* 1976: 42 (catalogue).

Differential diagnosis. A elongate species with face perpendicular, carinate, the sides thickly golden pollinose. Pro and mesofemora and tibiae yellow.

Description. Male. Head. Face black, nearly perpendicular, projecting forward only slightly, tubercle low yet broad, carinated above, mid-stripe broad, shining and bare; sides of face, front above the shining black arc, and a narrow band below antennae thickly golden pollinose; pile of face yellow, of front black; gena shining black with thin, more whitish pollen, pile white; ocellar triangle black with thin yellowish pollen, pile black; occiput with yellow hairs above, long cilia black, pollen and pile paler below; antennae reddish yellow, scape darker, basoflagellomere darkened above, scape and pedicel about as long as basoflagellomere; arista long and black, pilose.

Thorax. Black, mesonotum shining obscured by brown pollen, with two median whitish pollinose vittae on anterior half, pile long and yellow becoming black alongside; pleura also

coated with brownish pollen which is whitish posteriorly, yellow pilose; scutellum with long black hairs with some very short golden hairs intermixed, fringe long and yellow. *Wings.* Hyaline, stigma yellow; calypter yellow, border brown, fringe yellow; plumule yellow, halteres yellow, knob dark.

Legs. Pro and mesoleg entirely yellow, except metafemora brown on apical 2/3, yellow pilose becoming black apically; metatibia black to brown apically, brown pilose; tarsus brownish apically, pile sparse, long, black on dark areas.

Abdomen. Long and slender, black with three pairs of *lineata* yellow maculae, maculae on 2th tergum separated from base, sides, and apex; maculae on 3rd tergum reach from base to apical 5/6; maculae on 4th tergum similar but reaching only to apical 1/2, all isolated from sides; pile long and yellow on sides but black and shorter posteriorly; sterna yellowish, with a broad, median, black vitta, yellow pilose; male genitalia as figured (Fig. 11C).

Female. The females may be indistinguishable from *bolivariensis*, and Fluke strongly suspect that some of females listed under later species may be *browni*, but none of them exhibit rather low but sharp ridge of face above tubercle and they are also shorter.

Types: Holotype male, **ECUADOR:** Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. & H. Brown (AMNH). Paratypes: **ECUADOR:** Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. & H. Brown, 12♂ (AMNH); Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100-3219m, IV-28-1939, F.M. & H. Brown, 1♂ (CNC 1973); Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. & H. Brown, 1♂ (USNM58849); Bolivar, Hacienda

Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939 F. M. & H. Brown, 4♂ (WIRC).

BRAZIL: Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, 1938-1952, F. Plaumann, 8♂ (BMNH).

Non-type material. COLOMBIA: Antioquia, Belmira, Paramo de Belmira, 6°39'17.29"N, 75°40'10.99"W, 3240m, II-5- 2009, A.L. Montoya, 1♂ (CEUA). Thompson *et al.* (1976) recorded the species from Colombia.

Etymology. The name is in honor of Dr F. Martin & H. Brown, who spent part of their life collecting flies in South America, particularly in Ecuador.

Length. (3): body, 9.5-10 mm; wings, 8.9-9.1 mm.

Distribution: Brazil, Colombia, Ecuador.

***Argentinomyia rex* Fluke, 1945**

Figures 5D, 6D, 7D, 9D, 11D

Melanostoma rex Fluke, 1945: 21, holotype male – Ecuador: Bolivar, Hacienda Talahua (AMNH). – Fluke, 1945: 21, figs. 32 (head), 50 (abdomen).

Melanostoma rex 1958: 277, figs. 93 & 94 (male genitalia).

Rhysops rex Thompson et al. 1976: 44 (catalogue). **Syn. nov.**

Differential diagnosis. A large species with protruding face, which is carinate above tubercle. Thorax black pilose on notopleuron and in the area above postalar callus. Antennae black. Abdomen with lineal yellow maculae. Surstyles three to four times longer than wide.

Description. Male. Head. Face black, sides of face broadly, and front except shining arc above antennae, yellow to golden pollinose; face with a very broad stripe free of pollen, and with a median sulcus just below antennae; pile black except for yellow hairs on lower slopes of face, and lower occiput; gena thinly, black pilose; ocellar triangle with golden pollen and long black hairs, cilia black; oral tips protruding well forward and downward, tubercle broad and long; a very prominent triangular rugose area on slopes of face opposite tubercle; antenna black, scape longer than pedicel, shorter than basoflagellomere, entirely black; arista black, pilose.

Thorax. Black, mesonotum semishining, with golden pollen, with black and yellow hairs intermixed, nearly all black along sides, with two median gray pollinose vittae on anterior half; pleura yellowish white pollinose, yellow pilose, black pilose on notopleuron and area above postalar callus; scutellum shining but with a thin coating of golden pollen, with long black hairs, with a few shorter yellow hairs intermixed, fringe long and yellow. *Wings.* Hyaline, stigma yellow, calypter yellow, border brown, fringe brown; plumule, halteres yellow, knob darkened.

Legs. Black; pro and metafemora yellow, except basal 1/4 to 1/3 brownish; pro and metatibia yellow except a preapical dark ring; metafemur on underside near apex also yellowish; pro and metatarsus reddish yellow on apical segments; pile mostly black, with a few yellow hairs toward bases of femora.

Abdomen. Elongate, slender, black; 2nd to 4th tergum each with a pair of narrow yellow side maculae, maculae on 2nd entirely isolated from base and apex, maculae on 3rd reach base and extend to apical 1/5, maculae on 4th similar and extend to apical 1/3; sterna yellowish, with a broad, median, black vitta; male genitalia as figured (Fig. 11D).

Female. Very similar, legs much paler; pro and mesofemora and tibiae yellow; metafemur yellow except for a dark streak on outside near apex, in some specimens most of metafemur dark. Pile on mesonotum not so long, fewer black hairs.

Type: Holotype, male, **ECUADOR:** Hacienda Talahua, Bolivar, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. and H. Brown (AMNH); Allotype, female, same data. Paratypes: **ECUADOR:** Hacienda Talahua, Bolivar, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. and H. Brown, 14♂ and 8♂ (AMNH); Bolivar, Hacienda Talahua, 1°21'0.00"S, 79°3'60.00"W, 3100m, IV-28-1939, F.M. & H. Brown, 2♂ and 1♀ (USNM58846).

Etymology. The specific epithet is derived from Greek *rex* meaning king, (Brown 1956: 306), and it probably refers to the large size of this species.

Length. (4): body, 10.2-11.5 mm; wings, 8.8-9.4 mm.

Distribution: Ecuador.

Argentinomyia octomaculata Enderlein, 1938

Figures 6E, 9E.

Allograptina octomaculata Enderlein, 1938: 226, holotype female (ZMB). – Thompson 1999b: 51 (Species incertae sedis status); Thompson *et al.* 2010, 779, couple 84 (key to *A. octumaculata*).

Allograptina octamaculata Vockeroth 1969: 138 (catalogue).

Allograptina octamaculata Thompson *et al.* 1976: 39 (catalogue).

Argentinomyia octamaculata Thompson 1999a: 338 (status notes).

Differential diagnosis. Face, scutellum and pleuron partially pale in color, usually yellow or yellowish-brown in ground color. Face without transversal grooves. Abdomen with a pairs of long, apically rounded maculae on 2nd-4th terga.

Description. Female. Head. Face orange, perpendicular, tubercle low, covered with whitish pollen, yellow whitish pilose, mid-strip shining and bare; front whitish pollinose, with a broad opaque band just below ocelli, gradually fading into white pollen in depression, pile brownish; gena orange more thinly white pollinose and thinly white pilose; ocellar triangle grey metallic, black pile; occiput smooth, yellow pilose; antennae yellow brownish, scape and pedicel about as long as basoflagellomere, basoflagellomere darkened on upper 1/2 and at apex; arista reddish, darker toward tip, pilose.

Thorax. Grey to brown orange, mesonotum grey-blue semishining, grey pollinose, white pilose; with two median gray pollinose vittae on anterior half; pleura yellowish white pollinose, yellow pilose, yellow on prostpronotum, supracoxa, middle region of anepimeron, dorsal surface

of katepisternum, katatergum, anatergum and postalar callus yellow orange; scutellum blue shining, brown on disc and orange on posterior margin, with two long yellow hairs and short yellow pile in last one; fringe short and yellow. *Wings*. Hyaline yellow ocher, slightly brownish on apex, stigma yellow ocher; calypter white yellowish, border yellow, fringe yellow; plumule white, halteres white rust, knob white.

Legs. Pro and metalegs brown yellow, yellow pilose; metafemur brownish except yellowish on underside near base and above apex; metatibia yellowish on basal 1/6; tarsus extensively brownish, pile mostly black, with a few yellow hairs toward bases of femora; metabasitarsomere long.

Abdomen. Oval, 1st tergum brown with base and lateral sides yellow; 2nd tergum with brownish-orange, elongate, apically rounded, lateral maculae along outer portion of tergum; 3rd and 4th tergum with two elongated oval maculae, reaching the apical 2/3 of tergum respectively; 5th tergum with slightly smaller maculae that begin at the base; sterna yellowish, black pilose.

Male. Unknown.

Types: Holotype, female, **MEXICO**: Deppe S. (ZMB 4012).

Non-type material: **MEXICO**: Sinaloa, El palmito, 23°33'44.25"N, 105°50'13.57"W, 1923m, VIII-3-1964, W.R.M. Mason, 1♀ (CNC).

Etymology. The specific epithet is derived from the Greek *okto* meaning eight (Brown 1956: 568), and the Latin *macula* meaning spots, stain, mark (Brown 1956: 502), and it refers to the characteristic eight maculae on abdomen of this species.

Length. (2): body, 7.5-8.3 mm; wings, 7.2-7.7 mm.

Distribution: Mexico

***Argentinomyia luculenta* Fluke, 1945**

Figures 5E, 6F, 7E, 9F, 11E.

Melanostoma luculentum Fluke, 1945: 17, holotype male – Ecuador: Tungurahua: Baños, 2300m. (AMNH). – Fluke, 1945: 17, figs. 26 (head), 46 (abdomen).

Melanostoma luculentus Thompson 1976: 43 (catalogue).

Differential diagnosis. Closely related to *tropica* Curran. Pro and mesotibia and femora yellow, metafemur dark. Facial pollen smooth and yellowish. Abdomen with *lineata* maculae. It is close to *tropica* but has darker metalegs and the face is more prominent. On *luculenta*, the metafemur is extensively brown; face is slightly produced below. Front blue-black with a broad transverse golden pollinose band in the depression, the pile black. Pile of thorax long and yellowish on a background of thin brownish pollen. Abdominal maculae similar to the female of *tropica*, except on 3rd and 4th tergum, where they reach to the apical 1/3 and 1/2, respectively.

Description. Male. Head. Face slightly protruding, tubercle low and elongate, covered with whitish yellow pollen and pile, a broad shining black facial carina 1/3 the width of face which does not quite reach the antennae; front with more brownish pollen, two rough areas just above the antennae shining, pile black; gena more thinly white pollinose and thinly white pilose;

ocellar triangle black with black pile; occiput very thin, the cilia black; occiput with yellow hairs above, the long cilia black, pollen and pile paler below; antennae yellow, scape slightly longer than pedicel, the first two about as long together as the basoflagellomere, basoflagellomere darkened on upper 1/2 and at the apex; arista reddish, darker toward the tip, pilose.

Thorax. Black, mesonotum shining coated with brownish golden pollen, yellow pilose; with a broad, median, light brown vittae on anterior half; yellow pilose; pleura yellowish white pollinose, yellow pilose; scutellum shining, with long yellowish to black hairs, with a few shorter yellow hairs intermixed, fringe long and yellow. *Wings.* Cinereous, with a slight smudge at the apex; the stigma dark brown; calypter yellow, border black, fringe black; plumule white; halteres yellow, knob darker.

Legs. Yellow to brownish, pro and mesofemora brownish except yellowish on upper side toward the apex; a dark streak on upper side of metafemora toward the apex, narrowly yellow at the base, yellow pilose, black on darkened areas; pro and mesotibia brownish basally, yellow on apical 1/2; all tarsus extensively brownish, pile mostly black.

Abdomen. Black with three pairs of *lineata* yellow side maculae, maculae on 2nd tergum reaching from almost the base to the apical 1/6, maculae on 3rd reaching from the base to the apical 1/5, on 4th reaching the apical 1/3, maculae on 2nd and 3rd tergum widen at the base nearly to the side margins but are not very distinct; pile long and yellow alongside on anterior 1/2, shorter and black apically; sterna mostly shining, with a broad median black vitta, which is interrupted at the incisures; male genitalia as figured (Fig. 11E).

Female. Facial pollen more golden; front shining black with a broad yellow pollinose band in the depression, pile black. Pile of thorax and scutellum much shorter and all yellowish. Legs paler, procoxae yellow, the tarsi mostly yellowish red, only the mid-segments of prolegs and apical segments of metapair brownish. Abdomen with four pairs of yellow maculae, on 2nd tergum spreading out on sides and converging posteriorly, an additional pair of fasciate maculae on 5th tergum.

Type. Holotype, male, **ECUADOR:** Tungurahua, Baños, 1°15'48.70"S, 78°33'57.91"W, 2300m, VII-21-1939, W.C. Macintyre (AMNH). Allotype: **ECUADOR:** Tungurahua, Baños, 1°15'48.70"S, 78°33'57.91"W, 2300m, VII-21-1939, W.C. Macintyre, 1♀ (AMNH). Paratype: **ECUADOR:** Tungurahua, Pondoá, 1°19'5.11"S, 78°28'38.72"W, 2800m, VII-17-1939, W.C. Macintyre (AMNH).

Non-type material. COLOMBIA: Antioquia, Guarne, Vereda Piedras Blancas, 6°16'19.91"N, 75°26'35.52"W, 3240m, I-15-2008. A.L. Montoya, 1♀, (CEUA 47449). **ECUADOR:** Pichincha, Guayabamba, 0°3'32.59"S, 78°20'29.21"W, 2200m, Asteraceae *Baccharis* sp, I-27-2000, P. Jimenez, 1♀ (QCAZ); Pichincha, Quito, 0°13'0.00"S, 78°30'60.00"W, 2870m, in Scrophulariaceae *Buddleja coriacea* "Quisuar" Buddlejaceae, IV-19-1984, G. Paz & Miño, Det. Vockeroth, 1986, 2♀ (QCAZ); Pichincha, Quito, 0°13'0.00"S, 78°30'60.00"W, 2810m, in Verbenaceae *Aloysia triphylla*, I-27-2000, C. Enriques, 1♀ (QCAZ)

Etymology. The specific epithet is derived from the Latin *luculentus* meaning full of light (Brown 1956: 499), and it probably refers to the anterior legs and facial pollen full yellowish.

Length. (5): body, 8.8-10.2 mm; wings, 8.5-9.2 mm.

Distribution: Colombia, Ecuador

***Argentinomyia tropica* Curran, 1937**

Figures 5F, 6G, 7F, 9G, 11F.

Melanostoma tropicus Curran, 1937: 3, holotype male – Brazil: Sao Paulo, Campos do Jordao. (AMNH).

Melanostoma tropicum Frey, 1946: 157 (catalogue).

Rhysops tropicus Thompson 1976: 44 (catalogue). **Syn. nov.**

Differential diagnosis. A black species with face perpendicular, the sides thickly coated with cinereous yellow pollen. Abdomen with three pairs of reddish maculae. Legs reddish, metalegs mostly brown, reddish on basal 1/2. It is similar to the female of *luculentum*. On *tropicum*, however, the metafemur yellow on basal 1/2; face more perpendicular and less produced below. Front blue-black with a broad transverse golden pollinose band in the depression, pile black. Pile of thorax short and yellowish on a background of thin brownish pollen. Abdominal maculae similar to female of *luculentum*, except on 3rd and 4th tergum, where they reach to apical 1/3 and 1/2, respectively.

Description. Male. Head. Face almost perpendicular, tubercle low but distinct, narrowly separated from the anterior oral margin; sides of face thickly cinereous yellow pollinose, the median $1/5$ shining black and not at all ridged or grooved, pile pale yellowish; gena cinereous shining with thin, more whitish pollen, pile white; ocellar triangle brownish yellow pollinose with a shining, roughened area above the antennae, pile black; vertical triangle thinly brownish pollinose and blackish pilose; occiput cinereous pollinose, pile whitish, the upper occipital cilia fine and black; antennae reddish, basoflagellomere brown above and apically; basoflagellomere $1/2$ longer than wide as long as the basal two segments combined; antennae reaching to a little below the middle of face; arista brown, pilose.

Thorax. Aeneous, mesonotum shining, yellow pilose; with a pair of very broad, narrowly separated pale pollinose vittae in the middle on anterior half and in some lights with thin brownish pollen; pleura mostly thinly grayish brown pollinose, yellow pilose; scutellum shining, with long yellowish to black hairs, with a few shorter yellow hairs intermixed; fringe long and yellow. *Wings.* Cinereous hyaline with luteous tinge; stigma luteous; calypter brown, border brown, fringe white; plumule white, halteres orange, knob darker.

Legs. Reddish to orange, pro and mesolegs yellow; metafemora brown, except reddish on almost the basal $1/2$, pile reddish, black on brown portions and on apical segments of tarsi.

Abdomen. Long and slightly spatulate, being narrowest at the end of 2nd tergum and widest at the end of 3rd; black with three pairs of reddish maculae shining with the sides and anterior border obscurely reddish, on 2nd tergum opaque black with the lateral $1/6$ reddish, on 3rd tergum opaque black with maculae extending from the base to the apical $1/4$, gently tapering posteriorly and broadly separated from the lateral margins by a sub-shining stripe; maculae on

4th tergum extend to the apical 1/3 and the posterior margin is broadly subshining; 5th tergum very short and wholly shining; pile short and black, long and yellowish on sides of 1th and 2th and basal 1/2 of 3rd tergum; sterna metallic brownish red with mostly black pile; genitalia mostly brownish red and with thin yellowish brown pollen; male genitalia as figured (Fig. 11F).

Types. Holotype, male, **BRAZIL:** Sao Paulo, C. do Jardao, 23°33'57.43"S, 46°38'1.25"W, 189m, I-23-1936, F. Lane (AMNH). Paratype, **BRAZIL:** Sao Paulo, C. do Jardao, 23°33'57.43"S, 46°38'1.25"W, 189m, I-23-1936, F. Lane, 1♂ (AMNH).

Non-type material: **ARGENTINA:** Tucuman, Burreyacu, Quebrada La Toma de Tafi viejo, 26°29'57.93"S, 64°44'30.99"W, 526m, XII-21-1950, R.A. Golbach, 3♂ (WIRC); Tucumán, Villa Nougés, 26°50'60.00"S, 65°22'59.99"W, 1426m, R.K. I-1929, 2♀ (WIRC). **BRAZIL:** Sao Paulo, C Jordão, 23°33'0.69"S, 46°35'4.08"W, 761m, I-10-1936, F. Lane, 2♂, 1♀ (WIRC); Parana, Ponta Grossa, 25°11'14.12"S, 50° 8'38.03"W, 867m, IX-1945, P. Machado, 1♀ (WIRC). **ECUADOR:** Baños, 1°23'54.39"S, 78°25'59.44"W, 2300m, VII-21-1939, W.C. Macintyre. **MEXICO:** Chiapas, San Cristoban de las Casas, L. C. Huitepec, 16°44'3.64"N, 92°42'5.73"W, 2510m, II-26-2011, P. Sagot, 1♂, 1♀ (ECO-TAP-E).

Etymology. The specific epithet is derived from the Latin *tropicus* meaning turning, solstice (Brown 1956: 815), and it probably refers to the species distribution.

Length. (4): body, 8.6-10.1 mm; wings, 8.6-9.0 mm.

Distribution: Argentina, Ecuador, Brazil, Mexico.

***Argentinomyia opaca* Fluke, 1945**

Figures 5G, 6H, 7G, 9H, 11G.

Rhysops opaca Fluke, 1945: 10, holotype male – Ecuador: Chimborazo, Urbina, Cerro Chimborazo (AMNH). – Fluke, 1945: 10, fig. 15 (head).

Rhysops opaca Fluke, 1958: 279, figs. 115 & 116 (male genitalia).

Rhysops opacus Thompson, 1976: 44 (catalogue). **Syn. nov.**

Differential diagnosis. A small, entirely black species, only bases of tibiae reddish. Face perpendicular with a prominent tubercle, with no transversal grooves.

Description. Male. Head. Face shining black, sides of face, front and gena lightly dusted with white pollen; pile of face and gena white, of front black; face nearly perpendicular with a large, well-rounded tubercle, deeply concave above tubercle; ocellar triangle shining black, with black pile in front and brownish pile near occiput; cilia black, occipital yellow pilose below; antennae black, scape longer than pedicel, shorter than basoflagellomere, which is shorter than first two combined; arista black, pilose.

Thorax. Black; mesonotum shining; with a pair of faint brownish pollinose vittae on anterior half in some lights with thin brownish pollen, pile long and brownish yellow; pleura mostly thinly grayish brown pollinose, yellow pilose; scutellum shining, pile mixed with short and long yellowish hairs, fringe short and yellow. *Wings.* Hyaline, stigma yellowish brown;

calypter black, border brownish, fringe yellow brownish; plumule yellow, halteres black, knob reddish.

Legs. Black, all tibia reddish on basal 1/4 to 1/3, femora reddish apically, but there is no sharp demarcation of colors; pile sparse and pale.

Abdomen. Opaque black, shining area along sides somewhat resembling elongate side maculae; pile long and yellow on sides, very short, black and appressed on discs; sterna extensively black shining; male genitalia black, yellowish pilose, genitalia as figured (Fig. 11G).

Female. Head. On each side of ocellar triangle a shining spot devoid of pollen and pile; frontal pile black with a few pale hairs in the triangular side dust maculae. Mesonotal pile shorter and paler; in front of scutellum brownish pollen can be observed in certain lights. Two pale setulose hairs on rim of scutellum. Legs sometimes somewhat more extensively red.

Types. Holotype, male, **ECUADOR:** Urbina, Cerro Chimborazo, 1°29'31.14"S, 78°44'58.01"W, 3650m, IV-18-1939, F.M. and H. Brown (AMNH). Allotype, female, same data. Paratypes: **ECUADOR:** Urbina, Cerro Chimborazo, 1°29'31.14"S, 78°44'58.01"W, 3650m, IV-18-1939, F.M. and H. Brown, 6♂ and 15♀. (AMNH); Urbina, Cerro Chimborazo, 1°29'31.14"S, 78°44'58.01"W, 3650m, IV-18-1939, F. M. and H. Brown, 1♂ and 2♀ (USNM58845); Urbina, Cerro Chimborazo, 1°29'31.14"S, 78°44'58.01"W, 3650m, IV-18-1939, F. M. and H. Brown, 3♂ and 2♀ (WIRC).

Non-type material. ECUADOR: El Tambo, Canar, 2°30'30.75"S, 78°55'31.66"W, 2800-2990m, VII-3-1965, Pena, Det. J. R. Vockeroth, 2♂, 1♀ (CNC112211, CNC112212,

CNC112213). Pichincha, Quito, Cutuglagua, 0°0'56.57"N, 78°32'40.13"W, 2810m, V-7-2001, D. Alvarado, 1♀ (QCAZ).

Etymology. The specific epithet is derived from Latin *opacus* meaning shady, obscure or dim (Brown 1956: 574), and it refers to entirely black body of this species.

Length. (4): body, 5.2-6.5 mm; wings, 5.3-5.7 mm.

Distribution: Ecuador

***Argentinomyia rugosonasa* Williston 1891**

Figures 5H, 6I, 7H, 9I, 11H.

Melanostoma rugosonassus Williston, 1891: 13, holotype male –Mexico: Guerrero, Omiltemi (BMNH). – Fluke, 1945: 7 (redescription), fig. 6 (head).

rugonassus, Aldrich, 1905: 361; Williston, 1907:2, Coquillett, 1910a: 601, misspellings.

Rhysops rugonassus Williston, 1907: 2.

Rhysops rugonassus Coquillett, 1910: 13

Rhysops rugosonassus Fluke, 1958: 269, 279, figs. 6, 15 & 130 (male genitalia).

