

# A catalog of Pipunculidae of Chile (Diptera)

José Albertino Rafael<sup>1</sup>; Christian Raúl González<sup>2</sup> & Rosaly Ale-Rocha<sup>3</sup>

<sup>1</sup> Instituto Nacional de Pesquisas da Amazônia (INPA), Coordenação de Biodiversidade (COBIO). Manaus, AM, Brasil.  
ORCID: [0000-0002-0170-0514](https://orcid.org/0000-0002-0170-0514). E-mail: [jarafael@inpa.gov.br](mailto:jarafael@inpa.gov.br) (corresponding author)

<sup>2</sup> Universidad Metropolitana de Ciencias de la Educación (UMCE), Facultad de Ciencias Básicas, Instituto de Entomología (IE). Santiago, Chile.  
ORCID: [0000-0003-2582-6071](https://orcid.org/0000-0003-2582-6071). E-mail: [christian.gonzalez@umce.cl](mailto:christian.gonzalez@umce.cl)

<sup>3</sup> Instituto Nacional de Pesquisas da Amazônia (INPA), Coordenação de Biodiversidade (COBIO). Manaus, AM, Brasil.  
ORCID: [0000-0001-9874-9770](https://orcid.org/0000-0001-9874-9770). E-mail: [alerocha@inpa.gov.br](mailto:alerocha@inpa.gov.br)

**Abstract.** An updated catalog of the Pipunculidae from Chile is provided. We present all valid names and synonyms for the 21 species belonging to six genera and three subfamilies distributed in the country. Information is given on name, author, year of publication, page number, type species, type depository, type locality, Chilean localities, and references. *Tomosvaryella* Aczél and *Eudorylas* Aczél are the richest genera in Chile, with eight species each, followed by *Protonephrocerus* Collin with two species, and *Chalarus* Walker, *Neocephalosphaera* De Meyer and *Elmohardyia* Rafael with one species each. The geographical distribution of the species was compiled from the literature and the retrieval of distributional data from collections.

**Keywords.** Andean Region; Chilean species list; Distribution; Taxonomy.

## INTRODUCTION

Pipunculidae (big-headed flies) includes 1,491 valid species (Evenhuis & Pape, 2023). The family occurs in all terrestrial ecosystems of the world except Antarctica (Rafael & Skevington, 2010). Presently, the species are distributed in 21 extant genera and 11 recognized subgenera (*Motamedinia et al.*, 2021). Adults are small to medium-sized flies (body length 2.0–11.5 mm) with head semiglobose or globose, with the compound eyes occupying most of the head; wings without spurious vein and cell  $r_5$  open; female terminalia modified into piercing ovipositor. They have a potential value for biological pest control, as most species are endoparasitoids of mainly Cicadelloidea and Fulgoroidea (Hemiptera: Auchenorrhyncha) (Virla & Rafael, 1996).

The Chilean species of Pipunculidae were cataloged previously by Stuardo (1946), Hardy (1966), Aczél (1952) with four species, Rafael & Ale-Rocha (1997) with 19 species, and Rodríguez & Rafael (2012) with 20 species. The latter does not consider *Tomosvaryella santiagoensis* De Meyer & Skevington, 2000 as the new name for *Tomosvaryella pruinosa* Ale-Rocha, 1996, preoccupied Kozánek (1992).

Recent phylogenetic hypotheses recovered Pipunculidae as a sister group to Schizophora (Wiegmann *et al.*, 2011; Tachi, 2014; Pauli *et al.*, 2018). According to *Motamedinia et al.* (2021), they are divided into four subfamilies: Nephrocerinae,

*Protonephrocerinae*, Chalarinae, and Pipunculinae. The last three subfamilies occur in Chile.

This study is part of a series on Chilean dipteran families aiming to catalog the whole order. Here we provide an updated catalog of the Pipunculidae of Chile with references and additional information for each species and genus considering the current classification proposed by *Motamedinia et al.* (2021).

## MATERIAL AND METHODS

We provided references that mention each of the Chilean species, synonyms, and subsequent combinations in chronological order. Selected references are given for the genus and species. Chilean distribution by region (from north to south), province, and locality are given based on the literature and collections.

Six Chilean species loaned by Luis E. Peña (LEP) were described by JAR (5 species) and RAR (one species), and the primary type specimens were returned to him (LEP particular collection). His collection was sold to the Field Museum of Natural History (FMNH), and only two type specimens were confirmed to be there. The remained type specimens were not found, neither in LEP nor in FMNH.

Acronyms are used for the location of primary types following Evenhuis (2020): **CAS**: California Academy of Sciences, San Francisco, USA; **CMNH**:

Carnegie Museum of Natural History, Pittsburgh, USA; **FMNH**: Field Museum of Natural History, Chicago, USA; **LEP**: Luis E. Peña collection, Chile; **MCZ**: Museum of Comparative Zoology, Massachusetts, USA; **MNNC**: Museo Nacional de Historia Natural, Santiago, Chile; **NHMUK**: The Natural History Museum, London, United Kingdom.

The abbreviations used are: cat. = catalog, distr. = distribution, fig/s. = figure/s, mon. = monotypy, NP. = National Park, orig. des. = original designation, preocc. = preoccupied, subs. des. = subsequent designation, syn. = synonym.