Rhysops rugosonassus Thompson 1976: 44 (catalogue).

Argentinomyia rugosonassus Thompson *et al.* 2010: 767, fig. 23 (head, male, lateral view).

Differential diagnosis. A dark species with a flat face, which has about six or seven transversal grooves, a large oval median vitta is shining, but the rest of face is whitish pollinose. Scape and pedicel a little longer than basoflagellomere. Notopleural tubercle very prominent. Pile is quite long on outer sides of metafemora, and there are about one-half dozen longer hairs on outer sides of metatibiae. Abdomen elongate, opaque black, more shining alongside and broadly on anterior corners of 3rd and 4th tergum.

Description. Male Head. Face moderately shining, submetallic black, flat, with a large oval median shining vitta, but the rest of face is whitish pollinose; face shining black, partly concealed beneath whitish pollen, which, on sides, is faintly striate; in middle, with well-marked, slender, about six or seven transversal grooves; front, below, above, with a black opaque cross-band below ocelli; ocellar triangle black with thin yellowish pollen, pile black; antennae reddish, basoflagellomere blackish in upper part, scape and pedicel a little longer than basoflagellomere; arista black, pilose.

Thorax. Black, mesonotum moderately shining, brownish-steel-blue, yellow pilose; with two darker, not conspicuous, pollinose vittae on anterior half, pile yellow; pleura mostly thinly grayish brown pollinose, yellow pilose; scutellum steel-blue, pile short, with long yellow pile; fringe yellow; notopleural tubercle very prominent. *Wings.* Hyaline; stigma yellow; calypter brown, border brown, fringe brown; plumule white, halteres orange, knob orange brown.

Legs. Pro and mesolegs reddish or brownish-yellow, femora and tarsi blackish basally; metafemora black, with long yellow pile on outer sides; metatibia and tarsi brown, except reddish-yellow basally, there are about one-half dozen of longer brownish hairs on outer sides of metatibiae, metabasitarsomere elongate.

Abdomen. Elongate, shining metallic bluish; 2nd-4th tegum with a posterior black band, extending more or less forward in middle, more shining along sides and broadly on anterior corners of 3rd and 4th tergum; sterna black shining, yellow pilose; male genitalia as figured (Fig. 11H).

Female. Quite similar except that the pile of legs is much briefer, with very few long hairs on femora and none on tibiae.

Types. Holotype, male **MEXICO:** Mexico City, Omiltemi, 17°33'18.50"N, 99°41'13.17"W, 2600m, VII-1936, H. G. Meyer (BMNH). Paratypes: **MEXICO:** Mexico City, Omiltemi, 17°33'18.50"N, 99°41'13.17"W, 2600m, VII-1936, H. G. Meyer, 8 ♂ and 1 ♀ (BMNH).

Non-type material. **COSTA RICA:** Provincia San Jose, Estacion Cuerici, 46km de Villa Mills, 9°33'52.79"N, 83°42'28.46"W, 2600m, V-31-1996, A. Picado, 3♂, Cat. N. 7028; Provincia San Jose, Estacion Cuerici limite de la Finca Cuerici, 3km E. Villa Mills, 9°33'52.79"N, 83°42'28.46"W, 2800m, VI-23-1996, A. Picado, 2♂ Cat. N. 7698; 2♂, Cat. N. 7699; Provincia San Jose, Estacion Cuerici limite de la Finca Cuerici, 3km, E. Villa Mills, 9°33'52.79"N, 83°42'28.46"W, 2800m, VIII-20-28-1995, A. Picado, 2♂, Cat. N. 5902; Provincia San Jose, R. Negro, Mora, 9°46'35.70"N, 84°11'6.25"W, 1500m, IV-1-1992, H. Vargas, F.G. Zumbado & M.A. Zumbado, X♂; Provincia Puntarenas, Cerro Biolley, Estacion Altamira, ACIA PILA, 9°16'2.38"N, 83°10'23.84"W, 1766m, VIII-2-1995, L. Donzo, 1♀, Cat. N. 5379; Provincia Puntarenas, R.I. Ujaras, Salitre, Cabagra, Buenos Aires, 9°14'48.74"N, 83°2'2.43"W, 2990m, IX-19-2003, M. Alfaro, Libre, 3♂, Cat. N. 74941. **MEXICO:** Chiapas, San Cristoban de las Casas, L. C. Huitepec, 16°44'3.64"N, 92°42'5.73"W, 2510m, II-26-2011, P. Sagot, 13♂, 5♀

(ECO-TAP-E); Mexico city, 19°25'53.21"N, 99°7'53.33"W, 2675m, VII-1936, H.G. Meyer, 2♂
 (WIRC); Mexico city, 19°25'53.21"N, 99°7'53.33"W, 2675m, VII-1936, H.G. Meyer, 2♂, 1♀
 (AMNH).

Etymology. The specific epithet is derived from Latin *ruga* meaning wrinkle, crease (Brown 1956: 672), and the Latin suffix *-nasus* denoting nose (Brown 1956: 45, 546) and it refers to the rugose area on face with six or seven transversal grooves.

Length. (7): body, 9.8-10.2 mm; wings, 9.1-9.8 mm.

Distribution: Costa Rica, Mexico.

***Argentinomyia crenulata* Williston, 1891**

Figures 5I, 6J, 9J, 11I.

Melanostoma crenulatus Williston, 1891: 12, holotype male and female – Mexico: Guerrero, Xucumanatlan (BMNH) & (AMNH). – Williston, 1891: 12 pi. 1: 5 (habitus), 5a-Hb (head).

Rhysops crenulata Curran, 1937: 2 (Key).

Rhysops crenulata Fluke, 1945: 5, fig. 3 (head).

Rhysops crenulatus Thompson et al. 1976: 42 (catalogue). **Syn. nov.**

Differential diagnosis. Antennae elongate, scape longer than last two combined. Face with seven or eight transversal grooves. Wings with two short, narrow, transverse brown bands near the middle on anterior half. Metafemur black. Abdominal maculae metallic.

Description. Male. Head. Face shining black; running from inner side of each antenna, with a gentle outward curve to oral margin, is a slender white line of pollen; mid-stripe shining, bare, with three or four narrow, shallow, transversal grooves; three small spots of white pollen along orbital margin, the lowest one extended diffusely to oral margin; frontal triangle opaque black above, shining below, with pile short, black; gena shining black with thin, more whitish pollen, pile white; ocellar triangle black with thin yellowish pollen, pile black; occiput shining blue-black, lower occiput heavily coated with white pollen and pile; antennic elongate, slender, remote at their base; antenna black brown, scape as long as pedicel and basoflagellomere together, scape and pedicel yellowish or reddish of about equal length; basoflabellomere black, more than twice as long as wide, obtusely pointed; arista black, bare.

Thorax. Black or bluish-black bronze, mesonotum moderately shining; with three brownish pollinose vittae on anterior half, pile yellow; pleura mostly thinly grayish brown pollinose; scutellum more steel-wine, yellow pilose; fringe short and yellow. *Wings.* Hyaline, stigma yellow, narrow brown clouds on anterior cross, vein and across from the origin of 3rd vein to vein at the base of last posterior cell; calypter brown, border brown, fringe brown; plumule white, halteres orange, knob orange.

Legs. All femora black, except yellow apically; mesofemora with black long hairs in posterior side; pro and mesotibia yellow; metatibia dark with basal 1/3 yellow; first two tarsal segments yellow, remainder segments brown or blackish; metatarsi elongate, but not thickened.

Abdomen. Black or bluish-black, shining, subopaque, 1st tergum and anterior angles of following ones shining metallic; sterna black, yellow pilose; male genitalia as figured (Fig. 11I).

Female. *Head.* Front with an opaque black cross, band above composed of two coalescent oval spots. Face highly polished, pollen white and confined to a narrow stripe on each side from the antennae to close to oral margin, connecting by a broader stripe to the eye and thence along eye to a triangle opposite lowest depression of face, then connecting with white triangles on lower front; pile of face short and white. Front brownish opaque below ocellar triangle and above the depression, bordered above by a very narrow whitish pollinose band; white pollinose band across depression not interrupted, ground color bluish. *Abdomen.* with a large opaque or subopaque triangle on 2nd tergum.

Types: Holotype, male, **MEXICO:** Guerrero, Omiltemi, 17°33'18.50"N, 99°41'13.17"W, 2438m, VII-1-1903, H.H. Smith (BMNH). Syntype: **MEXICO:** Guerrero, Xucumanatlan, 17°27'14.34"N, 99°28'47.43"W, 2140m, VII-1-1903, H.H. Smith, 8♂ (BMNH). Cotype: **MEXICO:** Guerrero, Omiltemi, 17°33'18.50"N, 99°41'13.17"W, 2438m, VII-1-1903, Ag H.H. Smith. S.W. Williston Collector, 1♀ (USNM ENT19255).

Non-type material. **BOLIVIA:** La paz, Alto Rio Bendi, South Rio Inicua, 15°9'44.81"S, 67°51'55.58"W, 1100m, I-15-18-1976, L.E. Peña, 1♂, 4♀ (AMNH). **COSTA RICA:** Provincia Cartago, Tapanti, Quebrada Segunda, Orilla del Rio Grande de Orosi, 9°47'47.15"N, 83°55'43.56"W, 1000-1500m, II-18-19-1997, M. Segura, 2♂, Cat. N. 45297, 1♂, Cat. N. 6365, 1♀, Cat. N. 45358. Provincia Guanacaste, Estacion Cacao, Lado sur del Volcan Cacao, 10°55'12.42"N, 85°25'45.86"W, 1000-1400m, VI-1990, InBio, III curso Parataxomy, 3♂, 2♀

(USNM); Provincia Monteverde, 10°18'25.14"N, 84°48'35.03"W, 1420m, VIII-20-25-1991, D.M. Wood, 1♀ (CNC).

Etymology. The specific epithet is derived from Latin *crenulatus* meaning minutely crenate (Brown 1956: 237), and it refers to the three or four narrow, shallow, transverse grooves on face.

Length. (7): body, 7.3-8.5 mm; wings, 7.0-7.6 mm.

Distribution: Bolivia, Costa Rica, Mexico.

***Argentinomyia testaceipes* Lynch Arribálzaga, 1891**

Figures 6K, 9K.

Argentinomyia testaceipes Lynch Arribálzaga, 1891: 199, holotype male – Argentina: Provincia de Buenos Aires, Chacabuco (MACN). – Lynch Arribálzaga, 1891:199 (1892c: 41), 268, fig. 4 (habitus); Fluke, 1945: 6, fig. 5 (head);

Rhysops lopesi Fluke, 1945: 6, holotype, female – Brazil, S. Jose dos Campos, H.S. Lopes, (AMNH). Paratype: Brazil, São José dos Campos, 23°11'11"S 45°52'43"W, 660m, X-1933, (*Braziliana sp nov?*), Det. H.S. Lopes, 1♀ (WIRC).

Rhysops lopesi Thompson 1976: 43 (catalogue). **Syn. nov.**

Argentinomyia testaceipes Thompson 1976: 57 (catalogue).

Argentinomyia testaceipes Thompson 1999: 338 (catalogue).

Differential diagnosis. Antennae elongate, the scape nearly four times as long as pedicel and about twice as long as basoflagellomere, arista bare. Frontal prominence greatly produced, female front wide. Face with a low tubercle and with no prominent depressions above. Sides of face evenly white pubescent, not punctuate. Mesonotum shining black without pollen.

Female. Head. Face shining black with white pile except for some brownish hairs on upper half of front; face with a very low elongate tubercle, only slightly concave below antennae, with no distinct transverse depressions, although there are two very faint depressed lines immediately above tubercle; face entirely covered with white pollen except for a median vitta, which is broadest over tubercle; oral tips somewhat produced below; a shining area between eyes and oral tips; front highly, polished with coppery reflections, extremely wide; ocelli on a slightly raised triangle, pile white below, more brownish in a wide band across vertex; gena heavily coated with white pollen and white pile; side of tubercle is a large, rectangular, flat, slightly rugose area, although the wrinkles show only on upper edge; brown, pile also appears on rather wide upper part of occiput, rest of occiput with white pollen and pile; antennae inserted on a raised base; scape extremely long, yellowish in color with black pile; pedicel dark brown, about one-fourth as long as scape; basoflagellomere black and about one-half as long as the scape; arista thick, about as long as the third segment, yellow at base and dark on apical third, bare.

Thorax. Black, mesonotum highly polished, short golden pilose; without a pollinose vittae on anterior half, pile yellow; pleura shiny black, white pilose, white pollinose; pleura shiny bluish cast, covered with white pollen and rather long white pile; scutellum polished, but with two rugose depressions near the tip, pile entirely white; fringe with short golden pile; notopleura

with only a slight indication of tubercle. *Wings.* Hyaline, stigma diluted yellow, calypter yellow, border white, fringe white; plumule white, halteres yellowish white, knob white.

Legs. Entirely yellow-yellowish; femora reddish brown, except metafemur black on apical 1/2 or less; metatibia black; pile everywhere yellow; three apical meso and metatarsomeres brown, with few black hairs dorsally.

Abdomen. Everywhere polished with dark brown to black reflections, no evidence of yellow maculae anywhere, pile all white except for some darker hairs down the middle of 4th tergum; sterna black shining, yellow pilose.

Male. Unknown.

Types: Holotype, male, **ARGENTINA:** Provincia de Buenos Aires, Chacabuco, 34°38'8.89"S, 60°27'54.74"W, 173m (MACN). Paratype, **BRAZIL:** S. Jose dos Campos, 21°45'28.48"S, 41°19'30.52"W, 53m X-9-1933, H. S. Lopes, 1♀ (AMNH).

Etymology. The specific epithet is derived from Latin *testaceus* meaning having a shell, shelly (Brown 1956: 788), and the Latin suffix *-pes* denoting foot (Brown 1956: 45, 600) and it refers to the characteristic legs shape.

Length. (3): body, 7.3-8.5 mm; wings, 7.1-7.5 mm.

Distribution: Argentina, Brazil

***Argentinomyia nigrans* Fluke, 1945**

Figures 5J, 6L, 7I, 9L, 11J.

Rhysops nigrans Fluke, 1945: 8, holotype male – Brazil: Santa Catarina. Nova Teutonia (AMNH). – Fluke, 1945: 8, fig. 8 (head).

Rhysops nigrans 1958: 279, figs. 111 & 112 (male genitalia)

Rhysops nigrans Thompson 1976: 44 (catalogue). **Syn. nov.**

Differential diagnosis. Face perpendicular without prominent grooves. Wing only tinged with brown, extensively hyaline. Abdomen black with small yellow to red maculae on basal corners of 2nd tergum, reaching over the sides and 1/2 of segment length. Femora and tarsi black.

Description. Male. Face nearly straight, tubercle low with two very faint transverse depressions; white pollinose, shining on a broad mid-stripe, around the oral edges, a narrow band above the gena from the eyes to oral edge, an arc above the antennae, and thinly pollinose from antennae down the slopes of face almost to the flat area opposite tubercle, pile white; front dark with a broad opaque band just below the ocelli, gradually fading into white pollen in the depression, pile black; gena shining black with thin, more whitish pollen, pile white; ocellar triangle semi-shining black with black pile; occiput whitish pollinose and white pilose on lower two-thirds, black pilose on upper 1/3; antennae brownish black, reaching to the tubercle, scape shorter than basoflagellomere, basoflagellomere a little shorter than first two together, reddish yellow but darker on outer sides and above on basoflagellomere, arista yellow at base and dark on apical 1/3, pilose.

Thorax. Black, mesonotum semiopaque on disc, more shining alongside, pile longer and brownish yellow; with two median white pollinose vittae on anterior half, pile whitish and very short, dark brown alongside beyond the suture; pleura lightly white pollinose, white pile; notopleural tubercle prominent; scutellum blue-black, shining, slightly rugose, pile short and pale; fringe thin and white. *Wings.* Tinged with brown, stigma elongate brown, very light clouds at the fork of 2nd and 3rd veins and on anterior cross vein, calypter brown, border brown, fringe brown; plumule white; halteres yellow, knob slightly brown.

Legs. Dark brown to black; femora reddish yellow apically; tibia reddish yellow on basal 1/3; pile all black, even the mat under the metatarsi.

Abdomen. Semi-shining black to opaque, yellowish red triangles on basal corners of 2nd tergum reaching over the sides and 1/2 of segment length, pile longer alongside, short, black, and appressed on discs of tergites; sterna shining black, yellow and long pilose; male genitalia as figured (Fig. 11J).

Female. *Head.* Very similar, frontal triangle pollen whitish along the eyes, brownish elsewhere

Type: Holotype, female, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'59.85"S, 52°24'0.17"W, 857m, VI-1-1936, F. Plaumann (AMNH). Allotype, male, same locality, VII-20-1937. Paratypes: **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'59.85"S, 52°24'0.17"W, 857m, VI and VII 1936 and 1937, F. Plaumann, 10♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'59.85"S, 52°24'0.17"W, 857m, I-21-1929, F. Plaumann, 1♂ (AMNH); Santa Catarina, Bom Retiro, 27°48'28.95", 49°32'1.40"W, 845m, I-21-1929, 1♂ (WIRC); Santa Catarina, Nova

Teutonia, 27°2'59.85"S, 52°24'0.17"W, 857m, VI-21-1936, F. Plaumann, 3♀ (WIRC).
 Metatypes: **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 530m, VI-21-1936, F. Plaumann, 3♀ (AMNH).

Non-type material: BRAZIL: Santa Catarina, Nova Teutonia, 27°2'59.79", 52°23'59.99"W, 500m, 1969, F. Plaumann, 3♂, 5♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'59.79", 52°23'59.99"W, 857m, 1964-1974, F. Plaumann, 1♂, 3♀ (USNM); Sao Paulo, Campos do Jordao, 22°44'19.17"S, 45°35'31.93"W, 1662m, I-1954, J. Lane, 6♂, 1♀ (WIRC).

Etymology. The specific epithet is derived from Latin *nigrans* meaning black, dark, dusky (Brown 1956: 557), and it refers to the characteristic semishining black abdomen.

Length. (5): body, 9.5-10.1 mm; wings, 6.2-7.1 mm.

Distribution: Brazil

***Argentinomyia neotropica* Curran, 1937**

Figures 5K, 6M, 7J, 10A, 11K.

Melanostoma neotropicus Curran, 1937: 4, Holotype male – Brazil: Sao Paulo (AMNH). –

Fluke, 1945: 8, figs. 9 (head), 39 & 40 (abdomen)

Melanostoma columella Fluke, 1945: 8 (description), Holotype, male – Brazil: Santa Catarina, Nova Teutonia. Allotype, female, Brazil: Nova Friburgo, E. Dorio. Paratypes: Brazil: Santa Catarina, Nova Teutonia, X-16-1936, Friz Plaumann (1♂) (WIRC); San Vicente, A. A. B., IV-22-1934, (1♂) (WIRC),

Rhysops neotropicum Fluke, 1945: 18 (catalogue).

Melanostoma neotropicum Frey, 1946: 157 (catalogue).

Rhysops neotropicum Fluke, 1958: 278, figs. 117 & 118 (male genitalia). **Syn. nov.**

Rhysops neotropicus Thompson 1976: 43 (catalogue). **Syn. nov.**

Differential diagnosis. Closely related to *nigrans*, differ in its slightly larger size, more wrinkled face and prominent yellow markings on abdomen.

Description. Male. Head. Face shining black, slopes of face whitish pollinose, which thins out down middle from antennae to the flattened rugose area opposite tubercle; three or four faint depressions above tubercle, pile black on sides; front more brownish pollinose except for highly roughened arc above antennae, pile black; gena shining black with thin, more whitish pollen, pile white; ocellar triangle black with black pile, occipital pile black above, yellow below; occiput whitish pollinose and white pilose on lower two-thirds, black pilose on upper 1/3; antennae orange brown, scape and pedicel shorter than basoflagellomere, reddish yellow but darker on outer sides and above on basoflagellomere, arista yellow at base and dark on apical third, pilose.

Thorax. Black, mesonotum semishining aeneous, yellow pilose; with two whitish vittae on anterior half, sides brownish pollinose, pile brownish; pleura shining black with a light coating of white to brownish pollen, yellowish pilose; katepimeron and meron with brownish metallic reflections, yellow pilose; scutellum shining, slightly rugose on apical half, pile long and

yellow, fringe long and yellow. *Wings*. Brownish hyaline, stigma brown; calypter brownish yellow, border yellow, fringe yellow; plumule white, halteres yellow, knob slightly brownish orange.

Legs. Reddish brown to black; femora reddish yellow apically; tibia yellowish orange on basal 1/2, no sharp demarcation; pile inconspicuous, mostly black.

Abdomen. Black; 1st tergum shining; 2nd opaque with a pair of slender yellow maculae on sides, free from base and reaching apical 1/6; 3rd opaque black in middle but with a pair of large, nearly rectangular, yellow maculae, free from shiny sides and reaching apical 1/3 of segment, apical ends of maculae rounded, basal ends widen before reaching base; 4th tergum with similar but smaller maculae, segment nearly all shining; 5th tergum shining, pile of sides longer and more yellowish anteriorly, with black brownish pile on black areas; sterna shining yellow to black with yellow pile, male genitalia as figured (Fig. 11K).

Female. Face with four transversal grooves, facial pile white. Front with a broad opaque black fascia just below ocelli, the depression whitish pollinose, pile black. Thorax pile very short, scutellum with two apical setulose hairs. Abdominal maculae narrower and more isolated than on male, on 2nd tergum wider, on 4th reaching only halfway.

Types: Holotype, male, **BRAZIL**: Sao Paulo, 23°32'36.68"S, 46°24'39.36"W, 775m, IV-18-1905, A.A. Barbiellini (AMNH). Allotype, female, **BRAZIL**: Rio de Janeiro, Nova Friburgo, E. Dorio, 22°17'13.69"S, 42°32'1.31"W, 928m, IV-4-1937, H.S. Lopes (WIRC). Paratypes, **BRAZIL**: Santa Catarina, Nova Teutonia, 27°2'59.79", 52°23'59.99"W, 857m, VI-10-1937, F. Plaumann, 1 ♂ (AMNH); Rio de Janeiro, Nova Friburgo, E. do Rio, 22°16'55"S, 42°31'51"W,

846m, IV-28-1937, H. S. Lopes, 1♀ (WIRC). Metatypes: Santa Catarina, Nova Teutonia, 27°2'59.79", 52°23'59.99"W, 857m, VI-18-1937, F. Plaumann, 2♀ (WIRC); Sao Paulo, Cantareira, 23°27'27.00"S, 46°38'14.23"W, 870m, 1945, J. Lane, 1♂ (WIRC).

Non-type material. ARGENTINA: Tucuman, Burreyacu, Quebrada La Toma, 26°29'57.93"S, 64°44'30.99"W, 526m, XII-21-1950, R. A. Golbach, 5♂, 1♀ (WIRC); Tucuman, Burreyacu, Villa Padre Monti, 26°29'49.42"S, 64°44'26.20"W, II-5-1948, R. A. Golbach, 7♂, 14♀ (WIRC). **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'59.79", 52°23'59.99"W, 500m, 1964-1971, F. Plaumann, 6♂, 4♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'59.79", 52°23'59.99"W, 857m, 1964-1974, F. Plaumann, 35♂, 26♀ (USNM); Santa Catarina, Nova Teutonia, 27°2'59.79", 52°23'59.99"W, 500m, 1939, F. Plaumann, 1♀ (WIRC); Sao Paulo, Guaianazes, 23°32'36.68"S, 46°24'39.36"W, 775m, II-1950, M. Carrera, 1♂ (WIRC).

Etymology. The specific epithet is derived from the Greek *neo* meaning new, young recent (Brown 1956: 45, 554), and the Latin *tropicus* denoting a turnig, solstice (Brown 1956: 45, 815), and it refer to the geographica name region.

Length. (5): body, 8.5-9.3 mm; wings, 7.3-8.1 mm.

Distribution: Argentina, Brazil.

***Argentinomyia lineata* Fluke, 1937**

Figures 5L, 6N, 7K, 10B, 11L.

Melanostoma lineatus Fluke, 1937: 9, holotype male – Brazil: Santa Catarina, Nova Teutonia. (AMNH). – Fluke, 1937: 9, fig. 11 (abdomen); 1945:7, fig. 7 (head).

Rhysops lineata 1958: 277, figs. 105 & 106 (male genitalia).

Rhysops lineata Thompson 1976: 43 (catalogue).

Differential diagnosis. A shining black aeneous species with relatively short antennae, two faint transversal grooves above tubercle. Highly polished mesonotum with two faint vittae anteriorly. Abdomen with elongate linear yellow vittae. Metafemur yellow on basal 1/4, pro and mesofemura broadly yellow apically.

Description. Male. Head. Face almost perpendicular with two faint transverse depressions, tubercle elongate, broad and low; mid-stripe shining black, sides white pollinose, heavier next to the eyes; pile pale, sparse; frontal triangle rough, but shining above antennae, broadly cinereous pollinose along the eyes, more whitish next to orbits, pile black; gena shining, lightly whitish pollinose; ocellar triangle black, with black pile; occipital pile fine, short and black; occiput narrow, even below; silvery pollinose below; antennae yellowish, darker toward the end and above on basoflagellomere, scape only very little longer than pedicel which is wider than long, basoflagellomere slightly less in length than first two together; arista yellow at base and dark on apical third, pilose.

Thorax. Aeneous, mesonotum shining with a slight bronze cast, yellowish brown pilose; with two very faint pollinose vittae on anterior half, yellow pilose; pleura lightly coated with brownish to rusty colored pollen, yellow pilose; scutellum with long hairs, some of apical ones

blackish brown; fringe short and yellow. *Wings.* Hyaline, slightly tinged with brown, stigma yellow; calypter white, border white yellowish, fringe white; plumule white, halteres yellow, knob slightly brown.

Legs. Black to brownish; metafemora yellow on apical 1/5 and on tip, pro and mesofemora yellow on apical 1/3 to 1/4, pro and mesotibia yellow; metatibia yellow on basal 1/3; basal segment of tarsi yellowish to brownish. No peculiar hairs present on legs.

Abdomen. Narrow with nearly parallel sides, mostly shining black, 2nd and 3rd tergum more opaque, each with a pair of elongate yellow maculae, apically acute, both start basally, on 2nd tergum reaching apical 1/3, on 3rd reaching apical 1/2 of segments; sterna yellow, brownish metallic on 2nd sternum, only yellowish on apical 1/6, 3rd and 4th sternum yellow basally on 1/2 and 1/6 respectively; male genitalia as figured (Fig. 11L).

Female. Quite similar to male. Front with a broad, very narrowly bisected, brownish pollinose crossband, occupying the frontal depression; between this band and the ocelli a somewhat narrow black opaque band. Yellow areas on antennae and legs more extensive than on male. Wings hyaline, abdomen more shining and there are small elongate spots on second tergite.

Types: Holotype, male, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'58.05"S, 52°23'55.82"W, 857m, IX-2-1936, F. Plaumann (AMNH). Allotype, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'58.05"S, 52°23'55.82"W, 857m, VII-7-1936, F. Plaumann, 1♀ (AMNH). Paratypes: **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'58.05"S, 52°23'55.82"W, 857m, VII-6-7-1936, F. Plaumann, 3♂, (AMNH); Santa Catarina, Nova Teutonia, 27°2'58.05"S,

52°23'55.82"W, 857m, IX-1-2-1936, F. Plaumann, 1♂, 2♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'58.05"S, 52°23'55.82"W, 857m, VII-1-1936, F. Plaumann, 1♂, 2♀ (WIRC).

Non-type material: BRAZIL: Santa Catarina, Nova Teutonia, 27°2'58.05"S, 52°23'55.82"W, 300-500m, I-7-1960, F. Plaumann, 3♂, 2♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'58.05"S, 52°23'55.82"W, 300-500m, I-7-1960, F. Plaumann, Det. J. R. Vockeroth, 1♀ (CNC 112204); Santa Catarina, Nova Teutonia, 27°2'58.05"S, 52°23'55.82"W, 300-500m, X-1969, F. Plaumann, Det. J. R. Vockeroth, 2♂, 1♀ (CNC 112205, CNC 112206, CNC 112207). **BOLIVIA:** La paz, Alto Rio Bendi, South Rio Inicua, 15°9'44.81"S, 67°51'55.58"W, 1100m, I-15-18-1976, L.E. Peña, 2♀ (AMNH).

Etymology. The specific epithet is derived from Latin *Lineatus* meaning of a line, linear, lineal, *delineata*, align, rectilinear (Brown 1956: 485), it refers to the lineal maculae on abdominal tergum.

Length. (4): body, 7.5-9.2 mm; wings, 7.3-8.0 mm.

Distribution: Brazil, Bolivia.

***Argentinomyia pollinosa* Hull, 1942**

Figures 5M, 6O, 7L, 10C, 11M.

Rhysops pollinosus Hull, 1942b: 10, holotype female – Brazil: Sao Paulo (AMNH)

Rhysops pollinosa Hull. Fluke, 1945: 26, fig. 11 (head).

Rhysops pollinosa Fluke 1958: 279, figs. 113 & 114 (male genitalia).

Rhysops pollinosus Thompson 1976: 44 (catalogue). **Syn. nov.**

Differential diagnosis. Related distantly to *A. lineata* Fluke. The species is characterized by *lineata* maculae on abdomen. Face with four faint transverse grooves. Profemora yellow to orange. Brownish pollinose mesonotum with two yellowish median vittae on anterior half. A smoky wing tips.

Description. Male. Head. Front and vertex subopaque black, the former broadly divided transversely by yellowish-brown pollen; face pale greyish-yellow, almost white pubescent and with similar pile; face with a broad, shining, brownish-black middle stripe and a submedial, incomplete stripe partly bisecting the facial pubescence; face with four transverse grooves; pile of front and vertex black; frontal triangle black, brownish pollinose, pile black; gena bluish-black, antennae yellowish; ocellar triangle black, with black pile; occiput pile fine, short and yellow; antennae yellowish, darker toward the end and above on basoflagellomere; scape and pedicel little longer than basoflagellomere; arista yellow at base and dark on apical third, pilose.

Thorax. Aeneous, mesonotum shining bright brassy-black with obscure, brownish pollinose vittae; with a pair of moderately separated stripe of light brownish yellow pollen, yellow pilose; pleura grey brownish to rusty colored pollen, yellow pilose; scutellum with a pair of slender, pale bristles; fringe short and yellow. *Wings.* Hyaline, slightly tinged with brown near the apex; stigma dark yellowish-brown; calypter white yellowish, border brownish, fringe yellow whitish; plumule white, halteres yellow, knob slightly brown yellow.

Legs. Everywhere light orange-brown; metafemora yellow except the apical 1/5 narrowly brown; basal three protarsus brown, the apical one yellow orange; other tarsus yellow; yellow to orange pilose.

Abdomen. Elongate, 1st tergum shining black, 2nd shining blue-black with an obscure, diffuse, brownish-orange, elongate, sublateral maculae along outer portion of tergum; widely separated and equidistant from base and apex of 2nd tergum; on 3rd tergum with quite similar, slightly smaller maculae that begin at the base; on 4th tergum with smaller and similar basal maculae; sterna yellowish; male genitalia as figured (Fig. 11M).

Types: Holotype, female, **BRAZIL:** Sao Paulo, 23°32'56.34"S, 46°38'19.98"W, 801m, XI-1-1940, J. Lane, 1♀, (Hull Collection)

Non-type material: ARGENTINA: Tucumán, Burruyacu, Villa Padre Monti, II-5-1948, R. A. Golbach, 5♂, 5♀ (WIRC); Tucumán, Villa Nougés, 26°50'60.00"S, 65°22'59.99"W, 1426m, I-1931, R. K. 3♂ (WIRC).

Etymology. The specific epithet is derived from Latin *pollen* meaning fine flour, mill-dust, dust (Brown 1956: 622), and it refers to the yellowish-brown pollen on face and thorax.

Length. (3): body, 8.5-9.0 mm; wings, 6.7-7.5 mm.

Distribution: Argentina, Brazil.

***Argentinomyia praeusta* Loew, 1866**

Figures 5N, 6P, 8A, 10D, 12A.

Syrphus praeustus Loew, 1866a: 155 (1872b: 29), holotype male – Cuba, Wright (MCZ).

Rhysops quadrimaculata Hull, 1944c: 28, holotype male – Cuba, Wright (MCZ).

Rhysops quadrimaculata Fluke, 1945: 9 (redescription), figs. 12 (head), 41 (abdomen).

Rhysops quadrimaculatus Thompson *et al.* 1976: 44 (catalogue)

Rhysops praeustus Thompson *et al.* 1976: 44 (catalogue).

Rhysops praeustus Thompson 1981: 105 (Synonyms and notes).

Differential diagnosis. Very similar to *currani* Fluke, but abdominal maculae are quadrate instead of triangular. In addition, there is an extension of rugose area on sides of face opposite the two middle depressions as well as opposite the tubercle. Pollen of face in narrow bands, from antennae to oral edge, with another fork going to eyes and meeting first band broadly on lower rugose area, upper rugose area bare of pollen. Scape very little shorter than basoflagellomere.

Description. Male. Head. Face brilliantly shining, metallic black, with perhaps a faint bluish luster, mid-stripe, violet, margins are lined by a thin stripe of whitish pubescence, front bluish-black, grey dusted on upper half and with a narrow thin line of grey-white pubescence running down the eyes margin which expands anteriorly into a small, triangular spot on upper part of face and again on lower part of face opposite the tubercle, Lower half of face sparsely white pubescent and diagonally striate opposite the tubercle; the middle of face is cut by four shallow grooves, the outer ones less distinct; Pile of face and front light brownish-yellow, of

vertex darker; the vertical triangle small, the occiput not protruding beyond the eyes on upper third; scape and pedicel nearly equal in length; light brownish-yellow; basoflagellomere missing.

Thorax. Very convex, shining metallic black; with a three brownish pollinose vittae, the median run half-way down the posterior part of mesonotum, there are suggestions of a fourth pair of such vittae lying some distance from the others on lateral part of mesonotum. There is a low but well developed, rounded bump in the middle of anterior lateral corners of thorax lying diagonally from the humeri; pleura grey shining, whitish pollinose, yellow whitish pilose; scutellum broadly rounded, brilliantly metallic, with two or three subterminal, transverse, faint, ripple-like depressions; fringe long. *Wings.* Very lightly tinged with brown, the apical margin of wing to just past the end of 3rd vein marginate with brown, giving the impression of an elongate brown macula; stigma brownish; calypter yellow, the border dark brown, fringe dark brown; plumule white; halteres yellow, knob yellowish.

Legs. Almost wholly pale brownish-yellow; metafemora obscured on apical 1/3 or little more; metatibia and metatarsi obscurely dark except the indefinite base, metatarsi and the two or three tarsal segments of other tarsi dark brown.

Abdomen. Long and slender, rather flattened, sides almost parallel, end of 3rd tergum barely wider than base of abdomen; 1st tergum shining metallic black, 2nd shining on basal 2/5 with a brassy or golden, brown appearance; opaque, dark sepia-brown on almost all of remaining segments and quite to their posterior margin. Located near the base upon sides of 2nd tergum, not reaching the anterior corners and covering about 1-1/2 the segment length there is a shallow, diffuse, brownish-yellow maculae; in some specimens it extends inward for a greater distance. 3rd tergum with a pair of large, square, light brownish-yellow maculae occupying the base, the

entire anterior corners and the sides for one-half the segment length; their medial surfaces are just a little cut-away and diminished on their posterior surfaces; remainder of this segment opaque, dark sepia. 4th tergum with a pair of similar maculae, slightly smaller, barely darker, and a very little closer together; remainder of that segment shining black. The pile upon abdomen seems to be practically absent on 3rd and 4th tergum, though whether this is due to denudation I cannot ascertain. The sparse lateral pile of 2nd is pale; male genitalia as figured (Fig. 12a).

Female. Female front with a white pollinose line medially directed, abdomen mostly opaque black, more shining on sides with a pair of quadrate yellow maculae in the basal outside corners of 3rd and 4th tergum, slightly wider on outside and reaching nearly to the apical 1/2.

Types: Holotype, male, **CUBA:** Wright (MCZ Cat 23785). Paratypes, **CUBA:** Wright. **DOMINICAN REPUBLIC:** Loma Vieja, S. Constanza, 18°40'60.00"N, 70°15'60.00"W, 1200m, VIII-1938, 1♂ (CNC).

Non-type material: DOMINICAN REPUBLIC: Provincia Independencia, near Sierra de Baoruco National Park, 3.5km El Aguacate, 18°52'4.24"N, 70°58'32.34"W, 2210m, IX-30-1991, S. Thompson, 1♂ (USNM); Provincia La Vega, Trail Aguita Fria, Armando Bemudez, 19°2'44.61"N, 70°56'31.48"W, 2650-2450m, VII-1-2004, D. Perez, 3♂, 3♀ (USNM); Provincia Pedernales 9.7km NE, los Arroyos, 18°49'23.49"N, 70°49'55.80"W, 2070m, VII-15-16-1990, J. Raulins, C.W. Young & S.A. Thompson, 1♀ (USNM); Provincia La Vega, Sabana Kelly, Valle Nejeno, 18°45'60.5"N, 70°37'59.5"W, 2294m, IV-2-2003, D. Perez, R. Bastardo & B. Hierro, 2♂, 4♀ (USNM). **JAMAICA:** Hardward, Gap, 18° 4'5.30"N, 76°38'11.87"W, 1120m, VII-19-1966, Howden & Becker, 1♀ (CNC).

Etymology. The specific epithet is derived from the Latin *prae* meaning before (Brown 1956: 629), and the Latin *usta* denoting burnst color (Brown 1956: 45, 828) and it refers to the burnst color on anterior facial surface.

Length. (7): body, 5.4-6.7; wings, 4.2-4.6 mm.

Distribution: Cuba, Dominican Republic, Jamaica.

Argentinomyia currani Fluke, 1937

Figures 5O, 6R, 8B, 10F, 12B.

Rhysops currani Fluke, 1937: 8, holotype male – Brazil: Santa Catarina, Nova Teutonia (AMNH). – Fluke, 1937: 8, fig. 10 (abdomen)

Rhysops currani 1945: 9 (redescription), fig. 10 (head)

Rhysops currani 1958: 277, figs. 101 & 102 (male genitalia)

Rhysops currani Thompson 1976: 43 (catalogue).

Differential diagnosis. Pollen on sides of face neither punctate nor rippled. Abdominal macula triangular and located on basal corners. Female front with two rounded opaque brown maculae.

Description. Male. Head. Face black, covered with white pollen which is slightly brownish alongside; mid-stripe metallic black, bare, violet margined, reaches from oral edge to just above the flat tubercle and then forks so that there is a median dash of pollen extending from

the antennae almost to tubercle; a large shining spot above antennae, with three faint transverse depressions; gena semi-shining black with thin, more whitish pollen, pile white; ocellar triangle black blue, brownish pollinose, pile black; occiput whitish pollinose and white pilose on lower two-thirds, black pilose on upper 1/3; antenna orange brown, scape longer than pedicel but shorter than basoflagellomere, basoflagellomere shorter than first two combined; arista yellow at base and dark on apical 1/3, pilose.

Thorax. Black, mesonotum semi-shining aeneous, yellow pilose; with two whitish vittae on anterior half, side brownish pollinose, pile brownish; pleura shining blue with a light coating of white to brownish pollen, mesopleura with brownish metallic reflections, yellow pilose; scutellum shining, slightly rugose on apical 1/2, pile long and yellow, fringe long and yellow. *Wing.* Hyaline, slightly brownish, stigma brown; calypter yellowish, border yellowish, fringe yellowish; plumule white, halteres whitish orange, knob slightly yellowish.

Legs. Yellow to reddish; pro and mesofemora and tibia yellow; metafemora yellow on basal 1/2, with a darker apical smudge on outside, with long brown hairs; metatibia yellow on basal 1/4; basal two segments of tarsi yellow.

Abdomen. Yellow triangular maculae on basal corners of 3rd and 4th tergum; male genitalia as figured (Fig. 12B).

Types: Holotype, male, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VII-18-1936, F. Plaumann (AMNH). Allotype, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VII-18-1936, F. Plaumann, 1 ♀ (AMNH). Paratypes, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S,

52°23'60.00"W, 300-500m, VII-18 and IX-1-1936, F. Plaumann, 5 ♂ (AMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, IX-1 and X-20-1936, F. Plaumann, 2 ♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, X-18-1936, F. Plaumann, 2♂ (WIRC); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, X-23-1936, F. Plaumann, 1♀ (WIRC).

Non-type material. BRAZIL: Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, 1965, F. Plaumann, 3♂, 3♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, 1964-1971, F. Plaumann, 12♂, 2♀ (USNM); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VII-1964, F. Plaumann, Det. J. R. Vockeroth, 1♂ (CNC 112195); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VII-1965, F. Plaumann, Det. J. R. Vockeroth, 1♂ (CNC 112196); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VII-1969, F. Plaumann, Det. J. R. Vockeroth, 1♀ (CNC 112197); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VIII-1937, F. Plaumann, Det. Fluke, 1♂ (WIRC); Sao Paulo, 23°32'36.68"S, 46°24'39.36"W, 775m, XII-1945, J. Lane, 1♂ (WIRC).

Etymology. The specific epithet is refers to Dr. Charles Howard Curran (1894-1972), an enthusiastic entomologist who works as a specialist service in Diptera Entomology of Canada and as assistant curator at the AMNH (1923 to 1960). In 1931, he donated his collection to the AMNH including 400 types. Curran dedicated most of his live to study Syrphidae Neotropical, describing near 553 species (Arnaud & Owen 1981).

Length. (7): body, 8.5-9.1 mm; wings, 7.0-7.5 mm.

Distribution: Brazil.

***Argentinomyia maculata* Walker, 1852**

Figures 5P, 6S, 8C, 12C.

Paragus maculatus Walker, 1852: 220, holotype male – Brazil: Santa Catarina, Nova Teutonia (BMNH). – Fluke, 1945: 11, figs. 16 (head), 17 (antenna), 47 (abdomen).

Rhysops minuscula Fluke, 1945: 11, holotype, male, Brazil: Santa Catarina, Nova Teutonia.

Allotype, female, same locality. Paratypes: 11 males, same locality, 15 females, same locality (AMNH). Paratypes: Brazil: Santa Catarina, Nova Teutonia. VI-20-1936, 3♂, 3♀ (WIRC)

Melanostoma discretum Frey, 1946: 157, holotype male – Brazil: Santa Catarina, Nova Teutonia (UZMH).

Rhysops minuscula Fluke, 1958: 279, figs. 109 & 110 (male genitalia);

Rhysops maculatus Thompson 1976: 43 (catalogue).

Differential diagnosis. A small species with a low tubercle and two shallow transversal grooves. Scape and basoflagellomere about equal in length. Abdomen with triangular maculae on 3th-4th terga, which are often absent in female. Metatibia mostly yellow. Female front with two round pollinose macula.

Description. Male. Head. Face black, very highly polished blueblack; sides of face black, whitish on gena and lower occiput; mid-stripe highly polished with a narrow gray pollinose vitta, which reaches from base of antennae almost to the first depression; this pollinose vitta connects with a narrow vitta, which follows down sides of face to the oral margin and connects with a broad patch of pollen, which in turn connects to a narrow strip along the eyes, broadening on front with a narrow point projecting toward the antennae, but not quite reaching them; tubercle low and with two faint transverse depressions; side of face between tubercle and the eyes is a flattened rugose patch which has about three ridges on upper half of patch; front pollen brownish black but bordered with gray pollen; ocellar triangle dark brown with coppery reflections; pile all black; occiput whitish pollinose and white pilose, only black pilose on upper 1/3; antennae yellow, scape and pedicel about equal in length, pedicel about half as long as scape or basoflagellomere, yellow in color, basoflagellomere black above and at the apex; arista yellow at base and dark on apical third, pilose.

Thorax. Brown to black, mesonotum dark, black pilose with paler hairs on disc; with two faint brownish pollinose vittae on anterior half; pleura shining, very lightly pollinose especially around propleura, pile all yellowish brown; scutellum highly polished with a greenish black hue, pile light brown in color; scutellum with slightly longer hairs; disc with about five faint transverse depressions; notopleura tubercle very prominent. *Wing.* Hyaline, stigma light brownish; calypter dark brown, border black, fringe brownish; plumule light brown; halteres yellowish red, knob slightly brownish.

Legs. Yellow to reddish; pro and mesofemora and tibia yellow; metafemora yellow on basal 1/3, with a darker apical smudge on outside, pile sparse, long, black on dark areas; metatibia yellow on middle 1/4; tarsi yellow.

Abdomen. Somewhat spatulata, opaque black but shining alongside; with two pairs of yellow maculae located in the anterior corners of 3rd and 4th tergum; yellow pilose and rather elongate alongside of 2nd tergum; sterna polished, the incisure between the 2nd and 3rd sternites yellow; genitalia polished black, with black pile; male genitalia as figured (Fig. 12C).

Female. The pollen on face is whitish, as is also the pile; front is wide with two large dark brown pollinose spots, which are narrowly connected and are located in front of ocelli; a narrow band of white pollen separates the dark spots from ocelli, and a narrow brown vitta runs from the median ocellus to highly polished lunule. Mesonotum more shining blackish, with vittae bluish in color and pile all white. The abdomen is more oval, semi-shining on disc, highly polished alongside; yellow spots often obscured.

Types: Holotype, male, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, V-2-1937, F. Plaumann, (BMNH). Allotype, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, V-2-1937, F. Plaumann, 1 ♀ (BMNH). Paratypes, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, V-3-1937 and IX-1-1938, F. Plaumann, 11 ♂ (BMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VI-X-24-1937 and 1938, F. Plaumann, 15 ♀ (BMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VI-24-1937 and VII-29-1938, F. Plaumann, 1 ♂, 1 ♀ (AMNH); Santa Catarina, Nova

Teutonia, 27°2'60.00"S, 52°23'60.00"W, 500m, 1964-1974, F. Plaumann, 1♂ (USNM ENT58844).

Non-type material. ARGENTINA: Tucuman, Burreyacu, Quebrada La Toma, 26°29'57.93"S, 64°44'30.99"W, 526m, XII-21-1950, R. A. Golbach, 2♂, 1♀ (WIRC); Tucuman, Burreyacu, Villa Padre Monti, II-5-1948, R.A. Golbach, 1♂, 2♀ (WIRC). **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, XII-1971, F. Plaumann, 1♂, 3♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, VI-1964, F. Plaumann, Det. J. R. Vockeroth, 1♂ (CNC 112208); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, XI-1969, F. Plaumann, Det J. R. Vockeroth, 1♂ (CNC 112209); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, IX-1962, F. Plaumann, Det. J. R. Vockeroth, 1♀ (CNC 112210); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, 1964-1974, F. Plaumann, 22♂, 12 ♀ (USNM).

Etymology. The specific epithet is derived from the Latin *macula* meaning spot, stain, mark (Brown 1956: 502), and the Latin suffix *-tus* denoting having the nature of, pertaining to (Brown 1956: 45, 822) and it refers to the characteristic abdominal maculae.

Length. (5): body, 5.4-6.1; wings, 3.8-4.5 mm.

Distribution: Argentina, Brazil.

***Argentinomyia catabomba* Williston, 1891**

Figures 5Q, 8D, 10G, 12D.

Melanostoma catabombum Williston, 1891: 12, holotype Six males and three females – Mexico: Guerrero, Omiltemi, 8000 ft; Amula, 6000 ft. (BMNH) & (AMNH).

Rhysops catabomba Fluke, 1945: 5 (redescription), fig. 2 (head)

Rhysops catabomba Thompson 1976: 42 (catalogue).

Differential diagnosis. Scape and basoflagellomere of equal length. Protarsus dark. Wing hyaline, almost bare on basal 2/3 or more. Abdomen with rounded yellow maculae on 3rd-4th tergum.