## RESULTS

Six genera and twenty-one species of Pipunculidae have been recorded from Chile (Table 1). *Eudorylas* Aczél and *Tomosvaryella* Aczél are the most species-rich genera in Chile with eight species each.

### Family Pipunculidae Walker, 1834

**Type-genus:** *Pipunculus* Latreille, 1802.

#### Subfamily Protonephrocerinae Genus *Protonephrocerus* Collin, 1931a

*Protonephrocerus* Collin, 1931a: 52. Type-species: *P. chiloensis* Collin, 1931a (orig. des.).

**References:** (Collin, 1931a); Hardy (1943, 1966); Stuardo (1946); Aczél (1948, 1952); Rafael & Ale-Rocha (1997).

#### *Protonephrocerus chiloensis* Collin, 1931a

*Protonephrocerus chiloensis* Collin, 1931a: 52-54, figs. 15a-b.

**Holotype:** Female (NHMUK), Chile: Chiloé Island, Ancud.

**Distribution:** **Chile:** Región de Los Lagos: Llanquihue Province: Carelmapu, Llanquihue; Chiloé Province: Ancud (Chiloé Island).

**References:** Collin (1931a); Aczél (1948, 1952); Hardy (1966); Rafael (1988b); Rafael & Ale-Rocha (1997); Rodríguez & Rafael (2012); Skevington et al. (2021).

#### *Protonephrocerus flavipilus* Skevington, Marques & Rafael, 2021

*Protonephrocerus flavipilus* Skevington, Marques & Rafael, 2021: 25, figs. 1, 4, 5, 7. In: Skevington et al. (2021). = *Protonephrocerus chiloensis* sensu Rafael, 1988b: 465, figs. 3-9.

**Holotype:** Female (MNNC), Chile, Osorno, Parq. Nacional Puyehue, Antillanca.

**Distribution:** **Argentina:** Bariloche, Río Negro; Chubut, Alerces National Park; Neuquén, Chapelco; Río Negro, Río Manso, Nahuel Huapi National Park. **Chile:** Región Metropolitana de Santiago: Santiago Province: Quebrada de la Plata, Rinconada de Maipú. Región del Maule: Curicó Province: East of Potrero Grande, El Relevo. Región de Ñuble: Diguillín Province: Las Trancas, Shangrila. Región del Biobío: Biobío Province: Caledonia, Mulchén. Región de La Araucanía: Malleco Province: Cabrería, NP Nahuelbuta Curacautín, Las Raíces, NP Nahuelbuta, Pichinahuel, Río Blanco. Región de Los Ríos: La Unión Province: NP Alerce Costero. Región de Los Lagos: Osorno Province: Antillanca, NP Puyehue.

**References:** Rafael (1988b, partim); Kehlmaier et al. (2014); Motamedinia et al. (2021); Skevington et al. (2021).

**Remarks:** *Protonephrocerus flavipilus* is the most common species of *Protonephrocerus* and appears throughout the literature as *P. chiloensis* (Rafael, 1988b: 468, figs. 3-9, and male description on page 469; Kehlmaier et al., 2014, fig. 32, page 33).

#### Subfamily Chalarinae Genus *Chalarus* Walker, 1834

*Chalarus* Walker, 1834: 269. Type-species: *Cephalops spurius* Fallén, 1816 (subs. des. Westwood, 1840).

*Atelenevra* Macquart, 1834: 356 (nec *Atelenevra* Bezzi).

Type-species: *Pipunculus holosericeus* Meigen, 1824 (mon.).

*Atelenevra* authors; variant spelling.

#### *Chalarus chilensis* Collin, 1931a

*Chalarus spurius chilensis* Collin, 1931a: 52, fig. 14.

*Chalarus chilensis*; Rafael, 1988a.

**Holotype:** Male (NHMUK), Argentina, Bariloche, Río Negro.

**Distribution:** **Argentina:** Río Negro (Bariloche); La Rioja, Santa Cruz; Tucumán (Villa Padre Monti, La Caverna). **Brazil:** São Paulo, Paraná, Santa Catarina. **Chile:** Región de Coquimbo: Elqui Province: La Serena; Limarí Province: NP Fray Jorge; Choapa Province: Los Vilos. Región Metropolitana de Santiago: Chacabuco Province: Til-Til; Santiago Province: La Platina, Quebrada de la Plata, Rinconada, Maipú; Cordillera Province: El Canelo, Las Vizcachas. Región de Ñuble: Diguillín Province: Las Trancas.

**References:** Collin (1931a); Aczél (1948, 1952); Hardy (1954, 1965a, 1966); Rafael (1988a, 1990a); Rafael &

**Table 1.** Pipunculidae, subfamily/tribe, genus, and species recorded from Chile.

| Subfamily/tribe   | Genus   | Species  | Sex known |
|---|---|--|-----------|
| Protonephrocerinae  | <i>Protonephrocerus</i> Collin, 1931                            | <i>P. chiloensis</i> Collin, 1931  | ♂ ♀       |
|   |   | <i>P. flavipilus</i> Skevington, Marques & Rafael, 2021, In: Skevington et al. (2021)          | ♂ ♀       |
| Chalarinae  | <i>Chalarus</i> Walker, 1834                                    | <i>C. chilensis</i> Collin, 1931   | ♂ ♀       |
| Pipunculinae/Pipunculini  | <i>Neocephalosphaera</i> De Meyer, 1994                         | <i>N. santiagoensis</i> (Rafael, 1992)   | ♂ ♀       |
| Pipunculinae/Tomosvaryellini  | <i>Elmohardyia</i> Rafael, 1987<br><i>Eudorylas</i> Aczél, 1940 | <i>El. denigrata</i> Rafael, 1988c   | ♂ ♀       |
|   |   | <i>Eu. chilensis</i> (Rafael, 1990)  | ♂ ♀       |
|   |   | <i>Eu. flavitibia</i> (Rafael, 1990)   | ♂ ♀       |
|   |   | <i>Eu. fuscitibia</i> (Rafael, 1990)   | ♂ ♀       |
|   |   | <i>Eu. macrocerus</i> Rafael, 1997, In: Rafael & Ale-Rocha (1997)                              | ♂ ♀       |
|   |   | <i>Eu. penai</i> Rafael, 1995  | ♂ ♀       |
|   |   | <i>Eu. posticus</i> (Collin, 1931)   | ♂ ♀       |
|   |   | <i>Eu. scotinus</i> (Collin, 1931)   | ♂ ♀       |
|   |   | <i>Eu. simulator</i> (Collin, 1931)  | ♂ ♀       |
|   |   | <i>T. amazonensis</i> De Meyer & Skevington, 2000 = <i>T. pulchra</i> Ale-Rocha, 1992, preocc. | ♂         |
|   |   | <i>T. bisulca</i> Ale-Rocha, 1996  | ♂         |
|   |   | <i>T. chilensis</i> Ale-Rocha, 1996  | ♂ ♀       |
|   |   | <i>T. curta</i> Ale-Rocha, 1996  | ♂         |
| <i>T. mediocris</i> (Collin, 1931)  | ♂ ♀   |  |           |
| <i>T. pectinalis</i> Ale-Rocha, 1996  | ♂   |  |           |
| <i>T. santiagoensis</i> De Meyer & Skevington, 2000 = <i>T. pruinososa</i> Ale-Rocha, 1996, preocc. | ♂   |  |           |
| <i>T. subvirescens</i> (Loew, 1872)   | ♂ ♀   |  |           |

Ale-Rocha (1997); Rodríguez & Rafael (2012); Rodríguez et al. (2012).

**Remarks:** Despite the specific name (*C. chilensis*) this species was described based on specimens from Argentina, Río Negro (Bariloche), and was recorded from Chile by Rafael (1990a).

### Subfamily Pipunculinae

**Remarks:** Within Pipunculinae, two tribes were synonymized. Cephalopsini with Pipunculini and Eudorylini with Tomosvaryellini leaving Pipunculinae with three tribes: Microcephalopsini, Pipunculini, and Tomosvaryellini (Motamedinia et al., 2021), only the last two tribes with records in Chile.

#### Tribe Pipunculini

This tribe was redefined by Motamedinia et al. (2021) to include eight genera. Only *Neocephalosphaera* De Meyer, 1994 has one species occurring in Chile.

#### Genus *Neocephalosphaera* De Meyer, 1994

*Cephalosphaera* (*Neocephalosphaera*) De Meyer, 1994: 9. Type-species: *Pipunculus brevis* Cresson, 1911 (orig. des.).

*Neocephalosphaera*; Motamedinia et al., 2021: 14.

**References:** De Meyer (1994, 1996); Skevington & Yeates (2001); Souza & Ale-Rocha (2009); Rafael & Skevington (2010).

#### *Neocephalosphaera santiagoensis* (Rafael, 1992)

*Cephalosphaera santiagoensis* Rafael, 1992: 645, figs. 12, 25, 45, 46, 60, 71, 72.

*Cephalosphaera* (*Neocephalosphaera*) *santiagoensis*; De Meyer, 1994: 9.

*Neocephalosphaera santiagoensis*; Ramos-Pastrana et al., 2022.

**Holotype:** Male (CAS number 15774), Chile, Santiago, Quebrada de la Plata, near Maipú.

**Distribution: Chile:** Región Metropolitana de Santiago: Santiago Province: Quebrada de la Plata, Rinconada, Maipú; Cordillera Province: El Canelo.

**References:** Rafael (1992); De Meyer (1996); Souza & Ale-Rocha (2009); Ramos-Pastrana et al. (2022).

#### Tribe Tomosvaryellini

**Remarks:** Motamedinia et al. (2021) synonymized Eudorylini with Tomosvaryellini. They redefined this large tribe to include 11 genera, three of which occur in Chile, *Elmohardyia* Rafael, 1987, *Eudorylas* Aczél, 1940 and *Tomosvaryella* Aczél, 1939, with records in Chile.

#### Genus *Elmohardyia* Rafael, 1987

*Elmohardyia* Rafael, 1987: 37. Type-species: *Pipunculus doelloi* Shannon, 1927 (orig. des.).