Description. Male. Head. Face black, sides of frontal triangle and of face thickly covered with uniform yellow pollen, leaving a spot in the middle above antennae and a broad median stripe below shining, somewhat metallic black; gena semi-shining; frontal triangle with black pile; ocellar triangle blue metallic with thin brownish pollen, pile black; occiput with yellow hairs above, long cilia black, pollen and pile paler below; antennae red, basoflagellomere largely blackish above; scape about as long as the oval basoflagellomere, distinctly longer than pedicel; arista yellow at base and dark on apical third, pilose.

Thorax. Bronze to aeneous, mesonotum shining, yellow pilose; with three brownish vittae on anterior half, the median one slender (a lo largo del torax), side broadly brownish pollinose, pile yellow brownish; pleura of a similar colour in middle, more steel-blue below, posterior margin of anepisternum slightly reddish, grey pollines; scutellum shining steel-blue, yellowish pilose; fringe long and yellow. *Wing.* Hyaline, stigma brown narrow cloud at the tip in front

blackish, almost bare on basal 2/3 or more; calypter white, border brownish, fringe brownish; plumule white, halteres orange yellowish, knob slightly yellowish.

Legs. Yellow to reddish; pro and mesofemora brownish basally; pro and mesotarsus, except part or all of basal segments, blackish; metafemora brown except yellow apically; metatibia yellow on basal 1/4; basal two segments of tarsi yellow.

Abdomen. Rather narrow, its greatest width at distal end of 3rd tergum; opaque black; 1st tergum and hypopygium shining metallic; 2nd tergum on lateral margin in front metallic; 3rd and 4th each with a pair of moderately large, rounded yellow maculae anteriorly, touching lateral the margin; pile alongside long and light yellow; sterna blackish, yellow pilose, genitalia as figured (Fig. 12D).

Female. Front and sides of face whitish-pollinose; on upper part of former, below ocelli, an opaque black cross, band, with a point projecting downwards in middle. Thorax and scutellum moderately shining, greenish-blue; mesonotum with three darker stripes, the median one is linear. Abdomen subopaque, black, 1st and 5th tergum more shining; the oval maculae of 3rd and 4th tergum not touching lateral margin; 2nd tergum with a yellow maculae on each side in front.

Types: Holotype, male, **MEXICO:** Guerrero, 18°38'18.46"N, 99°50'36.73"W, 2438m, VII-1-1903, H. H. Smith. Allotype, **MEXICO:** Guerrero, Amula, 18°38'18.46"N, 99°50'36.73"W, 1829m, VII-1-1903, H. H. Smith 3♂ (BMNH). Paratype: **MEXICO:** Guerrero, 18°38'18.46"N, 99°50'36.73"W, 2438m, VII-1-1903, H. H. Smith, 6♂ and 3♀ (AMNH). Syntypes, **MEXICO:** Guerrero, Xucumanatlan, 17°34'33.43"N, 99°36'28.28"W, 1900m, VII-1-

1903, H. H. Smith, 8, (BMNH). Cotype, **MEXICO**: Guerrero, Omiltene, 17°34'6.51"N, 99°38'53.99"W, 2400m, VIII, H.H. Smith, Williston Collector, 1♂, (AMNH 19161).

Non-type material. MEXICO: Chiapas, San Cristoban de las Casas, L. C. Huitepec, 16°44'3.64"N, 92°42'5.73"W, 2510m, II-26-2011, P. Sagot, 12♂, 11♀ (ECO-TAP-E); Mexico Parque, along L. Zempoala, 19°55'1.06"N, 98°40'10.91"W, 2463m, VIII-10-11-1989. A.L. Norrbom. Sweeping *Dahlia imperialis* Roezl ex *Ortgies* (Asteraceae) (89 M12) (USNM); Oaxaca, Valle Nacional, 17°46'31.08"N, 96°18'9.17"W, 94m, VII-29-1992, M. Wood, 1♀ (CNC).

Etymology. The specific epithet is derived from the Greek *kata* meaning down, against, very (Brown 1956: 189), and the Latin *bombus* denoted a booming, humming, buzzing (Brown 1956: 155).

Length. (8): body, 8-10 mm; wings, 7.5-8.1 mm.

Distribution: Mexico

***Argentinomyia lanei* Fluke, 1936**

Figures 5R, 8E, 10H, 12E.

Melanostoma lanei Fluke, 1936: 61, holotype male – Brazil: Sao Paulo (AMNH). – Fluke, 1936: 61, figs. 4 (abdomen), 5 (head); 1945: 26, fig. 14 (head).

Rhysops lachrymellea Hull, 1942b: 10, holotype male – Brazil: Sao Paulo Oct-1940, J. Lane (AMNH). Paratypes: two females from Nova Teutonia, Brazil, 1937, F. Plaumann (AMNH).

Rhysops lanei Fluke, 1958: 277, figs. 103 & 104 (male genitalia).

Rhysops lanei Thompson, 1976: 43 (catalogue).

Differential diagnosis. Face with low tubercle, one transversal groove, similar to *scitula* Will; Scutum bronze reticulate with brown vittae. Metafemur at least 1/4 yellow basally. Abdomen narrowed toward the base, with three pairs of oval maculae.

Fluke Description. Male. Head. Face black, covered with white pollen which is slightly brownish alongside; mid-stripe metallic black, bare, violet margined, reaches from oral edge to just above the flat tubercle and then forks so that there is a median dash of pollen extending from antennae almost to the tubercle; a large shining spot above the antennae, with a single transverse groove; pile of head all pale except a few black hairs on vertical triangle and on antennae; gena black, covered with white pollen which is slightly brownish; ocellar triangle black with thin yellowish pollen, pile yellow; occiput with yellow hairs above, pollen and pile paler below; antennae yellow, basoflagellomere brown above; pedicel and scape sub equal, together about the length of basoflagellomere; arista yellow at base and dark on apical third, pilose.

Thorax. Punctulate, dull grey except on sides which are more aeneous, yellow pilose; with three brownish vittae on anterior half, a median slender brown vittae (extending a long way along the thorax), on each side a wider brownish vitta; pleura shining aeneous, posterior margin of

anepisternum somewhat reddish, pollen whitish and sparse; scutellum punctulate, shining greenish-brassy to aeneous. *Wings.* Hyaline, stigma slightly yellowish; calypter yellow whitish, border white yellowish, fringe white; plumula white; halteres yellow, knob orange to reddish.

Legs. Pro and mesolegs light orange-brown; metafemora brown except yellow on basal 1/2 and on tip; metatibia black to brownish; tarsi infuscated; pile pale, no peculiar hairs present.

Abdomen. Slender, narrowed toward the base, semishining black with three pairs of elongate, slightly oblique, yellow maculae, large lateral maculae on 2nd tergum separated by a 1/3 of segment's width and covering entire lateral margin but attenuated posteriorly; on 3rd tergum larger, more narrowly separated, oblong and somewhat oblique; the pair that posteriorly diverge and turn out to the lateral margin in middle of segment, basal corners of this segment are dark; 4th tergum with quite similar maculae which however, do not reach lateral margin; sterna yellowish orange, sterna 4th yellow basally and brown on apical 3/4; pile short and yellow; cercus and surstyles yellowish to reddish, male genitalia as figured (Fig. 12E).

Female. Very similar, front more brownish pollinose and there is a definite dark brown transverse band just in front of median ocellus. There are indications of small yellow maculae on 5th tergum. Scutellum apex with a pair of slender bristle yellow.

Types. Holotype, male, **BRAZIL:** Sao Paulo, I-1-1930, J. Lane, 1 ♂ (AMNH). Alotype: **BRAZIL:** Sao Paulo, I-1-1930, J. Lane, 1 ♀ (Hull's collection). Paratype, **BRAZIL:** Sao Paulo, I-1-1930, J. Lane, 1 ♂ (Collection of Instute Sao Paulo, Brazil).

Non-type material. ARGENTINA: Tucunam, Burruyacu, Villa Padre Monti, I-17, II-7-1948, Coll. R. Golbach, Det. C.L. Fluke, 1951, 1 ♂, 1 ♀ (FSCA). **BRAZIL:** Santa Catarina, Nova

Teutonia, 26°38'40.00"S, 50°45'37.02"W, 530m, IX-1948, A. Maller, 1♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'56.58"S, 52°25'17.11"W, 300-500m, XI-1952, F. Plaumann, Det. J. R. Vockeroth, 2♂ (CNC 112201; CNC 112202); Santa Catarina, Nova Teutonia, 27°2'56.58"S, 52°25'17.11"W, 300-500m, IX-1969, F. Plaumann, Det. J. R. Vockeroth, 1♀ (CNC 112203); Santa Catarina, Nova Teutonia, 27°2'56.58"S, 52°25'17.11"W, 857m, 1964-1974, F. Plaumann, 23♂, 7♀ (USNM).

Etymology. Patronymic. Named after the taxonomist and morphologist J. Lane who described four of original five species of Syrphidae and many other species of insects from the Neotropics.

Length. (4): body, 6.3-7.4 mm; wings, 5.9-6.7 mm.

Distribution: Argentina (Formosa, Salta, Tucuman), Brazil.

***Argentinomyia fastigata* Fluke, 1945**

Figures 5T, 6T, 8G, 10I, 12F.

Rhysops fastigatus Fluke, 1945: 4, holotype male – Brazil, Santa Catarina, Nova Teutonia.

(AMNH). – Fluke, 1945: 4, figs. 4 (head), 37 (abdomen)

Rhysops fastigata 1958: 277, figs. 99 & 100 (male genitalia).

Rhysops fastigatus Thompson *et al.* 1976: 43 (catalogue).

Differential diagnosis. Related to *longicornis* Williston and *peruviana* Shannon. Face less punctate in male; scape a little longer than basoflagellomere but shorter than pedicel and basoflagellomere together; pro and mesofemora entirely yellow; abdomen with oblique yellow macula on 3rd tergum of male, a pair on 2nd-3rd terga of female, notopleural tubercle is very prominent.

Description. Male. Head. Face shining black with coppery reflections alongside, mid-stripe bare, shining; pollen on sides of face white, lightly punctate, and with a rather large triangular bare spot above; facial pollen ripple like; a heavy white patch next to the eyes which connects narrowly to a brown pollinose spot in ocular corners of front; this spot of pollen extends toward the antennae as a fine point and is present in a longitudinal groove; tubercle low and with two three faint transverse grooves, two just above the tubercle and a third near the antennae; Pile of face and gena whitish, of front black, gena black, almost bare, slightly covered with white pollen; occiput heavily pollinose; ocellar triangle blue-black, the pile sparse and black; antennae yellow, dark on apex and upper half of basoflagellomere; scape curved, longer than basoflagellomere, shorter than basoflagellomere and the pedicel together.

Thorax. Shining greenish black, mesonotum brownish pollinose anteriorly; with two dark brown vittae on anterior half, which begin at the transverse suture and narrow to obscurity about half-way to scutellum, pile yellow, long; pleura mostly shining, pollinose on mesopleura and hypopleura, pile long, yellow with slighty black tips, underhanging hairs long; scutellum greenish black shining, slightly rugose on apical 1/2, pile long and yellow, fringe long and yellow. *Wings.* Hyaline, faint clouds at the cross veins; stigma yellow brownish; calypter black,

the basal corner yellow, border brownish, fringe brownish; plumule white; halteres orange yellow, knob slightly brownish yellow.

Legs. Yellow to brownish; pro and mesofemora and tibia orange brown; metafemora yellow on basal 2/3, all metatibia and apical two or three tarsal segments brown, pile brown, long on apical 1/3 of femur and basal 1/3 of tibia.

Abdomen. Oval, with a very short and scanty pilosity; except 1st and 2nd tergum laterally with long pilosity; 2nd tergum with a pair of small yellow macula on each side; 3rd tergum with a pair of oval, yellowish macula, pointed at either end, diagonally placed; suggestions of similar metallic pollinose macula on 4th and 5th tergum; sterna yellow; male genitalia as figured (Fig. 12F).

Female. Front with two rounded brown pollinose maculae just below the shining blue ocellar triangle; between them a narrow pollinose streak reaching to the shining arc above antennae. Mesonotum with three brown vittae, two laterals reaching almost to the scutellum and the median one very slender and reaching from the fore to the rear margin. Abdomen with a pair of yellow oblique maculae on 2nd-3rd terga. an additional isolated one on 2nd tergum, more slender than on 3rd tergum.

Types: Holotype, male and female, **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'59.99"S, 52°24'0.01"W, 857m, VII-4-1937, F. Plaumann (AMNH). Allotype: Santa Catarina, Nova Teutonia, X-17-1936, F. Plaumann, 1♀ (AMNH). Metatype: Santa Catarina, Nova Teutonia, 27°2'59.99"S, 52°24'0.01"W, 857m, VII-18-1937, F. Plaumann, 1♀ (AMNH).

Non-type material. ARGENTINA: Tucumán, Villa Nougés, 26°50'60.00"S, 65°22'59.99"W, 1426m, R.K. I-1929, 1♂, 1♀ (WIRC); **BRAZIL:** Santa Catarina, Nova Teutonia, 27°2'59.99"S, 52°24'0.01"W, 857m, VII-1964, F. Plaumann, 1♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'59.99"S, 52°24'0.01"W, 857m, 1964-1971, F. Plaumann, 2♂, 3♀ (USMN); Santa Catarina, Nova Teutonia, 27°2'59.99"S, 52°24'0.01"W, 300-500m, IV-1969, F. Plaumann, Det. J. R. Vockeroth, 1♂ (CNC 112198); Santa Catarina, Nova Teutonia, 27°2'59.99"S, 52°24'0.01"W, 300-500m, IV-1969, F. Plaumann, Det. J. R. Vockeroth, 1♂ (CNC 112199); Santa Catarina, Nova Teutonia, 27°2'59.99"S, 52°24'0.01"W, 300-500m, VI-1969, F. Plaumann, Det. J. R. Vockeroth, 1♀ (CNC 112200); Sao Paulo, Pto Albano, Pres. Epitacio, Rio Parana, 21°48'19.11"S, 52°14'1.39"W, 267m, X-1954, J. Lane, 2♂ (WIRC). **COLOMBIA:** Guarne, Piedras Blancas, 6°16'23.48"N, 75°29'12.62"W, 2445m, (MEPB 3788; 3784). **PERU:** Cuzco, Machu Picchu, 13°9'50.55"S, 72°32'45.10"W, 2300m, X-21-24-1972, P. Wygodzinsky, 1♂ (AMNH).

Etymology. The specific epithet is derived from the Latin *fastigatus* meaning sharpen to a point (Brown 1956: 317), and it refers to the characteristic facial points.

Length. (5): body, 7.4-8.3 mm. Wing 5.8-6.5 mm.

Distribution: Argentina, Brazil, Peru.

Argentinomyia longicornis Walker, 1836

Figures 5U, 6U, 8H, 10K, 11G.

Pipiza longicornis (Walker), 1837: 343, holotype male – "South America" (BMNH). – Fluke, 1945: 3, fig. 1 (head), 1958: 268, 278, figs. 4, 14, 133 (male genitalia); Thompson *et al.* 1976: 43 (catalogue); Borges & Pamplona, 2003: 164, figs. 2 (antenna), 3 (abdomen).

Melanostoma longicornis Williston, 1888: 263 (preocc. Walker, 1837), holotype male and female – Brazil: Mato Grosso, Chapada (AMNH).

Argentinomyia grandis Lynch Arribálzaga, 1892b: 255 (1892c: 156), holotype female – Argentina, Misiones, Fracrao, J. B. Ambrosetti (MACN). **Syn. nov.**

Braziliana vittithorax Hull, 1937a: 176, holotype female – Guatemala: Antigua, VI-17-1923, E.G. Smyth (USNM No. 51376). – Hull, 1937a: 176, fig. 9 (head).

Xanthandrus biguttatus Hull, 1945: 44, holotype female – Paraguay: Molino-Cue. (MCZ). – Borges & Pamplona, 2003 (Synonym and status).

Argentinomyia longicornis Thompson 1976, 46-57. Included in Microdontinae, as subgenus of *Aristosyrphus* Curran.

Differential diagnosis. Very similar to *A. fastigata* Fluke and *A. peruviana* Shannon, distinguished externally by the face punctate, with white pollen, low tubercle, face with two or three quite faint depressions above the tubercle, scape equal to the pedicel and basoflagellomere together. Frontal triangle broad on male. Abdomen with a pair of yellow macula on 3rd tergum, notopleural tubercle very prominent. Pro-femora black on basal 1/3 or more, mesotarsus with apical 3 tarsomeres black.

Description. Male. Head. Face shining black, white to black pilose, sparse white pollinose; mid-stripe bare and shiny; tubercle low with two or three faint transverse grooves, black, thinly whitish pollinose and brownish pilose; pollen on sides of face white, with large bare punctate maculae, the outer margin metallic stripe coppery; a heavy white patch next to the eyes which connects narrowly to a brown pollinose spot in the ocular corners of front; pile of front black; front below and at the vertex shining metallic, bluish black; vertex quite swollen, brilliant shining; ocellar triangle blue-black, pile dense and black; occiput black, heavily pollinos; antennae light brownish yellow except basoflagellomere brownish on apical 3/4, brown pilose; scape elongate, slightly curved basally, as long or longer than basoflagellomere, pedicel short, basoflagellomere rounded; arista about as long or longer than pedicel, yellow at base and dark on apical third, pilose.

Thorax. Shining metallic bronze green, but little shining; postpronotum dark brown to black, yellow whitish pilose; mesonotum with three faint brownish pollinose vittae on anterior half, the median one slender and dilated triangularly in front of scutellum, running full length, the lateral ones beginning broadly at the suture and attenuated posteriorly, pile longer yellowish, with lateral sides yellowish pollinose; notopleural tubercle very prominent; scutellum shining metallic blue blackish; highly polished, pile entirely yellowish, with pile longer and scattered around the disc, with about four faint transverse depressions. Pleuron silver dusted except on totally bare and brilliant anterior anepimeron, white-yellowish pollinose on anepisternum, katepisternum, meron, katepimerum and metaepisternum, pile long, yellow with black tips, the underhanging hairs long. *Wings.* Hyaline, tinged with yellow, stigma yellow brownish; calypter yellow, border brown, fringe yellow; plumule yellow, halteres yellow, knob brownish.

Legs. Yellow, or reddish yellow, pro and mesofemora brownish on basal 1/3; metafemur deep brown, except the base yellow, with long yellow brownish pilose on 2/3 of antero-apical surface; pro and mesotibia orange, yellow pilose; metatibia fully brown, brown pilose, metatarsus orange to brown, apical segments of other tarsi usually brownish; pile sparse, orange pilose ventrally and black pilose dorsally; front tarsi moderately dilated.

Abdomen. Abdomen less shining, 1st and 4th tergum shining green. 1st tergum metallic bronze green, laterally with long pilosity, medially bare; 2nd to 5th tergum opaque black, laterally with long pilosity; 2nd tergum approximately 2x broader than long, with a thin pollinose line along each side; 3rd tergum with a pair of oblique yellow macula extending from base to apical 1/3; 4th and 5th tergum with a pair of triangular pollinose macula on basal 2/3; 5th tergum shorter than 4th; sterna of all segments metallic bronze green with long yellow pilosity; sterna grey yellow.

Female. *Head.* Face shining black, sometimes bluish; in the middle and a stripe on gena bare; on sides rather thickly pollinose; front with two maculae of brown pollen just below the shining blue ocellar triangle; between the two maculae is a narrow brown pollinose streak reaching to the shining arc above the antennae, this spot of pollen extends toward the antennae as a fine point and is present in a longitudinal groove. The shining facial carina bisected above by a median dash of pollen which reaches to the middle depression. Ocellar triangle brownish pilose, short, not directed forward.

Thorax. Ground color on mid-dorsum steel blue, shining, whitish dusted anteriorly and around the shining anterior thoracic tubercle. Scutellum shining metallic blackish blue.

Abdomen. Oval, with a very short and scanty pilosity; except 1st and 2nd tergum laterally with long pilosity; 2nd tergum with a pair of small yellow macula on each side; 3rd tergum with a pair of oval, yellowish macula, pointed at either end, diagonally placed; suggestions of similar metallic pollinose macula on 4th and 5th tergum, which cannot be made out very definitely.

Types. Holotype, male and female, **BRAZIL:** Mato Grosso, Chapada (AMNH).

Non-type material. BRAZIL: Rio Grande do Sur, Chapada, 28°3'31.21"S, 53°3'57.45"W, 459m, 18xx, S. Williston, 2♀ (Collection Curran, Ace 31144, AMNH); Santa Catarina, Caúna, 26°20'60.00"S, 50°53'0.00"W, 752m, XII-1945, A. Maller, 1♂ (AMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, 1936, F. Plaumann, 1♂, 3♀ (AMNH); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, 1965-1971, F. Plaumann, 5♂, 2♀ (USNM); Santa Catarina, Nova Teutonia, 27°2'60.00"S, 52°23'60.00"W, 300-500m, 1938-1952, F. Plaumann, 1♂, 1♀ (WIRC); Sao Paulo, Pompeia, 22°6'25.62"S, 50°10'35.62"W, 553m, XI-1939, Barreta, 1♂, 2♀ (WIRC); Sao Paulo, S. Roque, 23°32'42.26"S, 46°37'47.60"W, 793m, XII-1946, J. Lane, 1♂ (WIRC). **COLOMBIA:** Valle del Cauca, Bet. Queremal and Buenaventura, 3°52'44.50"N, 76°41'29.64"W, 1000-1300m, 1938, Herbert F. Schwarz, 1♀ (AMNH). **COSTA RICA:** Provincia San Jose, Chimirol de Rivas, Alrededores de la casa de Anibal Picado, 9°26'0.62"N, 83°37'25.01"W, 1100m, X-8-9-1995, A. Picado, 1♂ (USMN 6312); Provincia Puntarenas, Prov. Gravel Pit near Las Alturas, 8°51'22.04"N, 82°51'1.03"W (GPS), 1600m, VIII-16-1995, M.A. Metz, 3♀ (USMN); Provincia Puntarena, cerca al cerro Pittier, 9°2'58.56"N, 82°56'55.52"W, 2000m, VII-27-1995, E. Alfaro, 1♀ (USMN 5930); Provincia Puntarena, cerca al cerro Pittier, 9°1'46.07"N, 82°58'5.85"W, 1670m, VI-26-1995, L. Agudelo & M. Zumbado, 2♀ (USNM5976; USNM6027); Provincia Puntarena, Colonia

Coto Brus, Cerro Chai, 9°0'46.26"N, 82°55'59.18"W, 2100m, VIII-12-19-1995, M.A. Zumbado, 1♀ (USMN6283); Provincia Puntarena, Finca Cafrosa, Tajo 1km Oeste, 8°54'33.80"N, 82°57'53.74"W, 148-1500m, IX-30-1998, E. Navarro, 1♂ (USMN51733); Provincia Puntarenas, Jardin, Las Cruces, 6km S. Sanvitoon Rt16, 8°47'28.15"N, 82°57'19.27"W, 1224m, V-29-31-1987, A.L. Norrborm, M.A. Condon & R. Mexzon, 1♀ (USMN); Provincia San Jose, Las Nubes, Estación Santa Elena, 10°2'54.64"N, 83°58'8.59"W, 1210m, VII-5-21-1996, M. Segura, 1♀ (USNM7888). **ECUADOR:** Napo, Talag, 0°44'39.55"S, 78° 6'41.44"W, 750m, VI-11-1994, I. Benitez, 1♂ (QCAZ); Puyo, Oriente, 1°13'17.84"S, 78°36'46.22"W, 3000m, XII-1-1938, F. M. Brown, 1 ♀ (AMNH). **PERU:** Cuzco, Paucartambo, Puente San Pedro (60km NW Pilcopata), 13° 2'26.81"S, 71°33'35.71"W, 1600m, IX-3-1988, A. Freidberg, 7♀ (USNM).

Etymology. The specific epithet is derived from the Latin *longius* meaning longer (Brown 1956: 494), the Latin *cornu* meaning horn (Brown 1956: 231), and the Latin adjectival suffix *-is* denoting with, having, nature of (Brown 1956: 443), it refers to the longer antennae.

Length. Body 7.5-9.0 mm. Wing 5.5-7.1 mm.

Distribution: Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Paraguay, Peru.

***Argentinomyia peruviana* Shannon, 1927**

Figures 5V, 6V, 8I, 10L.