**References:** Rafael (1987, 1988c); De Meyer (1996); Motamedinia et al. (2021).

### ***Elmohardya denigrata* Rafael, 1988c**

*Elmohardya denigrata* Rafael, 1988c: 234, figs. 6, 21, 36, 68, 69, 117, 145, 163.

**Holotype:** Male (originally at LEP; presently at FMNH), Chile, Ñuble, Las Trancas.

**Distribution: Chile:** Región de Valparaíso: Valparaíso Province: Estero Marga-Marga, Los Perales. Región del Maule: Cauquenes Province: Curanipe. Región del Ñuble: Diguillín Province: Las Trancas. Región de La Araucanía: Malleco Province: Cabrería, Cordillera Nahuelbuta.

**References:** Rafael (1988c, 1990b); De Meyer (1996).

### **Genus *Eudorylas* Aczél, 1940**

*Eudorylas* Aczél, 1940: 151. Type-species: *Pipunculus fuscipes* Zetterstedt, 1844 (subs. des.; ruling of the ICZN, 2002: 143, Opinion 2000, Case 3132).

*Metadorylas* Rafael, 1987: 35, figs. 1-8. Type-species: *Pipunculus schreiteri* Shannon, 1927 (orig. des.). Syn.: Skevington & Yeates (2001) in the sense of *P. fuscipes*, not *Cephalops opacus*.

*Neodorylas* Kuznetsov, 1995: 326. Junior objective synonym (ICZN, 2002). Type-species: *Pipunculus fuscipes* Zetterstedt, 1844 (orig. des.). Syn.: De Meyer (2001).

**Remarks:** *Eudorylas* is a highly heterogeneous genus, and it appeared as paraphyletic in the analysis by Motamedinia et al. (2021) and requires redefinition. As defined presently, it has a cosmopolitan distribution and a wide distribution in the New World, ranging from Canada to Chile. The typical Neotropical *Eudorylas* was revised by Rafael (1990c) under *Metadorylas*, presently synonymous with *Eudorylas*, and the remainder heterogeneous "*Eudorylas*" species were revised by Rafael (1993) treating Mexican and Central American species and Rafael (1995) treating the South American species.

**References:** Aczél (1940); Rafael (1987, as *Metadorylas*); Rafael (1990c, 1995); Skevington & Yeates (2001).

### ***Eudorylas chilensis* (Rafael, 1990)**

*Metadorylas chilensis* Rafael, 1990c: 136, figs. 19-26, 100. *Eudorylas chilensis*; Skevington & Yeates, 2001: 439.

**Holotype:** Male (LEP, type specimen not located), Chile, Ñuble, Chillán, Las Trancas.

**Distribution: Chile:** Región de Coquimbo: Limarí Province: NP Fray Jorge. Región de Valparaíso: Valparaíso Province: Marga Marga, Los Perales. Región Metropolitana de Santiago: Chacabuco Province: Til-Til; Santiago Province: Quebrada de la Plata, Rinconada,

Maipú; Cordillera Province: El Canelo. Región del Maule: Curicó Province: Fundo La Montana, Estero La Palma at Rio Teno, Los Queñes. Región del Ñuble: Diguillín Province: Chillán, Las Trancas. Región del Biobío: Concepción Province: Hualpén Botanical Park; Biobío Province: Caledonia, Mulchén. Región de Los Lagos: Osorno Province: Pucatrihue; Llanquihue Province: Petrohue; Chiloé Province: Tepuhueico.

**References:** Rafael (1990c); De Meyer (1996); Skevington & Yeates (2001); Rodríguez & Rafael (2012).

### ***Eudorylas flavitibia* (Rafael, 1990)**

*Metadorylas flavitibia* Rafael, 1990c: 143, figs. 40-43, 104. *Eudorylas flavitibia*; Skevington & Yeates, 2001: 439.

**Holotype:** Male (LEP, type specimen not located), Chile, Ñuble, Las Trancas.

**Distribution: Chile:** Región Metropolitana de Santiago: Chacabuco Province: Til-Til; Cordillera Province: Cordillera Las Vizcachas. Región de Ñuble: Diguillín Province: Las Trancas.

**References:** Rafael (1990c); De Meyer (1996); Skevington & Yeates (2001); Rodríguez & Rafael (2012).

### ***Eudorylas fuscitibia* (Rafael, 1990)**

*Eudorylas fuscitibia* Rafael, 1990c: 145, figs. 46-48, 105. *Eudorylas fuscitibia*; Skevington & Yeates, 2001: 439.

**Holotype:** Male (LEP, type specimen not located). Chile, Ñuble, Las Trancas.

**Distribution: Chile:** Región de Valparaíso: Valparaíso Province: Río Marga-Marga, Los Perales. Región de Ñuble: Diguillín Province: Las Trancas. Región del Biobío: Biobío Province: La Polcura.

**References:** Rafael (1990c); De Meyer (1996); Skevington & Yeates (2001); Rodríguez & Rafael (2012).

### ***Eudorylas macrocercus* Rafael, 1997**

*Eudorylas macrocercus* Rafael, 1997: 33, figs. 1-7. In: Rafael & Ale-Rocha (1997).