Braziliana peruvianus Shannon, 1927a: 7, holotype male – Peru: Rio Charape (USNM).

Rhysops peruviana Fluke, 1945: 4. **Syn. nov.**

Rhysops peruvianus Thompson *et al.* 1976: 44 (catalogue).

Differential diagnosis. Closely allied to the *A. longicornis*. Face less punctate; scape shorter, a little longer than basoflagellomere but shorter than pedicel and basoflagellomere together. Pro and mesofemora entirely yellow. Abdomen with a pair of oblique yellow maculae on 3rd tegum (♂), a pair on 2nd and 3rd tergum (♀).

Description. Male. Head. Face shining black, white to black pilose, sparse white pollinose; mid-stripe bare and shiny; tubercle low with two or three faint transverse grooves, black, thinly whitish pollinose and brownish pilose; pollen on sides of face white, with large bare punctate maculae, outer margin with violet and coppery reflections; a heavy white patch next to the eyes which connects narrowly to a brown pollinose spot in the ocular corners of front; pile of front black; front below and at the vertex shining metallic, bluish black; vertex quite swollen, brilliant shining; ocellar triangle blue-black, pile dense and black; occiput whitish pollinose and white pilose, only black pilose on upper 1/3; antenna elongate and slender, scape more than four times as long as broad, rather gently but distinctly bent basally, outer 2/3 directed obliquely downward; pedicel less than 1/2 the scape length; basoflagellomere nearly as long as the scape; arista nearly equal to the combined length of first two segments, yellow at base and dark on apical third, pilose.

Thorax. Bronzy aeneous, mesonotum semi-shining; with a pair of rather broad but very indistinct, pollinose vittae, brownish pilose; pleura shining black with a light coating of white to

brownish pollen, mesopleura with brownish metallic reflections, yellow pilose anepisternum posterior desnudo y brillante; scutellum shining, slightly rugose on apical 1/2, pile long and yellow, fringe long and yellow, pile of thorax entirely. *Wing*. Entirely brownish, stigma light brownish; calypter dark brown, border black, fringe brownish; plumule light brown; halteres yellowish red, knob slightly brownish.

Legs. Prolegs golden yellow, metafemora yellow on basal 1/3, yellow on tip; metatibia and apical two or three tarsal segments brown; pile brown, long on apical 1/3 of metafemur.

Abdomen. Very slightly constricted, blackish; 3rd tergum with a pair of rather obscure yellow maculae; sterna yellow ; male genitalia as figured (Fig. 12G).

Types. Holotype, male **PERU**: Rio Charape, 6°21'32.89"S, 78°19'26.46"W, 1000m, IX-13-1927, C. H. T. Townsend (USNM No. 28755)

Non-type material. **PARAGUAY**: Col. Independencia, 25°41'43.02"S, 56°15'33.85"W, 189m, VI-25 to VII-26, J. Foersten, 1♂ (WIRC). **PERU**: Cuzco, Quincemil, 12°40'20.79"S, 70°47'9.73"W, 780m, VIII-13-31-1962, L.Pena, 1♀ (CNC).

Etymology. The specific epithet is derived from the country's name where the species was found, Peru, and the Latin suffix *-anus* denoting pertaining to or belonging to (Brown 1956: 45, 94), it refer to the country where the holotype was collected.

Length. (2): body, 7.3-8.2 mm; wings, 7.1-7.6 mm.

Distribution: Paraguay, Peru.



Figure 5. Male head, frontal view. A. *A. altissima*, B. *A. bolivariensis*, C. *A. browni*, D. *A. rex*, E. *A. luculenta*, F. *A. tropica*, G. *A. opaca*, H. *A. rugosonasa*, I. *A. crenulata*, J. *A. nigrans*, K. *A. neotropica*, L. *A. lineata*, M. *A. pollinosa*, N. *A. praeusta*, O. *A. currani*, P. *A. maculata*, Q. *A. catabomba*, R. *A. lanei*, S. *A. scitula*, T. *A. fastigata*, U. *A. longicornis*, V. *A. peruviana*.



Figure 6. Female head, frontal view. A. *A. altissima*, B. *A. bolivariensis*, C. *A. browni*, D. *A. rex*, E. *A. octomaculata*, F. *A. luculenta*, G. *A. tropica*, H. *A. opaca*, I. *A. rugosonasa*, J. *A. crenulata*, K. *A. testaceipes*, L. *A. nigrans*, M. *A. neotropica*, N. *A. lineata*, O. *A. pollinosa*, P. *A. praeusta*, Q. *A. jamaicensis*, R. *A. currani*, S. *A. maculata*, T. *A. catabomba*, U. *A. lanei*, V. *A. fastigata*, W. *A. longicornis*, X. *A. peruviana*.



Figure 7. Abdomen, male, dorsal view: A. *A. altissima*, B. *A. bolivariensis*, C. *A. browni*, D. *A. rex*, E. *A. luculenta*, F. *A. tropica*, G. *A. opaca*, H. *A. rugosonasa*, I. *A. nigrans*, J. *A. neotropica*, K. *A. lineata*, L. *A. pollinosa*.



Figure 8. Abdomen, male, dorsal view: A. *A. praeusta*, B. *A. currani*, C. *A. maculata*, D. *A. catabomba*, E. *A. lanei*, F. *A. scitula*, G. *A. fastigata*, H. *A. longicornis*, I. *A. peruviana*.



Figure 9. Abdomen, female, dorsal view: A. *A. altissima*, B. *A. bolivariensis*, C. *A. browni*, D. *A. rex*, E. *A. octomaculata*, F. *A. luculenta*, G. *A. tropica*, H. *A. opaca*, I. *A. rugosonasa*, J. *A. crenulata*, K. *A. testaceipes* L. *A. nigrans*.



Figure 10. Abdomen, female, dorsal view: A. *A. neotropica*, B. *A. lineata*, C. *A. pollinosa*, D. *A. praeusta*, E. *A. jamaicensis*, F. *A. currani*, G. *A. catabomba*, H. *A. lanei*, I. *A. fastigata*, J. *A. thiemei*, K. *A. longicornis*, L. *A. peruviana*.

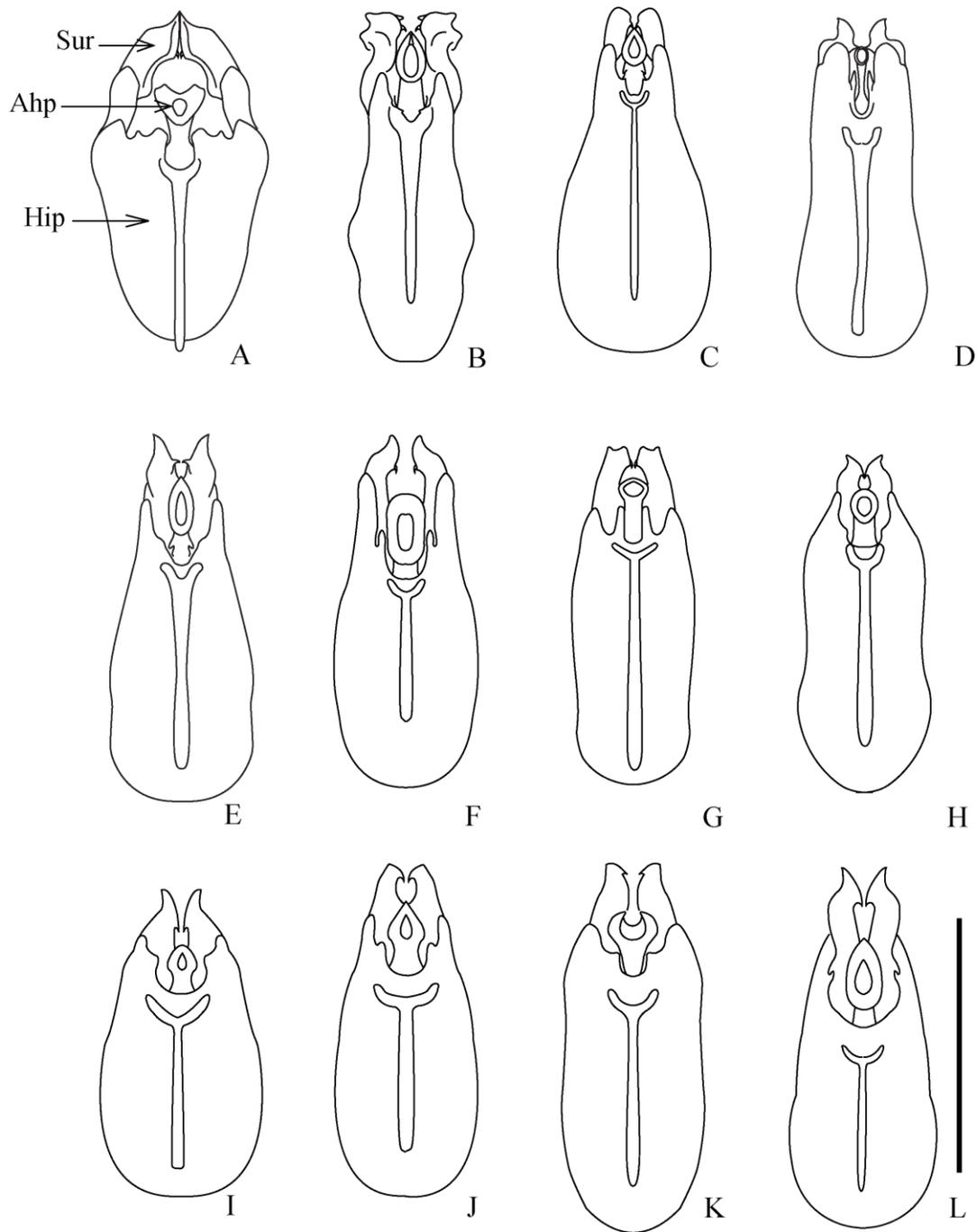


Figure 11. Male genitalia, dorsal view: A. *A. altissima*, B. *A. bolivariensis*, C. *A. browni*, D. *A. rex*, E. *A. luculenta*, F. *A. tropica*, G. *A. opaca*, H. *A. rugosunasa*, I. *A. crenulata*, J. *A. nigrans*, K. *A. neotropica*, L. *A. lineata*, M. *A. pollinosa*. Scale bar: 1 mm. (ahp: apex of hypandrium; hip: hypandrium; led: aedeagal lobe; sur: surstylus).

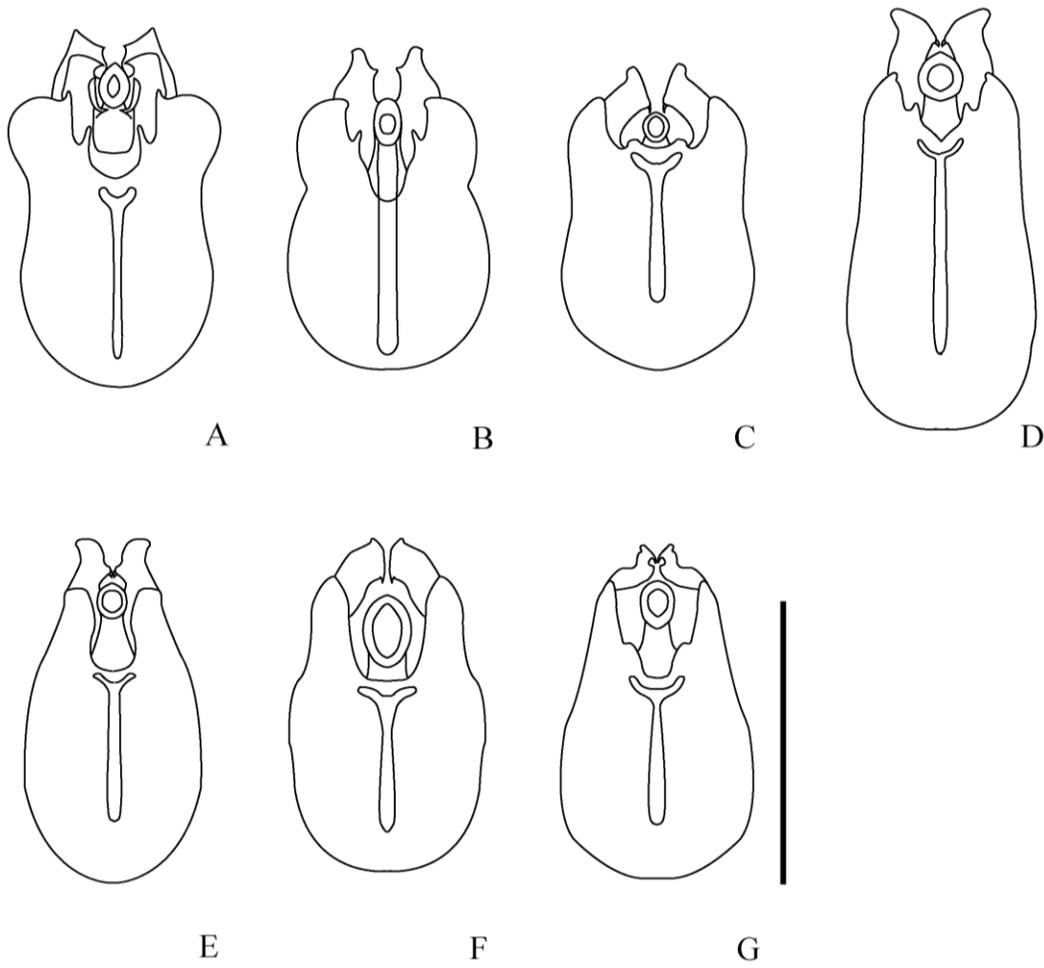


Figure 12. Male genitalia, dorsal view: A. *A. praeustra*, B. *A. currani*, C. *A. maculata*, D. *A. catabomba*, E. *A. lanei*, F. *A. fastigata*, G. *A. longicornis*.

4.3. Key to species of *Argentinomyia*

Adapted from original description (Fluke 1945).

1. Antenna elongated, scape generally longer than wide; face vertical, not produced ventrally, often with transverse grooves (Figs. 6J-K); female scutellum usually with two setulose hairs (Figs. 7E-I, 9 E-L)..... 2
 - Antenna short, scape wider than long; face at most with parallel sides or widened below, usually slightly produced ventrally, always without transverse grooves (Figs. 5A-F, 6A-H); scutellar pile longer than the marginal bristles (Figs. 7A-D, 9 A-D)..... 25
2. Scape about as long as pedicel and basoflagellomere combined, scape usually twice as long as pedicel (Figs. 5I, 5S-V, 6J-K, 6T-X)..... 3
 - Scape much shorter than pedicel and basoflagellomere, scape never twice as long as pedicel (Figs. 5E-R, 6H-S)..... 7
3. Metafemur black; pedicel and basoflagellomere about equal in length; face with seven or eight shallow transverse grooves above tubercle (Figs. 5I, 6J); wings with two short, narrow, transverse brown bands near the middle on the anterior half (Bolivia, Costa Rica, Mexico)..... ***crenulata* Williston, 1891**
 - Metafemur yellow basally; basoflagellomere twice as long as pedicel; face at most with one trasversal groove above tubercle (Fig. 6K); wings with at most only a faint brownish clouding on anterior crossvein..... 4

4. Sides of face evenly white pubescent, not punctuate; frontal prominence greatly produced, female front wide (Fig. 6K); arista bare; mesonotum highly polished; anterior anepimeron pilose; mesofemur without long yellow pile (Argentina, Brazil)..... *testaceipes* Lynch Arribálzaga, 1891
- Sides of face punctuate (Figs. 5T-V, 6T-V); front slightly produced; arista with pile evident; mesonotum at least partly pollinose, usually vittate; anterior anepimeron bare; mesofemur with long yellow pile..... 5
5. Abdomen with two pairs of large triangular macula on 3rd-4th terga (Fig. 6S); (Brazil, Colombia)..... *thiemei* Enderlein, 1938
- Abdomen with a pair of oblique maculae on 3rd-4th terga (Figs. 8H, 10K, 8I, 10L)..... 6
6. Profemora wholly yellowish; male frontal triangle narrow (Fig. 5V); mesotarsus with apical 3 tarsomeres yellow, abdomen with maculae on 2nd tergum (Paraguay, Peru)..... *perviana* Shannon, 1927
- Profemora black on basal 1/3 or more; male frontal triangle broad (Fig. 5U); mesotarsus with apical 3 tarsomeres black, abdomen without maculae on 2nd tergum (Argentina, Brazil, Colombia, Ecuador, Guatemala, Mexico, Trinidad & Tobago)..... *longicornis* Walker, 1836
7. Face, scutellum and pleuron black 8
- Face, scutellum and pleuron partially pale in color, usually yellow or yellowish-brown in ground color (Mexico)..... *octomaculata* Enderlein, 1938

8. Facial pubescence punctuate (Figs. 5T and 6V)..... 9
- Facial pubescence not punctuate (Figs. 5H, 5K-N, 6I, 6L-P)..... 10
9. Abdomen with oblique oval maculae, male with a pair on 3rd tergum, female with a pair on 2rd-3th terga (Fig. 10I); profemora yellow (Argentina, Brazil, Peru)..... ***fastigata* Fluke, 1945**
- Abdomen with large triangular macula cover with gray pollen on 2th tergum; profemora brownish on basal 1/2 (Colombia, Ecuador)..... ***columbiana* Enderlein, 1938**
10. Face with at least five transverse grooves (Figs. 5H, 6I), metabasitarsus black or dark brown, not contrasting with tibia and/or rest of tarsus 11
- Face with no more than four and usually with two shallow grooves or less (Fig. 5K-L, 6I-N)..... 12
11. Antenna reddish orange below; face with 5 or more grooves (Figs. 5H, 6I); at least the metatarsi wholly brownish yellow or reddish; abdomen with metallic maculae (Fig. 7H, 9I) (Costa Rica, Mexico)..... ***rugosonasa* Williston, 1891**
- Antenna black; face with four grooves; tarsi black with the basal segments reddish yellow; abdomen with only metallic posterior fasciae (Costa Rica)..... ***melanocera* Williston, 1891**
12. Pro- and mesofemura black or at least mostly dark brown..... 13
- Pro- and mesofemura yellow or orange yellow..... 17

13. Metafemur yellow on the basal 1/4, pro- and mesofemura broadly yellow apically; abdominal maculae lineate (Figs. 7K, 10B) (Brazil, Bolivia)..... ***lineata* Fluke, 1937**
- At most only the apex or narrow base yellow on the metafemur 14
14. Antennae entirely black; small black species with tubercle well-rounded, deeply concave above, face without distinct transverse grooves (Figs. 5G-6H) (Ecuador)..... ***opaca* Fluke, 1945**
- Antennae reddish, at least below on the basoflagellomere; tubercle with transversal grooves..... 15
15. Protibia largely black or brown 16
- Protibia yellow 18
16. Abdomen black, female with yellowish maculae on the basal corners of 2th tergum (Figs. 7I, 9L) 17
- Abdomen with large yellow triangular maculae, male with two pairs on 2nd-3th tergum, female with three pairs on 2nd-4th tergum, (Figs. 7J, 10A) (Argentina, Brazil)..... ***neotropica* Curran, 1937**
17. Abdomen dull black in color and only feebly shining down the middle; wing heavily tinged with brown which is darker upon the middle and in the costal, marginal and submarginal cells and is still darkened upon all of the crossvein and upon the stigmal portion of the subcostal cell (Brazil)..... ***funerea* Hull, 1949**

- Abdomen black, female with yellowish red triangles maculae in the basal corner of 2th tergum, reaching over the sides and 1/2 of length segment (Figs. 7I, 9L); wing only tinged with brown, extensively hyaline (Brazil)..... *nigrans* **Fluke, 1945**

- 18. Larger species (7 to 10 mm); metafemur at least one-half black, either basally or apically, abdomen with oblique maculae 20

- Small species (< 6.5mm); metafemur yellow with a black apical ring, abdomen with triangular maculae..... 19

- 19. Abdomen with quadrate maculae on 3th-4th terga; mesotibia mostly brownish (Figs. 8A, 10D); female front with a white pollinose line medially directed (Fig. 6P) (Cuba, Dominican Republic, Jamaica)..... *praestra* **Loew, 1866**

- Abdomen with triangular maculae on 3th-4th terga (Fig. 8C); metatibia mostly yellow; female front with two rounded pollinose maculae (Fig. 6S) (Argentina, Brazil)..... *maculata* **Walker, 1852**

- 20. Metafemur at least one-fourth yellow basally..... 23

- Metafemur black, only the narrow base yellow; yellow maculae on 3rd tergum separated by more than the width of spots (Figs. 8D-F, 10G-H)..... 21

- 21. Facial pubescence golden and very thick, pile of front yellow; abdomen a pair of vittae maculae on 2nd-4th terga (♂) (Ecuador)..... *festiva* **Fluke, 1945**

- Facial pile thinner and more whitish, pile of front black (Fig. 5S); abdomen with a pairs of yellow maculae on 3rd-4th terga (Figs. 8D-F, 10H)..... 22

22. Basoflagellomere as long as the scape and pedicel combined (Fig. 5S); protarsus wholly yellow; wings with two short, transverse maculae in front of the median half, extensively micotrichose (Brazil, Ecuador)..... ***scitula* Williston, 1888**
- Scape and basoflagellomere of equal length (Fig. 5Q); protarsus dark; wing hyaline, without such markings, extensibly bare on basal 2/3 or more (Costa Rica, Mexico)..... ***catabomba* Williston, 1891**
23. Mesonotum reticulate (Argentina, Brazil)..... ***lanei* Fluke, 1936**
- Mesonotum pollinose 24
24. Abdominal macula vittate (Figs. 7L, 10L); female front with a complete transverse black fascia (Fig. 6O) (Argentina, Brazil)..... ***pollinosa* Hull, 1942**
- Abdominal macula triangular and located on the basal corners (Fig. 10F); female front with two rounded opaque brown spots (Fig. 6R) (Brazil)..... ***currani* Fluke, 1937**
25. Antennae entirely black (Figs. 5D, 6D); surstyles three to four times longer than wide (Fig. 11D) (Ecuador)..... ***rex* Fluke, 1945**
- Antennae partialy pale ventrally, at least below on the basoflagellomere (Figs. 5A-C, 6A-C); surstyles no more than two times longer than wide..... 26
26. Pro- and mesofemora black to brown, at least on the basal fourth..... 30
- Pro- and mesofemora yellow, tibiae entirely pale orange to yellow..... 27

27. Abdominal maculae separated by less than its width, extending from the base to the apex of the segments (Ecuador, Galapagos Island)..... ***agonis* Walker, 1849**
- Abdominal maculae separated by more than its width, extending from the base to the apical 1/3 or less (Figs.7C, 9C)..... 28
28. Face above tubercle carinate; without iridescent reflections; gena brown to black (Figs. 5C, 6C); elongate species, more than 10mm (Brazil, Colombia, Ecuador).... ***browni* Fluke, 1945**
- Face transversely rounded, not carinate; with iridescent reflections; gena orange to yellow (Figs. 5E-F, 6F-G)..... 29
29. Mesofemur reddish or yellowish on the basal half; apex of aedeagus rounded (Fig. 11F) (Argentina, Ecuador, Brazil, Mexico)..... ***tropica* Curran, 1937**
- Mesofemur black, only very narrowly yellow basally; apex of aedeagus pointed (Fig. 11F) (Colombia, Ecuador)..... ***luculenta* Fluke, 1945**
30. Abdomen with maculae almost as wide as long, quadrate on 3rd terga (♂), female maculae triangular (Figs. 7A, 9A); facial pile mostly black (♂); apex of aedeagus widened and incised (Fig. 11A) (Colombia, Ecuador)..... ***altissima* Fluke, 1945**
- Abdomen maculae more slender, about two and one-half times as long as wide on 3th tergum, female abdomen generally black, at most with small reddish maculae (Fig. 9B); facial pile mostly yellowish except near antennae (Figs. 7B, 9C); apex of aedeagus pointed (Fig. 11B) (Colombia, Ecuador)..... ***bolivariensis* Fluke, 1945**

5. Filogenetic analysis

5.1. Preferred cladogram and character state optimizations

A matrix of 70 parsimony-informative characters was constructed for 41 terminal taxa, including 14 out-group species and 27 in-group species (Table 1 and 2). Parsimony was chosen as the optimality criterion for this study. We implemented a comprehensive search strategy (parsimony ratchet as implemented in TNT, see above ASADO) yielded a single most parsimonious cladogram (Fig. 1) with a length of 106 steps, a consistency index (CI) of 66, and a retention index (RI) of 90 (cf., Farris 1989). Bremer support values are mapped onto the internal nodes of the strict consensus tree, which also serves as the reference tree for addressing phylogenetic groups and relationships in this study (Fig. 13 & 14). The characters states and inferred optimizations are presented simultaneously in this section, and the consistency and retention indices for individual characters (CI and RI, respectively) are provided in cases of homoplasy. Characters 64 to 70 were coded as missing for *A. jamaicensis* (sp. nov.) and *A. octomaculata* due to the lack of male specimens. The subsequent discussion of synapomorphies is restricted to the in-group taxa.

General

0. Size, dorsal view: (0) average, > 7 mm and < 10 mm; (1) very large, > 11 mm; (2) relatively small, < 6.5 mm. State (1) is present in the *Talahua*; (2) is present in the *maculate* clade, with an apparent reversion in *A. currani* (CI=40; RI=50).

Head

1. Facial tubercle, shape, lateral view: (0) indistinct; (1) clearly recognizable. State (0) is present in *Leucopodella*.
2. Face production and tubercle shape, lateral view: (0) straight or slightly produced anteriorly, with a low and slightly prominent tubercle; (1) greatly produced anteriorly, with a very prominent and abrupt tubercle. Synapomorphy for the genus *Tuberculanostoma*.
3. Face, reflections pattern, front-lateral view: (0) opaque, without violet or coppery reflections; (1) with violet and coppery reflections. Convergently present in *Talahua*, *A. luculenta*-*A. tropica* and the *A. currani*-*A. peruviana* clade (CI=33; RI=87).
4. Face, violet and coppery reflections, shape, front-lateral view: (0) in the mind stripe; (1) restricted to the lateral sides of the mind stripe. Coded as inapplicable in taxa which face is opaque or without violet reflections (see character 4). Synapomorphy for the *A. luculenta*-*A. peruviana* clade.
5. Face, pollen, density, frontal view: (0) dense; (1) sparse. Convergently present in *A. crenulata*-*A. peruviana* clades, with an apparent reversion in *A. catabomba*-*A. lanei* clade (CI=50; RI=94).
6. Facial pubescence, lateral view: (0) pollen non-punctate; (1) pollen punctate. Synapomorphy for the *A. colombiana*-*A. peruviana* clade.

7. Facial pollinosity pattern below the antenna, frontal view: (0) completely pollinose above the tubercle; (1) with a partial bare area above the tubercle. Synapomorphy for the genus *Argentinomyia*.
8. Face, mid-stripe pollinosity pattern, frontal view: (0) with a very wide pollinose lateral area (1); with a narrow pollinose lateral area. Convergently present in *A. crenulata*-*A. peruviana* clade, with an apparent reversion in *A. catabomba*-*A. lanei* clade (CI=50; RI=90).
9. Face, with a triangular pollinose area to each side, just above antennal tubercle, lateral view: (0) absent; (1) present. Synapomorphy for the *A. longicornis*-*A. peruviana* clade.
10. Face, pollinose area below the antenna, frontal view: (0) a broad shining black mid-stripe one-third the width of face which reaching tubercle; (1) with the upper part forked by a broad dash of pollen reaching tubercle. Coded as inapplicable in taxa with a very wide pollinose lateral area (see character 10). Synapomorphy for *A. currani*-*A. peruviana* clade.
11. Face, mid-stripe pollinose pattern of the forked, frontal view: (0) with a broad dash of pollen reaching to the tubercle; (1) with a thin dash of pollen reaching the tubercle. Coded as inapplicable in taxa with a very wide pollinose lateral area (see character 10). Synapomorphy for the *A. praestra*-*A. jamaicensis* clade.
12. Face, transverse grooves above tubercle, lateral view: (0) without transverse grooves; (1) with shallow transverse grooves. Synapomorphy for the *A. rugosonasa*-*A. peruviana* clade.
13. Face, with a faint, slightly rugose area near to the gena, lateral view: (0) absent; (1) present. Synapomorphy for *Talahua*.

14. Face, anteclypeus, length related to its wide, ventral view: (0) short, approximately 2.5X longer than wide or less, parallel sides; (1) long, more than 3.5X longer than wide, apically narrower. Convergently present in *P. ecuadoriensis-Tuberculanostoma*, with an apparent reversion in *P. scutatus* (CI=50; RI=50).
15. Female front, presence of a pollinose pattern, frontal view: (0) absent; (1) present, with a complete transversal black fascia or two rounded maculae; (2) different, with a line medially directed. State (1) is present in the *A. octomaculata-A. peruviana* clade; (2) is present in the *A. praeustra-A. jamaicensis* clade (CI=100; RI=100).
16. Female front, pollinose pattern, frontal view: (0) with a complete transversal black fascia; (1) two rounded maculae. Synapomorphy present in *A. currani-A. peruviana* clade.
17. Female front, with a pollinose line medially directed, frontal view: (0) absent; (1) present. Synapomorphy for the *A. nigrans-A. peruviana* clade.
18. Female front, coloration of pollinose line, frontal view: (0) black; (1) white. Coded as inapplicable in taxa without a pollinose line medially directed (see character 18). Synapomorphy for the *A. praeustra-A. jamaicensis* clade.
19. Female front, with a mediolateral triangular pollinose white macula, frontal view: (0) absent; (1) present. State (1) present *Platycheirus-Xanthandrus* clade (CI=50; RI=90).
20. Front, area below the antenna, with a circular bare, frontal view: (0) absent; (1) present. Convergently present in the *A. crenulata-A. peruviana* clade, with an apparent reversal in *A. lineata-A. neotropica* clade (CI=50; RI=92).

21. Female front, with a narrow point projecting toward the antenna, frontal view: (0) absent; (1) present. Synapomorphy for the *A currani*-*A. maculata* clade.
22. Antennal tip, dorsal view: (0) separated; (1) confluent. Synapomorphy for the *Xanthandrus* clade.
23. Antenna length and shape, lateral view: (0) scape broader than long, basoflagellomere short and slightly oval; (1) scape much longer than broad, basoflagellomere usually long. Synapomorphy for the *Argentinomyia*.
24. Antenna, scape, length in relation to the pedicel and basoflagellomere, lateral view: (0) short, no longer more than the pedicel and basoflagellomere; (1) long, much longer than the pedicel and basoflagellomere. Convergently present in the *A. crenulata*-*A. testaceipes* and *A. thiemei*-*A. peruviana* clades (CI=50; RI=75).
25. Basoflagellomere, size, lateral view: (0) narrow; (1) large. Synapomorphy for *Talahua*.
26. Arita pubescence, lateral view: (0) bare; (1) with pile evident. State (0) is convergently present in *Tuberculanostoma*-*Xanthandrus* clade and the *A. currani*-*A. peruviana* clades (CI=50; RI=93).

Thorax

27. Scutum, presence of white pollinosity on the prostpronotum and notopleural region: (0) absent; (1) present. Synapomorphy for *Talahua*.

- 28.** Anterior anepimeron, pilosity, lateral view: (0) pilose; (1) bare. Synapomorphy for the *A. fastigata-A. peruviana* clade.
- 29.** Posterior spiracle, pile type, lateral view: (0) simple; (1) plumose. Synapomorphy for *Tuberculanostoma*.
- 30.** Postmetacoxal bridge, development: (0) incomplete, with a membranous area ventroposterior to bases of metacoxae; (1) complete. Synapomorphy for *Leucopodella*.
- 31.** Metastenum, development, ventral view (Thompson, 1972): (0) well development, with median portion broadly joined to lateral arm; (1) underdevelopment, with deep posterior incision on each side. Synapomorphy for *Melanostoma*.
- 32.** Metathoracic pleuron with fine piles, ventral to spiracle: (0) absent; (1) present. Convergenly present in *Baccha-Leucopodella* and the *Xanthandrus* clade (CI=50; RI=80).
- 33.** Scutellum, presence of a deep groove next to the rim (emarginate): (0) absent (1) present. Synapomorphy for *Talahua*.
- 34.** Scutellum, pilosity length regard to the marginal bristles, lateral view: (0) short; (1) long. Convergenly present in *Platycheiurs* and the *A. altissima-A. bolivariensis* clade (CI=50; RI=50).
- 35.** Scutellum coloration: (0) brown to black; (1) yellow orange. Convergenly present in *Melanostoma* and *A. octomaculata* (CI=50; RI=50).
- 36.** Scutum, coloration pattern: (0) with two white lines and the dark background; (1) with two or three lines and a metallic background. Convergenly present in *A. octomaculata-A. tropica* and *A. nigra-A. peruviana* clade clades (CI=50; RI=95).

37. Scutum, medium line size, dorsal view: (0) apically thin; (1) apically wide. Synapomorphy for the *A. scitula*-*A. peruviana* clade.

38. Scutum, lateral line length regard to the notopleural suture: (0) short, only reaching the suture; (1) long, crossing the suture. Synapomorphy for the *A. scitula*-*A. peruviana* clade.

39. Notopleural tubercle, shape, dorsal lateral view: (0) indistinct; (1) distinctive. The character is present in most of the Melanostomatini species sensu Hull, with an apparent reversal in the *Tuberculanostoma*-*Baccha*-*Leucopodella* clade (CI=50; RI=80).

Wing

40. Alula size, dorsal view: (0) narrow to absent, narrow than cell; (1) wide, wider than cell. Synapomorphy for the *Baccha*-*Leucopodella* clade.

Legs

41. Legs coloration, lateral view: (0) with at least some dark markings; (1) entirely yellow. Convergenly present in *M. scalare*, *A. altissima*-*A. rex* and *A. currani*-*A. peruviana* clades (CI=33; RI=88).

42. Proleg in male, frontal-lateral view: (0) simple, with slender male tarsi and tibiae; (1) modified, with broadened male protarsus and tibiae. Synapomorphy for *Tuberculanostoma*-*Platycheirus*, with an apparent regain in *T. antennatum* (CI=50; RI=50).

43. Metacoxal pilosity on apical posteromedially angle, latero-ventral view: (0) bare; (1) pilose. Convergently present in *Leucopodella* and the *Xanthandurs-Talahua* clade (CI=50; RI=80).

44. Metafemur, with long yellow pile, lateral view: (0) absent or short; (1) present and long. Synapomorphy for *A. colombiana*-*A. peruviana*.

Abdomen

45. Abdomen, shape, dorsal view: (0) parallel-sided or narrowly oval; (1) distinctly petiolate, petiolate much narrower than thorax. Synapomorphy for the *Baccha-Leucopodella*.

46. Tergum I, antero-tergite shape, dorsal view: (0) antero-tergite almost fused with tergite I; (1) antero-tergite free. Synapomorphy for *Talahua*.

47. Tergum I, with a lateral semitriangular yellow macula, dorsal view: (0) absent (1) present. Convergently present in *Talahua* and *A. octomaculata*-*A. tropica* clade (CI=50; RI=75).

48. Tergum II with lateral lineal macula, Tergum III-IV oblique maculae, dorsal view: (0) absent; (1) present. Synapomorphy for the *A. catabomba*-*A. lanei* clade.

49. Tergum III, with a pair of basal oblique maculae, dorsal view: (0) absent or different; (1) present. Synapomorphy for the *A. catabomba*-*A. peruviana* clade.

50. Tergum III-IV, with a pair of triangular maculae in the latera edge, dorsal view: (0) absent or different; (1) present. Convergently present in *A. neotropica* and the *A. currani*-*A. maculata* clade.

- 51.** Tegum I-V, macula coloration, dorsal view: (0) metallic; (1) yellow to orange. Convergetly present in *B. elongata*-*A. tropica* and *A. bolivia sp nov*-*A. peruviana* clade, with an apparent reversal in *A. jamaicensis* (CI=25; RI=66).
- 52.** Tergum I-IV, maculae pattern, dorsal view: (0) less than four or absent; (1) with four, usually with a pair of small maculae in the basal corners. Convergetly present in the clade *T. fervid*-*A. tropica* (CI=50; RI=91).
- 53.** Tegum I-IV, presence of lineal maculae, dorsal view: (0) absent or different (1) present. Convergetly present in *A. altissima*-*A. browni*, *A. luculenta*-*A. tropica* and *A. lineata*-*A. pollinosa* clades (CI=33; RI=71).
- 54.** Tegum II-IV, with a pair of rectangular maculae, dorsal view: (0) absent or different; (1) present. Synapomorphy for *A. browni*-*A. bolivariensis* clade.
- 55.** Tegum II-IV, with a pair of big semicircular maculae, dorsal view: (0) absent or different; (1) present. Synapomorphy for *Talahua* clade.
- 56.** Tegum III, presence of a small square maculae, dorsal view: (0) absent or different; (1) present. Synapomorphy for *A. maculate*-*A. praestra* clade.
- 57.** Tegum III, presence of obliqua maculae, dorsal view: (0) absent or different; (1) present. Synapomorphy for the *A. scitula*-*A. peruviana* clade.
- 58.** Tegum V, macula present, dorsal view: (0) absent; (1) present. Convergetly present in *Talahua*, *A. octomaculata*-*A. tropica* and *A. neotropica*-*A. pollinosa* clades (CI=33; RI=71).

59. Tegum III-IV, with a pair of triangular maculae in the lateral edge, dorsal view: (0) absent or different; (1) present. Synapomorphy for the *A. currani*-*A. maculate* clade.
60. Tegum II-IV, with semitriangular maculae, dorsal view: (0) absent or different; (1) present. Synapomorphy for *A. octomaculata*-*A. tropica* clade.
61. Tegum II-V with medial subshiny black area, dorsal view: (0) absent or different; (1) present. Synapomorphy for *A. opaca*-*A. testaceipes* clade.
62. Abdomen with only a pair of oblique maculae in tergum II, dorsal view: (0) absent or different; (1) present. Synapomorphy for the *A. longicornis*-*A. peruviana* clade.
63. Sternum I-V, coloration pattern, ventral view: (0) concolor, black or yellow; (1) with a median black line along each segment. Synapomorphy for *Melanostoma* and *A. .*

Male genitalia

64. Superior lobe, shape, lateral view: (0) without a ventral extension; (1) with a ventral extension. Synapomorphy for *Argentinomyia*.
65. Superior lobes shape, lateral view: (0) triangular to irregular in shape; (1) crescent-shaped or L-shape. Synapomorphy for *Platycheirus*.
66. Gonostylus shape, lateral view: (0) stout with a hook-like process; (1) usually slender with a hook-like process. Synapomorphy for *Platycheirus*-*Tuberculanostoma*.

- 67.** Surstylus shape, lateral view: (0) not forked and with a single broad lobe; (1) forked and with a long, slightly curved lateral lobe. Synapomorphy for *Platycheirus*.
- 68.** Surstylus shape, lateral view: (0) sub-oblong, ventral and dorsal margins almost parallel; (1) ventral and dorsal margins similar (square-like). Synapomorphy for *Argentinomyia*.
- 69.** Surstylus, shape lateral view: (0) short, usually thin or triangular; (1) longer and wider. Synapomorphy for *Xanthandrus*.

Table 2. Character matrix for the cladistic analysis of the species of *Argentinomyia*, with selected outgroup taxa; all multistate characters are coded as additive; “-” represent inapplicable character states (see also text).

Taxon/ Character	5	10	15	20	25	30	35	40	45	50	55	60	65	70
<i>Trichopsomyia antillensis</i>	0000-	000--	--000	0-0-0	00000	01000	00000	00--0	00000	00000	00000	00000	00000	00000
<i>Tuberculanostoma antennatum</i>	0110-	000--	--001	0-0-1	00000	01001	00000	00--0	00000	00000	00000	00010	01100	00-00
<i>Tuberculanostoma browni</i>	0110-	000--	--001	0-0-1	00000	01001	00000	00--0	00010	00000	00000	00010	01100	00-00
<i>Platycheirus scutatus</i>	0100-	000--	--000	0-0-1	00000	01000	00001	00--1	00000	00000	00000	00100	11101	00-00
<i>Platycheirus ecuadoriensis</i>	0100-	000--	--001	0-0-1	00000	01000	00001	00--1	00010	00000	00000	00100	11101	00-00
<i>Baccha elongata</i>	0100-	000--	--000	0-0-1	00000	01000	10110	00--0	00010	10000	01000	00000	00--1	-----
<i>Leucopodella gracilis</i>	0000-	000--	--000	0-0-1	00000	01000	10110	00--0	10010	10000	01000	00000	00000	00-00
<i>Leucopodella delicatula</i>	0000-	000--	--000	0-0-1	00000	01000	10110	00--0	10010	10000	01000	00000	00000	00-00
<i>Xanthandrus nitidulus</i>	0100-	000--	--000	0-0-1	00100	00000	00110	00--1	10010	00000	01100	00011	00000	00-00
<i>Xanthandrus bucephalus</i>	0100-	000--	--000	0-0-1	00100	00000	00110	00--1	00010	00000	01100	00011	00000	00-00
<i>Talahua fervida</i>	11010	000--	--010	0-0-1	00000	10100	00010	00--1	00010	011000	01100	10010	00000	00000
<i>Talahua sp nov 1</i>	11010	000--	--010	0-0-1	00000	10100	00010	00--1	00010	01100	01100	10000	00000	00000
<i>Melanostoma mellinum</i>	0100-	000--	--000	0-0-0	00000	01000	01000	10--1	00000	00000	01100	00000	00000	00-01
<i>Melanostoma scalare</i>	0100-	000--	--000	0-0-0	00000	01000	01000	10--1	01000	00000	01100	00000	00000	00-01
<i>Argentinomyia altissima</i>	0100-	00100	0-000	0-0-0	00010	01000	00001	00--1	01000	00000	01111	01000	00010	01101
<i>Argentinomyia browni</i>	0100-	00100	0-000	0-0-0	00010	01000	00001	00--1	01000	00000	01111	01000	00010	10001
<i>Argentinomyia bolivariensis</i>	0100-	00100	0-000	0-0-0	00010	01000	00001	00--1	01000	00000	01111	01000	00010	10001
<i>Argentinomyia rex</i>	0100-	00100	0-000	0-0-0	00010	01000	00001	00--1	01000	00000	01111	01010	00000	10001
<i>Argentinomyia octomaculata</i>	0100-	00100	0-000	100-0	00010	01000	00000	11--1	00000	00100	01100	01000	00010	--00
<i>Argentinomyia luculenta</i>	01011	00100	0-000	100-0	00010	01000	00000	01--1	00000	00100	01110	01000	00010	10001
<i>Argentinomyia tropica</i>	01011	00100	0-000	100-0	00010	01000	00000	01--1	00000	00100	01110	01000	00010	-0000

Table 2. Continuation...

Taxon/ Character	5	10	15	20	25	30	35	40	45	50	55	60	65	70
<i>Argentinomyia opaca</i>	0100-	00100	0-000	100-0	00010	01000	00000	00--1	00000	00000	00000	01000	00010	00000
<i>Argentinomyia rugosonasa</i>	0100-	00100	0-100	100-0	00010	01000	00000	00--1	00000	00000	00000	01000	00010	00000
<i>Argentinomyia crenulata</i>	0100-	10110	0-100	100-0	10011	01000	00000	00--1	00000	00000	00000	01000	00010	00000
<i>Argentinomyia testaceipes</i>	0100-	10110	0-100	100-0	10011	01000	00000	00--1	00000	00000	00000	01000	00010	00000
<i>Argentinomyia nigrans</i>	0100-	10110	0-100	10100	00010	01000	00000	01--1	00000	00000	01000	01000	00010	00100
<i>Argentinomyia lineata</i>	0100-	10110	0-100	10100	00010	01000	00000	01--1	00000	00000	01000	01000	00010	00100
<i>Argentinomyia neotropica</i>	0100-	10110	0-100	10100	00010	01000	00000	01--1	00000	00000	01010	01000	00010	00100
<i>Argentinomyia pollinosa</i>	0100-	10110	0-100	10100	00010	01000	00000	01--1	00000	00000	01010	01000	00010	00100
<i>Argentinomyia currani</i>	01011	10110	10100	2-110	10010	00000	00000	01001	01000	00000	01000	01000	00010	01000
<i>Argentinomyia maculata</i>	21011	10110	11100	2-110	10010	00000	00000	01001	01000	00000	01000	01000	00010	01010
<i>Argentinomyia praeusta</i>	21011	11100	11100	11100	10010	00000	00000	01001	01000	00000	01000	01000	00010	01010
<i>Argentinomyia jamaicensis</i>	21011	11100	10100	11100	10010	00000	00000	01001	01000	00000	01000	---00	00---	-----
<i>Argentinomyia catabomba</i>	01011	00100	10100	11100	10010	00000	00000	01001	01000	00011	01000	01000	00010	00000
<i>Argentinomyia lanei</i>	01011	00100	10100	11100	10010	00000	00000	01001	01000	00011	01000	01000	00010	00100
<i>Argentinomyia scitula</i>	01011	10110	10100	11100	10010	00000	00000	01101	01000	00001	01000	01000	00010	0-000
<i>Argentinomyia columbiana</i>	01011	11110	10100	11100	10010	00000	00000	011-1	01001	00001	01000	---00	00---	-----
<i>Argentinomyia fastigata</i>	01011	11110	10100	11100	10010	00010	00000	01111	01001	00001	01000	01000	00010	01000
<i>Argentinomyia thiemei</i>	01011	11110	10100	11100	10011	00010	00000	01111	01001	00001	01000	01000	00010	0-000
<i>Argentinomyia longicornis</i>	01011	11111	10100	11100	10011	00010	00000	01111	01001	00001	01000	01000	00010	00000
<i>Argentinomyia peruviana</i>	01011	11111	10100	11100	10011	00010	00000	01111	01001	00001	01000	01000	00010	0-000

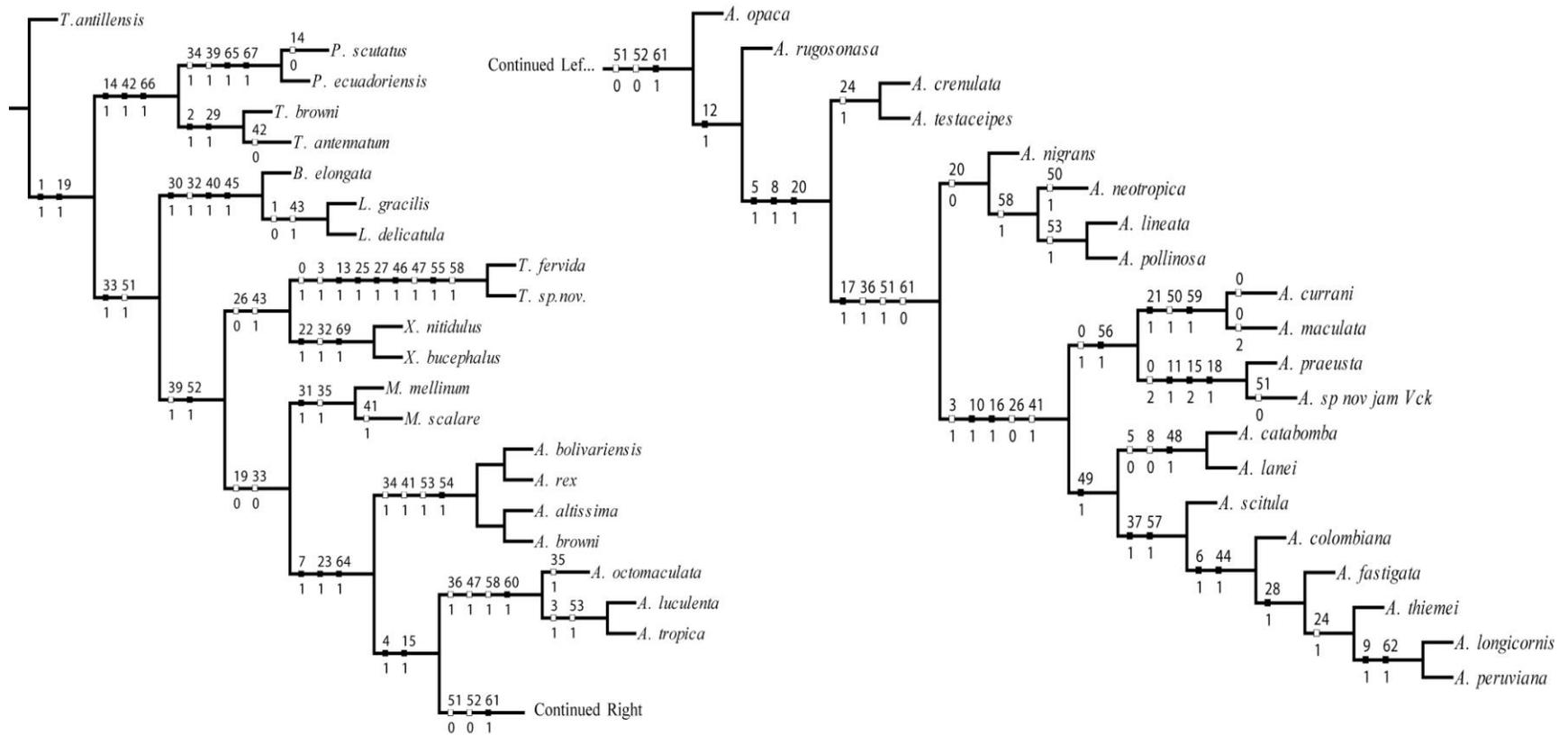


Figure 13. Phylogeny of the species of *Argentinomyia* and selected out-group taxa, according to the strict consensus tree (L= 106, CI= 66, RI= 90) of one most parsimonious tree. Characters 0, 1, 11, 19, 20, 32, 41 and 53 are mapped under ACCTRAN optimizations, whereas character 6 is mapped under DELTRAN optimization (Agnarsson and Miller 2008). All other characters have unambiguous optimizations. Black rectangles represent single, non-homoplasic character states transformations, and white rectangles represent multiple, homoplasic character states transformations. The numbers above and below each rectangle correspond to character number and states, respectively; the numbers displayed at the left end of each branch represent Bremer support values.