**Holotype:** Male (CMNH), Chile, Chiloé, Isla Chiloé, Ahoni Alto.

**Distribution: Chile:** Región de Los Lagos: Chiloé Province: Ahoni Alto.

**References:** Rafael & Ale-Rocha (1997); De Meyer & Skevington (2000); Rodríguez & Rafael (2012).

***Eudorylas penai* Rafael, 1995**

*Eudorylas penai* Rafael, 1995: 820, figs. 128-132, 212.

**Holotype:** Male (originally at LEP; presently at FMNH), Chile, Ñuble, Chillán, Shangrila.

**Distribution: Chile:** Región Metropolitana de Santiago: Santiago Province: Quebrada de la Plata. Región del Maule: Curicó Province: Estero la Palma at Río Teno, Fundo la Montaña. Región de Ñuble: Diguillín Province: Chillán, Las Trancas, Shangrila. Región de Los Lagos: Osorno Province: Purránque; Llanquihue Province: N Correntoso Horno Huinco; Chiloé Province: Dalcahue, Tepuhueico.

**References:** Rafael (1995); De Meyer (1996); Rodríguez & Rafael (2012).

***Eudorylas posticus* (Collin, 1931a)**

*Pipunculus posticus* Collin, 1931a: 59-60, figs. 17c, 18a.

*Dorilas ? posticus*; Aczél, 1948: 25.

*Dorilas posticus*; Aczél, 1952: 241.

*Pipunculus (Pipunculus) posticus*; Hardy, 1966: 7.

*Eudorylas posticus*; Rafael, 1995: 822.

**Holotype:** Female (NHMUK), Chile [Aconcagua], Los Andes.

**Distribution: Chile:** Región de Valparaíso: Valparaíso Province: Marga Marga, Los Perales, Los Andes Province: Los Andes. Región Metropolitana de Santiago: Chacabuco Province: Til-Til; Santiago Province: Quebrada de la Plata. Región del Maule: Curicó Province: Estero la Palma at Río Teno, Fundo la Montaña, Los Queñes. Región de Ñuble: Diguillín Province: Chillán, Las Trancas. Región de La Araucanía: Cautín Province: Temuco. Región de Los Lagos: Llanquihue Province: Correntoso, Horno Huinco; Chiloé Province: Tepuhueico.

**References:** Collin (1931a); Stuardo (1946); Aczél (1948, 1952); Hardy (1954, 1965a, 1965b, 1966); Rafael (1987, 1995); De Meyer (1996); Rodríguez & Rafael (2012).

***Eudorylas scotinus* (Collin, 1931a)**

*Pipunculus scotinus* Collin, 1931a: 60-61, figs. 16b, 18c.

*Dorilas ? scotinus*; Aczél, 1948: 25.

*Dorilas scotinus*; Aczél, 1952: 242.

*Dorilas (Eudorylas) scotinus*; Hardy, 1954: 42 (part.).

*Pipunculus (Eudorylas) scotinus ?*; Hardy, 1965b: 51 (error); 1966: 6.

*Eudorylas scotinus*; Rafael, 1995.

**Holotype:** Male (NHMUK), Argentina, Misiones, Bompland.

**Distribution: Argentina:** Misiones (Bompland), Chubut (Cusmen). **Chile:** Región Metropolitana de Santiago:

Santiago Province: Quebrada de la Plata, Rinconada, Maipú; Cordillera Province: El Canelo. Región del Maule: Curicó Province: Estero La Palma at Río Teno, Fundo la Montaña, Los Queñes. Región de Ñuble: Diguillín Province: Las Trancas. Región de La Araucanía: Malleco Province: Cabrería, Cordillera Nahuelbuta. Región de Los Lagos: Llanquihue Province: N. Correntoso, Horno Huinco; Chiloé Province: Tepuhueico.

**References:** Collin (1931a); Stuardo (1946); Aczél (1948, 1952); Hardy (1954, 1965a, 1965b, 1966); Rafael (1987, 1995); De Meyer (1996); Rodríguez & Rafael (2012).

***Eudorylas simulator* (Collin, 1931a)**

*Pipunculus simulator* Collin, 1931a: 56-58, fig. 17b.

*Eudorylas simulator*; Aczél, 1948: 25 (distr.); 1952: (cat.).

*Pipunculus (Eudorylas) simulator*; Hardy, 1966: 5 (as syn. of *E. schreiteri*).

*Metadorylas simulator*; Rafael, 1987: 37.

**Holotype:** Female (NHMUK), Chile, Chiloé Island, Ancud.

**Distribution: ?Bolivia** (Tarija). **Chile:** Región Metropolitana de Santiago: Chacabuco Province: Til-Til; Cordillera Province: Cordillera, Las Vizcachas, El Canelo. Región de Ñuble: Diguillín Province: Chillán, Las Trancas. Región del Biobío: Biobío Province: El Abanico, Mulchén. Región de Los Lagos: Osorno Province: Pucatrihue, Volcán Osorno; Chiloé Province: Ancud.

**References:** Collin (1931a, 1931b); Stuardo (1946); Aczél (1948, 1952); Hardy (1954, 1966); Rafael (1987, 1990c); De Meyer (1996); Rodríguez & Rafael (2012).