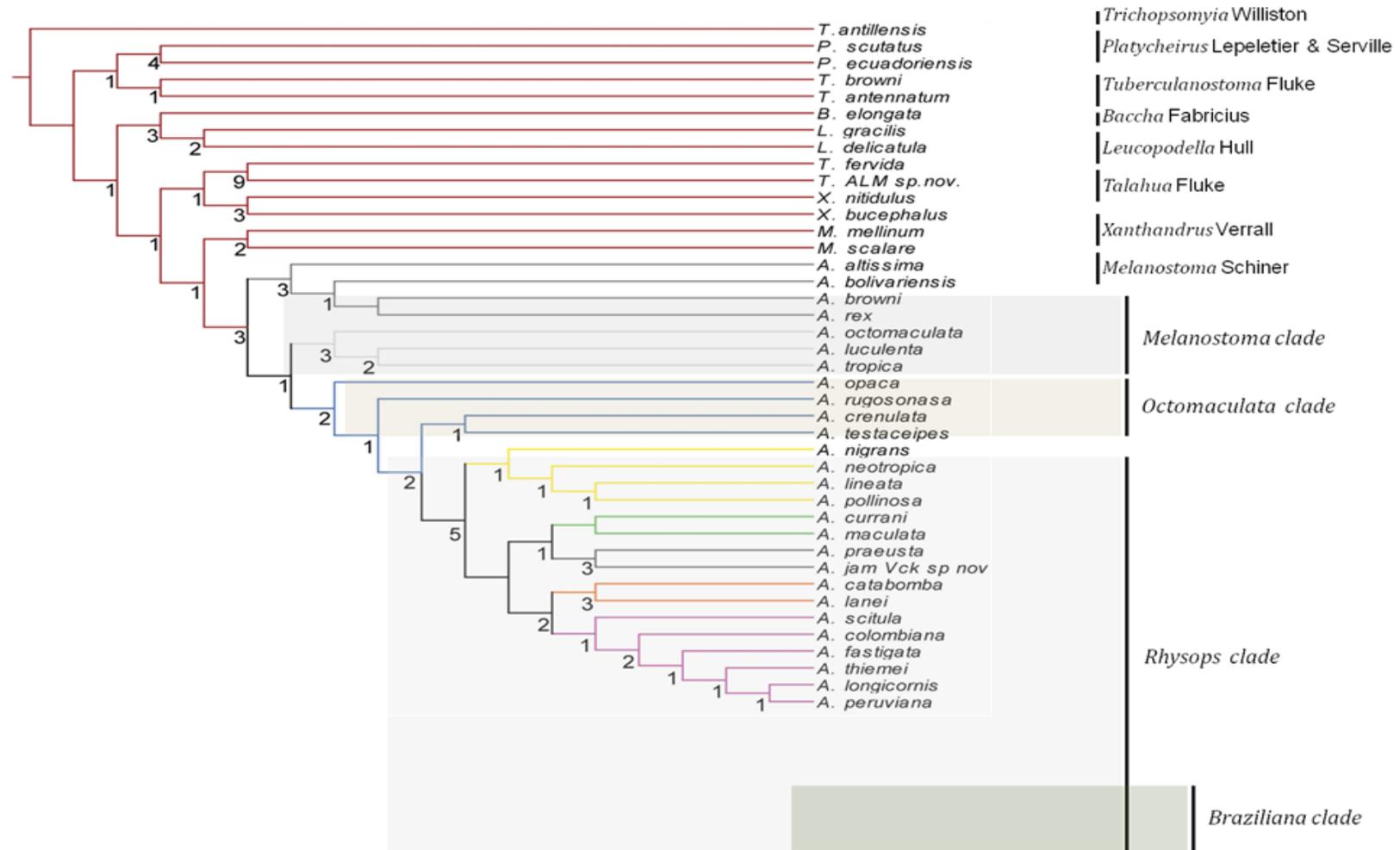


Figure 14. Phylogeny of the *Argentinomyia* species and selected out-group taxa according to the most parsimonious cladogram (L= 106, CI= 66, RI= 90). Numbers displayed above at the left end of each branch represent Bremer support values.

6. Discussion

6.1. Systematic Position of *Argentinomyia* and Related Bacchini Genera

Vockeroth (1969) suggest the classification of Bacchini as a union of the two tribes or perhaps a division into several tribes. In posterior analysis, Vockeroth (1992) found Bacchini as polyphyletic. In a recent study based on molecular evidence, the “traditional” Bacchini was recovers as a paraphyletic group and its reclassification was suggested (Mengual *et al.* 2008). A monogeneric tribe Bacchini, was proposed for the genus *Baccha* with the type species *Baccha elongate* (Fabricius) as initially suggested by different authors. The related genera were thus included in the tribe Melanostomatini as previously proposed by Williston (1887), Hull (1949a), Wirth *et al.* (1965), Vockeroth (1969), Thompson (1972), Shatalkin (1975), Thompson *et al.* (1976). In Mengual’s analysis (2008), the subtribes Melanostomina and Platycheirina formed monophyletic groups, respectively. *Xanthandrus*, *Argentinomyia* and *Melanostoma* formed a separate clade, the Melanostomatina *sensu* Shatalkin (1975). In posterior analysis, the inclusion of the Neotropical genus *Talahua* produced a new topology, with this as the sister group of *Xanthandrus*, both recovered as closed related to the *Argentinomyia-Melanostoma* clade (Mengual 2010).

Mengual’s analysis (2008), showed that the position of *Leucopodella* was inconsistent position although in previous analyses it was resolved as a single lineage. In posterior analysis, the genus was resolved in the same clade with *Baccha* (Mengual 2010).

Members of Platycheirina formed two separated but resolved clades (Mengual 2008), one including *Platycheirus* and *Pseudoplatycheirus* and another including *Pyrophaena*,

Rohdendorfia and *Spazigaster*, in accordance with Shatalkin (1975). In posterior analyses, Mengual (2010) and Young *et al.* (in preparation) included *Tuberculanostoma*, a genus previously included in Melanostomina (Shatalkin (1975)). *Tuberculanostoma* was considered as member of *Platycheirus* and thus was synonymized. The genus was considered as the most immediate relative of *Carposcalis* (a *Platycheirus* subgenus).

In our analysis, *Leucopodella* was placed in the basal position of Melanostomatina as the sister group of the genus *Baccha*. The genus *Leucopodella* was well-supported as well as the clade formed by *Leucopodella-Baccha* (Bremer 2, 3, respectively). Both genera share the following synapomorphic characteristics: abdomen distinctly petiolate, petiolate much narrower than the thorax and the postmetacoxal bridge complete. *Leucopodella* is characterized by the absence of a distinctive tubercle on face.

The Melanostomina subtribe was formed by two main clades: *Xanthandrus-Talahua* and *Melanostoma-Argentinomyia*.

Talahua was found to be the sister-group of *Xanthandrus* and formed a separated clade from the *Melanostoma-Argentinomyia* clade. The clade *Talahua-Xanthandrus* has a low support (Bremer 1) and is characterized by the presence of pilosity on the metathoracic pleuron, ventral to the posterior spiracle, in addition to the tergum II, longer than wide.

The *Talahua* clade has the highest branch support (Bremer 9) probably due to the high number of synapomorphies in the dataset concerning this genus. The monophyly of *Talahua* was supported by the following synapomorphies: face with a faint slightly rugose area near to the gena, basoflagellomere large, scutum with pollinosity restricted to the prostpronotum and

notopleural region, male genitalia large, with the superior lobes elongate and surstyles three to four times longer than wide. In addition, the arista is bare, and metacoxa with pile posteromedially on apical angle, character shared with *Xanthandrus*. This information contrasts previously suggested that “the distinctions between *Talahua* and *Argentinomyia* are not currently well understood. For practical purposes *Talahua* species should be treated at a species level within *Argentinomyia*”. Consequently, our *Talahua* is more complete than Fluke’s (1945; 1957) and Thompson’s (1999).

The *Xanthandrus* clade was well-supported (Bremer 3) and defined by three synapomorphic characters: antennal cavity confluent, Tergum II as long as segment wide, surstyles longer and wider apically.

Argentinomyia was corroborated as the sister-group of *Melanostoma* in accordance with previously work of Mengual *et al.* (2008). This relationship was supported by two homoplastic characteristics, the absent of a medio-lateral triangular pollinose macula on the female front, and the apparent lost of scutellum emargination next to the rim. The close relationship between *Argentinomyia-Melanostoma* clade and the *Xanthandrus-Talahua* clade was also evidenced in previous analyses of Mengual *et al.* (2008, 2010).

However, the monophyly of *Melanostoma* has a low Bremer support, probably due to the lack of synapomorphies for this clade (Bremer 2). *Melanostoma* was supported by the following unique morphological synapomorphy: metasternum greatly reduced, with deep posterior incisions lateral so that sclerotized portion consists of a median diamond-shaped area with narrow anterior and lateral strips (Andersson 1970; Thompson 2010). An additional homoplasy was the scutellum yellow, character shared with *A. octomaculata*.

In the subtribe *Platycheirina*, *Tuberculanostoma* was recovered in a separated clade with *Platycheirus* according to our phylogenetic hypothesis. The clade *Platycheirus-Tuberculanostoma* has a low support (Bremer 1) and was characterized by the presence of an elongated anteclypeus, more than 3.5X longer than wide, apically narrowed except in *P. scutatus*; protibia modified, with strong setae, except in *T. antennatus*, gonostylus usually slender with a hook-like process and aedeagus funnel-shape. The monophyly of *Tuberculanostoma* was supported by the notopleural tubercle indistinct, character present in most Bacchini species, and with an apparent reversal in *Tuberculanostoma*. The posterior thoracic spiracle is plumose in *Tuberculanostoma*. *Tuberculanostoma* has a good Bremer support (Bremer 1). *Platycheirus* synapomorphic characteristics include the superior lobes shape crescent-shaped and surstylus with a long, slightly curved lateral, forked. *Platycheirus* has a good Bremer support (Bremer 4).

6.2. *Argentinomyia* Monophyly

According to the strict consensus tree (Figs. 13 & 14) the monophyly of *Argentinomyia* was supported by four synapomorphies and has relatively high branch support (Bremer 3). There are several apparent synapomorphies for *Argentinomyia*, although all show reversals in at least one or more species. Synapomorphies include: the presence of a bare area under the antenna, elongated antenna, with scape much longer than broad, basoflagellomere usually elongate, female front with a pollinose pattern varied from a complete transversal black fascia, or two black brownish rounded maculae, face with transverse grooves, sometimes broadly punctuate reflections and with iridescent reflections, male genitalia with surstyles generally widen and irregular apically and the superior lobe is irregular in shape and has a ventral extension.

Additional homoplastic traits for the genus include the surstylus non-forked, generally short, superior lobes triangular to rectangular often irregular in shape. This new definition of *Argentinomyia* is more inclusive than Fluke's (1945; 1957) and Thompson's (1999), since it includes new characters that facilitate the identification and recognition of species within the genus and are sufficient to separate them from other Bacchini genera. In general, the resulting cladogram (Fig. 14), has a good Bremer support for several clades within the phylogeny (Bremer >2). However, the apical nodes have low support probably due to the high degree of homoplasy in the dataset.

Argentinomyia is composed of three major species groups: *Melanostoma*, "octomaculata" and *Rhysops*. The *Melanostoma* group includes the *browni* clade. The "octomaculata" group includes the species *A. tropica*, *A. luculenta*, *A. octomaculata*. The *Rhysops* group includes the clade *crenulata*, *neotropica*, *lanei*, *maculata* and *longicornis*, except *Argentinomyia opaca*. These groups are based on characters of the female head, abdominal pattern and male genitalia. Each group is named for the earliest-described species.

The most basal group of *Argentinomyia* was the *browni* clade which has a relatively high branch support (Bremer 3). The species in this clade are extremely similar morphologically, with several distinct synapomorphies: both sexes with face produced ventrally, opaque, without violet or coppery reflections, female pollinosity on front very diffused, without a pollinose pattern. Antennae partially yellow, at least below on the basoflagellomere, except completely black in *A. rex*. Scutellum with pilosity longer than the marginal bristles. Legs entirely yellow. Tegum I-IV, with lineal macula. We found no more than two synapomorphies within this group, probably

owing to the highly uniformity of the clade members. Species members: *A. altissima* Fluke, *A. rex* Fluke, *A. browni* Fluke, *A. bolivariensis* Fluke.

The second group, the *tropica* clade, is the sister-group of the *Rhysops* species group. The *tropica* clade is weakly supported (Bremer 3) by three homoplastic characteristics. In this clade, both sexes have face neither produced downward or carinated above tubercle. All females have a complete transversal black fascia on front. Face with violet and coppery reflections in *A. tropica* and *A. luculenta*, except in *A. octomaculata*. Legs with at least some dark markings, with the procoxa yellow in the anterior edge. Tergum I with semitriangular yellow maculae, the tergum V with a pair of yellow maculae. Species members: *A. octomaculata* Enderlein, *A. tropica* Curran, *A. luculenta* Fluke.

Argentinomyia opaca is sister-group of the remaining species of the *Rhysops* group. However, *A. opaca* was included in the *crenulata* clade despite being the only clade member with face nearly perpendicular, deeply concave above tubercle (see diagnosis). The *crenulata* clade is a weakly supported (Bremer 2) and presents the following synapomorphies: Face with transverse grooves (from one to seven or eight). Further evidence of a close relationship between *A. crenulata* and *A. testaceipes* is the scape long, much longer than the pedicel and basoflagellomere, a convergent character found also in the *longicornis* clade. Female front in the *crenulata* clade has a complete transversal black fascia. Antennae partially yellow, at least below on the basoflagellomere, except completely black in *A. opaca* and *A. crenulata*. Arita bare in *crenulata* and *testaceipes*. Tergum I-V, with metallic maculae and a medial subshiny black area. Species members: *A. opaca* Fluke, *A. rugosonasa* Williston, *A. crenulata* Williston, *A. testaceipes* Lynch Arribálzaga.

The *neotropica* clade has low branch support (Bremer 1) and it is defined by the following synapomorphic characteristics: Females of this group are distinguishable by the front pollinose pattern, with a complete transversal black fascia and a pollinose line medially directed. Front without a circular bare area below the antenna. Face with a narrow pollinose lateral area and a broad shining black mid-stripe one-third the width of face. Species: *A. nigrans* Fluke, *A. lineata* Fluke, *A. neotropica* Curran, *A. pollinosa* Hull.

The *maculata-lanei-fastigata* major clade is well-supported (Bremer 5) throughout the phylogeny. This major clade is supported by three synapomorphic and two homoplastic characters (Fig. 14). Face, mid-stripe with the upper part forked by a dash of pollen and violet and coppery reflection. Female front with two round macula. Scutum with a defined pattern. Legs entirely yellow.

The *maculata* clade has a low branch support (Bremer 1). The clade is characterized by a relative small body size (< 6.5 mm), except medium size in *A. currani*. Female front with a narrow point projecting toward the antenna and a white pollinose line medially directed. The arista is bare. Species members: *A. currani* Fluke, *A. maculata* Walker, *A. praeusta* Loew, *A. jamaicensis* (sp. nov.). The close relationship of *A. praeusta* Loew, *A. jamaicensis* was supported by presence of a white pollinose line medially directed in the female front. The clade *A. praeusta*-*A. jamaicensis* has a good support (Bremer 3)

The *lanei* clade is relatively well supported (Bremer 3). The species are characterized by the presence of following synapomorphies: face with violet and coppery reflections laterally to the tubercle and the mid-stripe with the upper part forked by a dash of pollen and a very wide

pollinose lateral area. Female with two rounded maculae. Facial pollen dense. Legs entirely yellow. Species members: *A. catabomba* Williston, *A. lanei* Fluke.

The *longicornis* clade has a low support (Bremer 1). The clade is defined by two synapomorphies: Face widely punctuate, except in *A. scitula*. Scape long, much longer than the pedicel and basoflagellomere except in *A. columbiana*, *A. fastigata*, *A. scitula* and *A. thiemei*. Arita bare in all species. Anterior anepimeron bare, except pilose in *A. columbiana* and *A. scitula*. Metafemur, with long yellow pile in all species except in *A. scitula*. Tergum II, with a pair of obliqua maculae. Species members: *A. scitula*, *A. columbiana*, *A. fastigata*, *A. thiemei*, *A. longicornis*, *A. peruviana*.

6.3. Relationships within *Melanostoma* and *Rhysops* species groups, with the inclusion of the *Octomaculata* species group

The *Melanostoma* species group *sensu* Fluke (1945: 11) was represented in the analysis by *A. altissima*, *A. bolivariensis*, *A. browni* and *A. rex*. This group was previously placed in the *Rhysops* group based on genital structures, with only *A. rex* included in the *Melanostoma* group (Fluke 1957). However, since the name *Rhysops* is only applicable to species with transverse grooves and long antennae, and *Melanostoma* include species with short antennae, face perpendicular or protruding, and abdomen narrower, we consider including the species listed above in the *Melanostoma* species group. Thus the remaining species, except *A. opaca* should be included in the *Rhysops* species group.

A new species group is proposed here and temporally denoted as “*Octomaculata*”. The species group includes *A. luculenta*, *A. tropica* and *A. octomaculata*.

An additional subgroup, *Braziliana* was defined by Curran (1925: 252) and followed by Enderlein (1938: 201) for the species *A. columbiana*, *A. thiemei*, *A. vittitorax* (now *A. longicornis*), *A. peruviana*. The *Braziliana* Curran’s (1937: 1) definition includes species with elongate antennae and quite faint depressions that suggest transversal grooves. This group was also characterized by the presence of punctuate metallic maculae on face. Fluke (1957) concluded that since the genitalia of *A. longicornis* Williston are not distinctive enough from *Braziliana* Curran to separate them, it would be considered of no generic value. In our analysis this group has a low branch support (Bremer 2).

Our division of *Argentinomyia* into species groups is consistent with that previously proposed by Curran 1937 and Fluke 1945, 1957, who stated that these should be treated as subgenera because “there are not doubts that *Rhysops* can be maintained as distinct from *Melanostoma*” (Fluke, 1957: 261).

6.4. Geographical Distribution of *Argentinomyia*

According to the available distributional data, the main *Argentinomyia* clades present the following patterns (Fig. 15):

The *browni* clade is mainly distributed in the high Andes at altitudes ranging from 2700 to 3240 masl (Colombia and Ecuador), with only *A. browni* extending its distribution to Southeast Brazil at 500 masl. This distributional pattern corresponds to the Biogeographical

region defined by Morrone (2001) and Sigrist & Carvalho (2009) as the AnMA – Andes and Central America (see map of Thompson 1997).

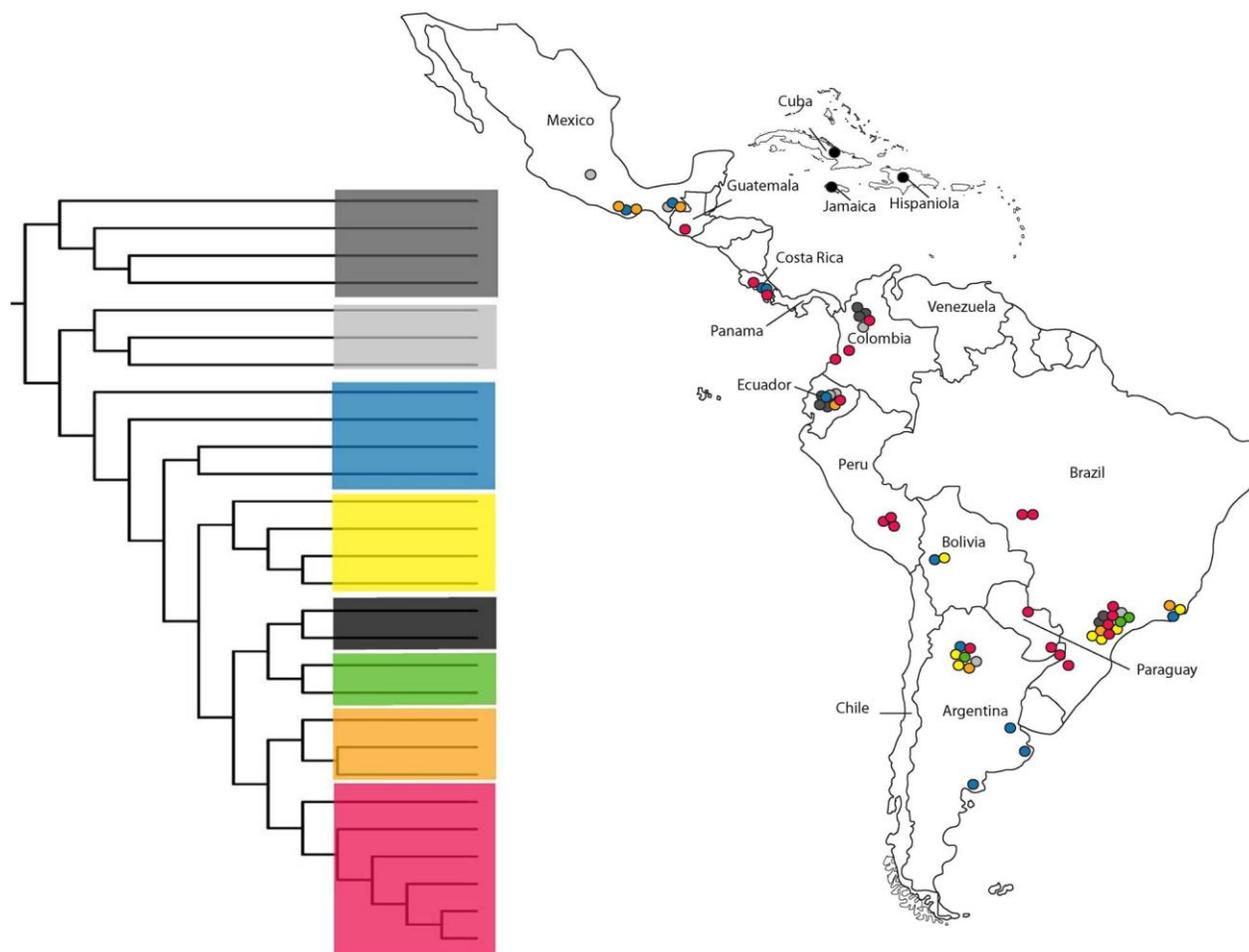


Figure 15. Distribution of *Argentinomyia* clades in the Neotropical region. Each *Argentinomyia* clade is represented by a dot in the map showing their geographical distribution. The dot color correspond to the clade presented in the cladogram. The clades are represented by colors as follows: *browni* (dark gray) *tropica* (light gray), *crenulata* (blue), *neotropica* (yellow), *maculata* (black and green), *lanei* (orange), *longicornis* (purple).