**Remarks:** This species was treated as a synonym of *E. schreiteri* (Shannon) by Hardy (1954, 1966). It was revaluated by Rafael (1987).

**Genus *Tomosvaryella* Aczél, 1939**

*Alloneura* Rondani, 1856: 140. Type-species: *Pipunculus flavipes* Meigen, 1824 (mon.). Suppressed by ICZN, 1961: 230 (opinion 597).

*Tomosvaryella* Aczél, 1939: 22. Type-species: *Pipunculus sylvaticus* Meigen, 1824 (orig. des.).

**References:** Aczél (1939, 1944, 1948, 1952); Hardy (1943, 1965a, 1965b, 1965c, 1966, 1975, 1980, 1989); Stuardo (1946); De Meyer (1996); De Meyer & Skevington (2000).

***Tomosvaryella amazonensis*  
De Meyer & Skevington, 2000**

*Tomosvaryella pulchra* Ale-Rocha, 1992: 347, figs. 1-10 (preocc. Kozánek, 1992: 10).

*Tomosvaryella amazonensis* De Meyer & Skevington, 2000.

**Holotype:** Male (INPA), Brazil, Amazonas, Manaus.

**Distribution:** **Argentina:** Santiago del Estero, Salta, Catamarca, Tucumán; **Brazil:** Amazonas, Mato Grosso; **Chile:** Región de Coquimbo: Elqui Province: Baños Pangué; Choapa Province: El Naranjo, Tilama; Limarí Province: NP Fray Jorge. Región Metropolitana de Santiago: Santiago Province: La Platina, Quebrada de la Plata, Rinconada de Maipú; Cordillera Province: El Canelo. Región de Ñuble: Diguillín Province: Las Trancas. Región del Biobío: La Polcura; **Paraguay:** San Pedro.

**References:** Ale-Rocha (1992); Rafael & Ale-Rocha (1997); De Meyer & Skevington (2000); Ale-Rocha & Souza (2011); Rodríguez & Rafael (2012).

#### ***Tomosvaryella bissulca* Ale-Rocha, 1996**

*Tomosvaryella bissulca* Ale-Rocha, 1996: 167, figs. 9-15.

**Holotype:** Male (CAS), Chile, Santiago (La Rinconada Maipú).

**Distribution:** **Argentina:** Salta, Catamarca. **Chile:** Región de Coquimbo: Elqui Province: Baños Pangué; Choapa Province: El Naranjo. Región Metropolitana de Santiago: Santiago Province: La Rinconada Maipú, Quebrada de la Plata.

**References:** Ale-Rocha (1996); Rafael & Ale-Rocha (1997); De Meyer & Skevington (2000); Ale-Rocha & Souza (2011); Rodríguez & Rafael (2012).

#### ***Tomosvaryella chilensis* Ale-Rocha, 1996**

*Tomosvaryella chilensis* Ale-Rocha, 1996: 167-169, figs. 16-24.

**Holotype:** Male (LEP, type specimen not located), Chile, Biobío (Mulchén, Caledonia).

**Distribution:** **Chile:** Región de Valparaíso: Marga Marga Province: Los Perales, Estero Marga Marga. Región Metropolitana de Santiago: Chacabuco Province: Til-Til; Santiago Province: Quebrada de la Plata, Rinconada de Maipú; Cordillera Province: Las Vizcachas; Maipo Province: Altos de Cantillana, Rincón El Árbol. Región de O'Higgins: Cachapoal Province: Las Cabras. Región de Ñuble: Diguillín Province: Las Trancas, Shangrila. Región del Biobío: Biobío Province: Mulchén, Caledonia; Concepción Province: Parque Botánico Hualpén, Talcahuano. Región de La Araucanía: Malleco Province: Cabrería, NP Nahuelbuta, Victoria, Monte Mila. Región de Los Ríos: Valdivia Province: Valdivia. Región de Los Lagos: Osorno Province: Anticura, NP Puyehue; Llanquihue

Province: Correntoso, Horno Huinco; Chiloé Province: Tepuhueico.

**References:** Ale-Rocha (1996); Rafael & Ale-Rocha (1997); De Meyer & Skevington (2000); Rodríguez & Rafael (2012).

#### ***Tomosvaryella curta* Ale-Rocha, 1996**

*Tomosvaryella curta* Ale-Rocha, 1996: 170, figs. 33-40.

**Holotype:** Male (CAS), Chile, Santiago, El Canelo.

**Distribution:** **Argentina:** Buenos Aires. **Chile:** Región Metropolitana de Santiago: Cordillera Province: El Canelo. Región del Maule: Curicó Province: Fundo La Montaña, Estero La Palma at Río Teno, Los Queñes.

**References:** Ale-Rocha (1996); Rafael & Ale-Rocha (1997); De Meyer & Skevington (2000); Ale-Rocha & Souza (2011); Rodríguez & Rafael (2012).

#### ***Tomosvaryella mediocris* (Collin, 1931a)**

*Pipunculus mediocris* Collin, 1931a: 54-56, figs. 16a, 17a, 18b.

*Tomosvaryella mediocris*; Aczél, 1948: 25.

**Holotype:** Male (BMNH), Chile, Llanquihue, Casa Pangué.

**Distribution:** **Argentina:** Tierra del Fuego. **Chile:** Región de Ñuble: Diguillín Province: Las Trancas, Shangrila. Región del Biobío: Biobío Province: La Polcura. Región de La Araucanía: Malleco Province: Cabrería, NP Nahuelbuta, Cordillera Las Raices. Región de Los Lagos: Llanquihue Province: Casa Pangué; Chiloé Province: San Pedro, Tepuhueico. Región de Magallanes y la Antártica Chilena: Tierra del Fuego Province: Estancia Camerón.

**References:** Collin (1931a); Aczél (1948, 1952); Ale-Rocha (1996); Rafael & Ale-Rocha (1997); De Meyer (1996); Rodríguez & Rafael (2012).

#### ***Tomosvaryella pectinalis* Ale-Rocha, 1996**

*Tomosvaryella pectinalis* Ale-Rocha, 1996: 177-179, figs. 100-107.

**Holotype:** Male (CSA), Chile, Santiago (La Rinconada).

**Distribution:** **Argentina:** Catamarca, Chubut. **Chile:** Región Metropolitana de Santiago: Santiago Province: Rinconada de Maipú; Cordillera Province: El Canelo. Región del Ñuble: Diguillín Province: Las Trancas. Región de Magallanes y la Antártica Chilena: Última Esperanza Province: Laguna Amarga.

**References:** Ale-Rocha (1996); Rafael & Ale-Rocha (1997); De Meyer & Skevington (2000); Ale-Rocha & Souza (2011); Rodríguez & Rafael (2012).

***Tomosvaryella santiagoensis*  
De Meyer & Skevington, 2000**

*Tomosvaryella pruinosa* Ale-Rocha, 1996: 181, figs. 130-136 (preocc. Kozánek, 1992: 8).

*Tomosvaryella santiagoensis* De Meyer & Skevington, 2000: 8.

**Holotype:** Male (CAS), Chile, Santiago, Quebrada de la Plata.

**Distribution: Chile:** Región de Coquimbo: Choapa Province: Hacienda Illapel. Región Metropolitana de Santiago: Santiago Province: Quebrada de la Plata.

**References:** Ale-Rocha (1996); Rafael & Ale-Rocha (1997); De Meyer & Skevington (2000); Rodríguez & Rafael (2012).

***Tomosvaryella subvirescens* (Loew, 1872)**

*Pipunculus subvirescens* Loew, 1872: 87.

*Pipunculus aridus* Williston, 1893: 255. Syn.: Hough (1901).

*Pipunculus glabrum* Adams, 1905: 165. Syn.: Hardy (1949).

*Pipunculus insularis* Cresson, 1911: 317. Syn.: Hardy (1943).

*Pipunculus metallescens* Malloch, 1913: 298. Syn.: Hardy (1943).

*Pipunculus similans* Becker, 1924: 15. Syn.: Hardy (1968).

*Pipunculus knowltoni* Hardy, 1939: 20. Syn.: Hardy (1943).

*Tomosvaryella subvirescens*; Hardy, 1943: 178, plate 17, figs. 101a-e.

**Holotype:** Male (MCZ, number 456), USA, Texas, Belgrave.

**Distribution: Chile:** Región de Taparacá: El Tamarugal Province: Pica. Widespread in the Palaearctic, Oriental, Australian, Nearctic and Neotropical regions. Neotropical: Mexico, Belize, Nicaragua, Costa Rica, Panama, Bahamas, Jamaica, Dominica, Cuba, Porto Rico, Colombia, Peru, Brazil, Chile.

**References:** Loew (1872); Hardy (1943, 1961, 1966, 1975, 1980, 1989); Aczél (1948, 1952); Ale-Rocha (1996); De Meyer (1996); Rafael & Ale-Rocha (1997); Rodríguez & Rafael (2012).

**AUTHORS' CONTRIBUTIONS:** JAR, CRG: Conceptualization; JAR, CRG, RAR: Methodology, formal analysis, writing – original draft; JAR, CRG, RAR: Writing – review & editing; all authors actively reviewed and approved the final version of the paper.