In the *tropica* clade, *A. octomacula* is restricted to the South region of Mexico. *Argentinomyia tropica* seems to have a wide distribution and is present in Argentina, Ecuador, Brazil and Mexico. *Argentinomyia luculenta* is restricted to the Andean areas in Colombia and

Ecuador, mainly distributed along the eastern slope of the Andes, ranging from 2200 to 2990 masl. The species in this clade seem to have overlapping distribution with those in *browni* clade.

The *crenulata* clade has a particular distributional pattern with *A. opaca* restricted to the high altitudes of Ecuador reaching above 3650 masl. *Argentinomyia rugosonasa* is restricted to Central America, in altitudes ranging from 1500 to 2990 masl. *A. crenulata* has a geographical distribution very similar to *A. rugonasa*, but in midlands at 1000-2438 masl. *Argentinomyia crenulata* has been collected in Bolivia, extending its distribution to southern latitudes. However, it seems that most species in the *crenulata* clade are distributed throughout the AnMA biogeographical region. Meanwhile, *A. testaceipes* is a Southern species, and has been only collected in Argentina and the Brazilian Atlantic Forest, behaving as a restricted species to the ArgSBR – Argentina/Southern Brazil or the Pampa biogeographical region (see Morrone 2001; Sigrist & Carvalho 2009 for a definition of these areas)

The *neotropica* clade is a restricted group and is confined to Argentina, Brazil and Bolivia. In this clade, all the species have been collected in Santa Catarina, Nova Teutonia (Southeast Brazil) and Tucuman, Burruyacu, Villa Padre Monti (Argentina at the eastern slope of the Andes), localities widely explored in the last 50 years (Marinoni & Thompson 2003).

In the *maculata* clade, *A. praeustra* and *A. jamaicensis* are restricted to the West Indies, in altitudes from 1100 to 2450 masl (Fig 15). Both species are the only *Argentinomyia* members in the Caribbean subregion (see Morrone 2001). *Argentinomyia maculata* and *A. currani* have only been found in the Southeast region of America, distributed mainly in Brazil. This area corresponds to the ArgSBR – Argentina/Southern Brazil or the Pampa region (Morrone 2001; Sigrist & Carvalho 2009). Although extensive collections are lacking, the distribution pattern

suggest that this group could also be present in Venezuela, Bolivia and probably Peru and Ecuador.

The *lanei* clade includes the Southern species *A. lanei*, distributed in Argentina and Brazil, and the Northern species *A. catabomba* only distributed in Mexico. This clade has a one of the widest distributional ranges, corresponding to three biogeographical regions, the AnMA, SWAm – Southwestern Amazonia, and the ArgSBR – Argentina/Southern Brazil.

In the *longicornis* clade, *A. fastigata* and *A. longicornis* are widely distributed species. *Argentinomyia fastigata* is restricted to South of the Panama Isthmus, while *A. longicornis* is present from Northwest Argentina and Brazil to the Yucatan Peninsula. In contrast, *A. thiemei* is distributed in Brazil and Colombia, while *A. colombiana* and *peruviana* seems to be restricted to the Andean countries. The *longicornis* clade has the widest distributional ranges and is found in at least four biogeographical regions, the AnMA, SWAm, ArgSBR, in addition to the southwest of Cerrado and the Atlantic Forest in Brazil.

The distributional patterns of *Argentinomyia* species are probably attributable to the altitudinal gradient as has been suggested for several syrphids flies by different author (Thompson 1997, Thompson *et al.* 2000, Nishida *et al.* 2002; Keil & Konvicka 2005; Montoya *et al.* 2012). In particular, all species in the *browni* clade and some species of the *tropica* and *crenulata* clades (*A. luculenta*, *A. opaca*, respectively) seem to be restricted to the Paramo ecosystem and are critical components of the Northern Andes biota. This pattern is probably explained by the ancient landmasses history such as the Andes formation and the subsequent isolation of the highlands. In this case, speciation events after dispersal/vicariance and subsequent radiation may have promoted the morphological changes in each clade.

In a hypothetical scenario, excluding the Northern species *A. octomaculata*, one could assume that there was a widespread ancestral species, which vicariated into 2 allopatric Andean components [$\text{Ancestral species} = (A. \textit{altissima} + (A. \textit{rex} + (A. \textit{browni} + A. \textit{bolivariensis}))) + (A. \textit{tropica} + A. \textit{luculenta})$]. Under these conditions, the high altitudes in the Andes probably promoted the radiation and speciation of both groups.

The distributional patterns of the sympatric species as *A. praeustra* and *A. jamaicensis* may be attributed to dispersion from Central America with the apparent connection to the island arcs of the West Indies resulting in posterior geographical isolation, vicariance and adaptive, radiation and speciation as suggested by Thompson (1972) and García-Casco *et al.* (2008).

In the Northern lands of Central American (Mexico to Costa Rica), six species are distributed, with three sympatric entities (*A. crenulata*, *A. catabomba*, *A. octomaculata*). It is important to note that in this region, as in the Andes region a high number of potential undescribed species have been collected in recent expeditions and surveys.

Finally, *A. testaceipes* and the clades (*A. currani*+*A. maculata*) and (*A. nigrans*+*A. lineata*+*A. neotropica*+*A. pollinosa*) are exclusively distributed in the Southern lands.

The restricted distribution of the Northern and Southern fauna could be explained by biogeographical barriers as well as events of vicariance, in which the organisms were rather immobile (as species) and dispersed with the land. Therefore, assuming that flies should be more closely related, reflecting the break-up of ancient landmasses (Thompson 2008).

On the other hand, the absence of *Argentinomyia* species in the Chilean subregion is puzzling, probably due to the arid, temperate to cold climatic conditions as well as the absence of

tropical rainforest (Thompson & Thompson 2006). The inexplicable absence of *Argentinomyia* species in Guyana and Uruguay is probably not attributable to the lack of sampling effort because there are important recent works by Reemer (2010) and Smith (2011).

Regarding to the others clades, one would assume that the widespread species have high adaptability and the ability to disperse throughout the Neotropical region, which is probably the case for *A. longicornis*, *A. tropica*, *A. crenulata* and *A. fastigata*. However, it is clear that a lack of sampling effort in specific biogeographical regions and countries such Panama, Venezuela, Amazonia, Guyana and Northern Brazil underestimates the distribution of most *Argentinomyia* taxa.

7. Conclusions

This is the first phylogenetic hypothesis for the Neotropical Bacchini based on 41 taxa and 70 informative morphological characters.

The subtribe Melanostomatina is composed by two major clades (*Xanthandrus*+*Talahua*) + (*Melanostoma*+*Argentinomyia*) in accordance with previously published molecular phylogeny (Mengual *et al.* 2008).

The Platycheirina clade was composed of *Platycheirus* and *Tuberculanostoma* as the sister group to the remaining Bacchini. This group was well supported in our analysis with at least four synapomorphic characteristics.

Our results, showed *Argentinomyia* as a monophyletic group closely related to *Melanostoma*. *Argentinomyia* was supported by at least three synapomorphic characteristics and has a good support in the analysis.

The genus *Argentinomyia* is composed of seven relatively well supported clades. In this work, we have divided the genus into three groups, the previously suggested *Melanostoma* and *Rhysops* groups and an additional one: the “*octomaculata*”. *Rhysops* was considered as paraphyletic when *A. opaca* was included and monophyletic when it was excluded. In this regard, we consider that is necessary to produce a more consistent classification in the future within *Argentinomyia* including Molecular evidence in order to formally define these groups

The concept of the genus *Talahua* is redefined and providing the discovery of undescribed species, which opens the opportunities for further revisions.

The present phylogenetic hypothesis is consistent with the finding on Molecular analysis and some morphological studies. However, is clear that a combined analysis of morphological and molecular characters will show if the phylogenetic relationships evidenced in the present analysis will remain invariable.

8. Cited literature

Agnarsson, I., and Miller, J. A. (2008). Is ACCTRAN better than DELTRAN? *Cladistics* 24, 1032–1038.

Andersson, H. 1970. Taxonomic notes on the genera *Platycheirus* and *Melanostoma* (Dipt. Syrphidae) with lectotype designations. *Entomologica Scandinavica* 1: 236-240.

Arnaud Jr. et P. H. & Owen T. C. 1981. Charles Howard Curran (1894-1972). *Myia*, 2: 393.

Bremer, K. 1994. Branch support and tree stability. *Cladistics* 10: 295-304.

Brower A. V. Z. 2006. The how and why of branch support and partitioned branch support, with a new index to assess partition incongruence. *Cladistics* 22: 378–386.

Brown R W. 1956. *Composition of scientific words, a manual of methods and a lexicon of materials for the practice of logotechnics*. Published by the author, Baltimore, 882 pp.

Claridge, M. F., H. A. Dawah & M. R. Wilson. 1997. Practical approaches to species concepts for living organisms. En: *Species: the Units of Biodiversity*. M.F. Claridge, H.A. Dawah & M.R. Wilson (eds.), Chapman & Hall, London, pp. 1-15.

Coe R. L., 1953. *Handbooks for the identification of British insects*. Royal Entomological Society of London Vol. X. Part 1. 98pp.

Coquillett, D. W. 1910. The type-species of the North American genera of Diptera. *Proceedings of the United States National Museum* 37: 499-647.

Cumming, J.M. & D.M. Wood 2009. Morphology and terminology. In: Brown, B.V. *et al.* (Eds.), *Manual of Central American Diptera*. Volume 1. NRC Research Press, Ottawa. pp. 9-50.

Curran, C. H. 1925. New American Diptera I. Annals and Magazine of Natural History 9(16): 243-253.

Curran, C. H. 1937. The Neotropical species of *Melanostoma* and allies (Syrphidae: Diptera). American Museum Novitates 926: 1-4.

Dusek, J. & P. Laska 1967. Versuch zum Aufbau eines natürlichen Systems mitteleuropäischer Arten der Unterfamilie Syrphinae (Diptera). Acta Sci. Nat. Brno 1, 349–390.

Duque P. V., Vargas H. H. M. & W. Marta 2011. Immature stages and natural history of the Andean butterfly *Altinote ozomene* (Nymphalidae: Heliconiinae: Acraeini). Zoologia 28 (5): 593–602.

Enderlein, G. 1938. Beitrag zur Kenntnis der Syrphiden. Sber. Ges. Naturf. Freunde Berl. 1937, 192–237.

Farris, J.S. 1989. The retention index and the rescaled consistency index. Cladistics 5: 417–419.

Fluke, C. L. Jr. 1936. New Syrphidae (Diptera) from Brazil and Cuba. Journal of the Kansas Entomological Society 9: 59-65.

Fluke, C. L. Jr. 1937. New South American Syrphidae (Diptera). American Museum Novitates 941: 14p.

Fluke, C. L. Jr. 1945. The Melanostomatini of the Neotropical Region (Diptera, Syrphidae). American Museum Novitates 1272: 29 pp.

Fluke, C. L. Jr. 1957. A study of the male genitalia of the Melanostomatini (Diptera: Syrphidae). Wisconsin Academy of Sciences, Arts and Letters 46: 261-279.

García-Casco, A., M. S. Iturralde-Vinent & J. Pindell 2008. Latest Cretaceous collision/accretion between the Caribbean Plate and Caribéana: origin of metamorphic terranes in the Greater Antilles. *Int Geol Rev* 50:781–809

Goloboff, P. A. 1993. NONA. Version 2.0. Published by the author. INSUE, Fundación y Instituto Miguel Lillo, Tucumán.

Goloboff, P. A. 1999. NONA (NO NAME), Version 2.0 (for Windows). Computer program and manual available at [http:// www.cladistics.com](http://www.cladistics.com)

Hippa, H. & G. Ståhl. 2005. Morphological characters of adult Syrphidae: descriptions and phylogenetic utility. *Acta Zoologica Fennica* 215: 1-72.

Hull, F. M. 1937. Some Neotropical and Oriental Syrphid flies in the United State National Museum. *Journal of the Washington Academy of Sciences* 27: 165-176.

Hull, F. M. 1942. Some new species of Syrphidae. *Journal of the Kansas Entomological Society* 15: 10-12.

Hull, F. M. 1944. Studies on syrphid flies in the Museum of Comparative Zoology. *Psyche* (Cambridge) 51: 22-45.

Hull, F. M. 1949a. The morphology and inter-relationship of the genera of syrphid flies, recent and fossil. *Transactions of the Zoological Society of London* 26: 257-408.

Hull, F. M. 1949b. The genus *Baccha* from the New World. *Entomologica Americana* 27: 89-291.

Hull, F. M. 1949c. American syrphid flies of the subfamilies Cheilosinae and Syrphidae. *Bulletin of the Brooklyn Entomological Society* 44: 73-79.

International Commission on Zoological Nomenclature (1999). *International Code of Zoological Nomenclature*. 4th Edition. The International Trust for Zoological Nomenclature, London, 306 pp.

Jorge C. M., Marinoni L. & R. C. Marinoni 2007. Diversidade de Syrphidae (Diptera) em cinco áreas com situações florísticas distintas no Parque Estadual Vila Velha em Ponta Grossa, Paraná. *Iheringia, Sér. Zool., Porto Alegre*, 97(4):452-460.

Keil, P. & M. Konvicka 2005. Local species richness of Central European hoverflies (Diptera: Syrphidae): a lesson taught by local faunal lists. *Divers Distrib* 11:417–426

Lima, Da Costa 1946. Nova Espécie do género *Rhysops* Williston (Diptera: Syrphidae). *Separata do Boletim da Sociedade Brasileira de Agronomia* 9(3): 154-156.

Lynch Arribálzaga, F. 1892. Dipterología Argentina, Syrphidae. [Part]. *Anales de la Sociedad científica Argentina*, 32: 80-99, 118-131, 194-202, 247-256, 307-314; 33: 51-58, 111-121, 189-199.

Marinoni L. & F. C. Thompson 2003. Flower flies of southeastern Brazil (Diptera: Syrphidae). Part I. Introduction and new species. *Studia Dipt* 10:567–578

Marinoni, L., Morales, M.N. & I. Spaler. 2006. Chave de identificação ilustrada para os gêneros de Syrphinae (Diptera, Syrphidae) de ocorrência no sul do Brasil. *Biota Neotropical* 7: 145-160.

Mayden, R. L. 1997. A hierarchy of species concepts: the denouement in the saga of the species problem. En: Species: the Units of Biodiversity. M.F. Claridge, H.A. Dawah & M.R. Wilson (eds.), Chapman & Hall, London, pp. 381-419.

Mengual, X. 2010. New insights into molecular phylogenetics of Syrphinae (Diptera: Syrphidae). 7th International Congress of Dipterology. San Jose, Costa Rica

Mengual, X., Ståhls, G. & S. Rojo. 2008. First phylogeny of predatory flower flies (Diptera, Syrphidae, Syrphinae) using mitochondrial COI and nuclear 28S rRNA genes: Conflict and congruence with the current tribal classification. Cladistics 24: 543-562.

Mengual X., Ruiz C., Rojo S., Ståhls G. & F. C. Thompson. 2009. A conspectus of the flower fly genus *Allograpta* (Diptera: Syrphidae) with description of a new subgenus and species. Zootaxa 2214: 1-28.

Montoya A.L., Pérez S.P. & M Wolff 2012. The Diversity of Flower Flies (Diptera: Syrphidae) in Colombia and Their Neotropical Distribution. Neotropical Entomology 41:46–56.

Morales M. N. & L. Marinoni. 2009. Cladistic analysis and taxonomic revision of the *scutellaris* group of *Palpada* Macquart (Diptera: Syrphidae). Invertebrate Systematics 23: 301-347.

Morrone, J. J. 2001. Biogeografía de América Latina y el Caribe. Zaragoza, Sociedad Entomológica Aragonesa, Manuales & Tesis SEA.

Nishida K., Rotheray G. & F.C.Thompson. 2002. First non-predaceous syrphine flower fly (Diptera: Syrphidae): a new leaf-mining *Allograpta* from Costa Rica. Studia dipterologica 9:421–436

Nixon, K. C. 1999. Winclada, Version 1.00. Published by the author. Ithaca, NY.

Nixon, K.C. 1999. The parsimony ratchet, a new method for rapid parsimony analysis. *Cladistics*, 15: 407-414.

Nixon, K. C. 2002. Winclada, Version 1.00.08. Computer program and manual available at <http://www.cladistics.com>.

Nixon K. C. & J. M. Carpenter 1993. On outgroups. *Cladistics* 9: 413-426.

Pape, T. & F. C. Thompson (Eds.) 2010. *Systema Dipteroorum*, Version 1.0. <http://www.diptera.org/> [Accessed on 20 January 2011.]

Quicke, D. L. J. 1993. *Principles and Techniques of Contemporary Taxonomy*. Blackie Academic & Professional, London; 311 pp.

Reemer, M., & G. E. Rotheray 2009. Pollen feeding larvae in the presumed predatory syrphine genus *Toxomerus* Macquart (Diptera, Syrphidae). *Journal of Natural History*. 43(15-16) 939-949.

Rojo, S., Gilbert, F., Marcos-García, M.A., Nieto, J.M., & M.P. Mier. 2003. A World Review of Predatory Hoverflies (Diptera, Syrphidae: Syrphinae) and their Prey. CIBIO Ediciones, Alicante. 281p.

Rotheray, G. E. & F. S. Gilbert. 1999. Phylogeny of Palaearctic Syrphidae (Diptera): evidence from larval stages. *Zoological Journal of the Linnean Society* 127(1): 1-112.

Rotheray, G. E. & F. S. Gilbert. 2011. *The natural history of hoverflies*. Forrest Text, Wales, London. 334p.

Shannon, R. C. 1927. A review of the South American two-winged flies of the family Syrphidae. Proceedings of the United States National Museum 70:1-34.

Shatalkin, A. I. 1975. A taxonomic analysis of the hover flies (Diptera, Syrphidae). I. Entomol. Rev. Wash. 54, 117–125.

Sigrist, M. S. & C. J. B. De Carvalho 2009. Historical relationships among areas of endemism in the tropical South America using Brooks Parsimony Analysis (BPA). Biota Neotropica 9: 1-12.

Sereno, P. C. 2007. Logical basis for morphological characters in phylogenetics. Cladistics 23(6): 565-587.

Skevington, J. and S.A. Marshall. 1998. A revision of the New World species of the genus *Pipunculus* Latreille (Diptera; Pipunculidae). Thomas Say Monographs.201pp.

Skevington, J. H. & D. K. Yeates. 2000. Phylogeny of the Syrphoidea (Diptera) inferred from mtDNA sequences and morphology with particular reference to classification of the Pipunculidae (Diptera). Molecular Phylogenetics and Evolution 16(2): 212-224.

Skevington, J. H. & D. K. Yeates. 2001. Phylogenetic classification of Eudorylini (Diptera: Pipunculidae). Systematic Entomology 26: 421-452.

Speight, M. C. D. 1987. External morphology of adult Syrphidae (Diptera). Tijdschrift voor Entomologie 130(1): 141-175.

Ståhls, G., Hippa, H., Rotheray, G., Muona, J., & F. Gilbert. 2003. Phylogeny of Syrphidae (Diptera) inferred from combined analysis of molecular and morphological characters. Systematic Entomology 28(4): 433-450.

Thompson, F. C. 1972a. A new *Platycheirus* from New Zealand and first record of a melanostomine syrphid fly associated with ants. *New Zealand J. Sci.* 15: 77-84.

Thompson, F. C. 1972b. Contribution to a generic revision of the Neotropical Milesinae (Diptera: Syrphidae). *Arquivos de Zoologia* 23(2): 73-215.

Thompson, F. C. 1981. The flower flies of the West Indies (Diptera: Syrphidae). *Memoirs of the Entomological Society of Washington* 9: 1-200.

Thompson, F. C. 1997a. Revision of the *Eristalis* flower flies (Diptera: Syrphidae) of the Americas south of the United States. *Proc Entomol Soc Wash* 99:209-237.

Thompson, F. C. 1999a. Data Dictionary and standards [for fruit fly systematic information database]. *Myia* 9: 49-63.

Thompson, F. C. 1999b. A Key to the genera of the flower flies of the Neotropical Region including descriptions of new genera and new species and a glossary of taxonomic terms. *Contributions on Entomology International* 3(3): 322-378.

Thompson, F. C. (Ed.) 2006. Biosystematic Database of World Diptera, Version 7.5. Available from <http://www.diptera.org/biosys.htm> (accessed 25 September 2012).

Thompson, F. C. 2008. A conspectus of New Zealand flower flies (Diptera: Syrphidae) with the description of a new genus and species. *Zootaxa* 1716: 1-20.

Thompson, F. C., Vockeroth, J. R. & Y. S Sedman. 1976. Syrphidae. In: Papavero, N. (ed). A catalogue of the Diptera of the Americas south of the United States. Departamento de Zoologia, Secretaria de Agricultura. São Paulo, Brazil, 195 p.

Thompson, F. C. & G. E. Rotheray. 1998. Family Syrphidae. In: Papp, L., Darvas, B. (Eds.), Manual of Palaearctic Diptera, Vol. 3. Science Herald, Budapest, pp. 81-139.

Thompson F.C., B. J. Thompson & J. E. Fairman 2000. Only in Costa Rica: new neotropical flower flies (Diptera Syrphidae). *Studia Dipt* 7:33-43.

Thompson F. C. & B. J. Thompson 2006. A new *Toxomerus* species from Chile (Diptera: Syrphidae). *Studia Dipt* 13(2):317–331

Thompson, F. C., Rotheray, G. E. & Zumbado, M. 2010. Family Syrphidae. Pp. 763-792. In Brown, B. (ed.), Manual of Diptera of Central America. xvi + 715-1,442 pp. NRC Press, Ottawa.

Velez, P. D., H. H. M. Vargas & M. Wolff 2011. Immature stages and natural history of the Andean butterfly *Altinote ozomene* (Nymphalidae: Heliconiinae: Acraeini). *Zoologia* 28 (5): 593–602.

Vockeroth, J. R. 1969. A revision of the genera of the Syrphini (Diptera, Syrphidae). *Memoirs of the Entomological Society of Canada* 62: 1-176.

Vockeroth, J. R. 1990. Revision of the Nearctic species of *Platycheirus* (Diptera, Syrphidae). *The Canadian Entomologist* 122: 659-766.

Wheeler, Q.D. & N.I. Platnick 2000. The phylogenetic species concept (*sensu* Wheeler and Platnick). In: Wheeler, Q.D. and Meier, R. (Eds) *Species concepts and phylogenetic theory: a debate*. Columbia University Press, New York, NY, pp. 55–69.

Weng, J.L. & G.E. Rotheray 2009. Another non-predaceous syrphine flower fly (Diptera: Syrphidae): pollen feeding in the larva of *Allograpta micrura*. *Studia Dipterologica*, 14, in press.

Williston, S.W. 1887. Synopsis of the North American Syrphidae. Bulletin United States National Museum 31.

Wirth, W.W., Sedman, Y.S., Weems, H.V., 1965. Family Syrphidae. In: Stone, A., Sabrosky, C.W., Wirth, W.W., Foote, R.H., Coulson, J.R. (Eds.), A Catalog of the Diptera of America North of Mexico. Agricultural Research Service, United States Department of Agriculture, Washington, DC, pp. 557–625.

Zuijen, M.P. van & Nishida, K. 2009. Description of life history and immature stages of phytophagous flower fly, *Allograpta zumbadoi* Thompson (Diptera: Syrphidae: Syrphinae). *Studia Dipterologica*, 14, in press.