**CONFLICT OF INTEREST:** Authors declare there are no conflicts of interest.

**FUNDING INFORMATION:** This project did not use any external financial support.

**REFERENCES**

- Aczél, M. 1939. Das System der Familie Dorylaidae. *Dorylaiden Studien* 1. *Zoologischer Anzeiger*, 125: 15-23.
- Aczél, M. 1940. Vorarbeiten zu Einer Monographie der Dorylaiden (Dipt.). *Dorylaiden-Studien V. Zoologischer Anzeiger*, 132(78): 140-169.
- Aczél, M. 1944. Die Gattung *Tomosvaryella* Acz. (Dipt.). *Dorylaiden-Studien VIII. Annales Historico-Naturales Musei Nationalis Hungarici*, 37: 75-130.
- Aczél, M. 1948. Grundlagen einer Monographie der Dorilaiden. (Diptera). *Dorilaiden Studien VI. Acta Zoológica Lilloana*, 6: 5-168.
- Aczél, M. 1952. Catálogo de la familia Dorilaidae (Pipunculidae) de la Región Neotropical. *Revista de la Sociedad Entomológica Argentina*, 15(4): 237-251.
- Adams, C.F. 1905. Diptera Africana. I. *Kansas University Science Bulletin*, 2: 21-47.
- Ale-Rocha, R. 1992. Descrição de *Tomosvaryella pulchra* sp. nov. (Diptera, Pipunculidae). *Boletim do Museu Paraense Emilio Goeldi, Série Zoológica*, 8(2): 315-318.
- Ale-Rocha, R. 1996. Revisão das espécies de *Tomosvaryella* Aczél da América do Sul (Diptera, Pipunculidae). *Revista Brasileira de Entomologia*, 40(2): 165-187.
- Ale-Rocha, R. & Souza, B.B. 2011. Espécies novas de *Tomosvaryella* Aczél (Diptera, Pipunculidae) da Argentina e chave para as espécies sul-americanas. *Revista Brasileira de Entomologia*, 55(3): 287-298.
- Becker, T. 1924. H. Sauters Formosa-Ausbeute: Pipunculidae (Dorylaidae: Diptera). *Entomologische Mitteilungen*, 13: 14-18.
- Collin, J.E. 1931a. Platypezidae, Pipunculidae. In: *Diptera of Patagonia and South Chile*. London, Printed by Oder of the Trustees, British Museum (Natural History). v. 6, pt. 2, p. 49-61.
- Collin, J.E. 1931b. Die Ausbeute der deutschen Chaco-Expedition 1925/26. Diptera. (Fortsetzung) XXIX. Pipunculidae. *Konowia*, 10(3): 171-176.
- Cresson, E.T. 1911. Studies in North American Dipterology: Pipunculidae. *Transactions of the American Entomological Society*, 36: 267-329.
- De Meyer, M. 1994. Phylogenetic relationships within the Cephalopsini (Diptera, Pipunculidae). *Bulletin et Annales de la Société Royale Belge d'Entomologie*, 130: 7-18.
- De Meyer, M. 1996. World catalogue of Pipunculidae. *l'Institut royal des Sciences naturelle de Belgique Documents de travail de*, 86: 1-127.
- De Meyer, M. 2001. Case 3132. *Eudorylas* Aczél, 1940 (Insecta, Diptera): proposed conservation of usage by the designation of *Pipunculus fuscipes* Zetterstedt, 1844 as the type species. *Bulletin of Zoological Nomenclature*, 58(1): 19-23.
- De Meyer, M. & Skevington, J.H. 2000. First addition to the World Catalogue of Pipunculidae (Diptera). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique. Entomologie*, 70: 5-11.
- Evenhuis, N.L. 2020. *The insect and spider collections of the world website*. Available: <http://hbs.bishopmuseum.org/codens>. Access: 11/10/2022.
- Evenhuis, N.L. & Pape, T. (Eds.). 2023. *Systema Dipterorum*, Version 4.1. <http://diptera.org>. Access: 22/03/2023.
- Hardy, D.E. 1939. New Nearctic Pipunculidae (Diptera). *Journal of the Kansas Entomological Society*, 12: 16-25.
- Hardy, D.E. 1943. A revision of Nearctic Dorilaidae (Pipunculidae). *Kansas University Science Bulletin*, 29: 3-23.
- Hardy, D.E. 1949. The African Dorilaidae (Pipunculidae-Diptera). *Mémoires de l'Institut Royal des Sciences Naturelles de Belgique*, 36: 1-80.
- Hardy, D.E. 1954. Neotropical Dorilaidae studies, Part III. Brazilian species and a key to the known species of *Dorilas sens. lat.* *Boletim do Museu Nacional, nova série, Zoologia*, 123: 1-60.
- Hardy, D.E. 1965a. The Pipunculidae of Argentina. *Acta Zoológica Lilloana*, 19: 187-241.

- Hardy, D.E. 1965b. Neotropical Pipunculidae (Diptera) Studies, Part IV. Further studies of Brazilian species. *Arquivos de Zoologia*, 14: 1-68.
- Hardy, D.E. 1965c. *A Catalogue of the Diptera of America North of Mexico*. Washington, D.C., United States Department of Agriculture, 1696p. (Agriculture Handbook n. 276)
- Hardy, D.E. 1966. 45. Family Pipunculidae (Dorilaidae). In: Museu de Zoologia, Universidade de São Paulo (Ed.). *A catalogue of the Diptera of the Americas South of the United States*. São Paulo. p. 1-15.
- Hardy, D.E. 1968. Bibionidae and Pipunculidae of the Philippines and Bismarck Islands (Diptera). *Entomologiske Meddelelser*, 36(5): 417-507.
- Hardy, D.E. 1975. Pipunculidae. In: Delfinado, M.D. & Hardy, D.E. (Eds.). *A catalogue of Diptera of the Oriental region II*. Honolulu, University of Hawaii. p. 296-360.
- Hardy, D.E. 1980. 37. Family Pipunculidae. In: Crosskey, R.W. (Ed.). *Catalogue of the Diptera of the Afrotropical Region*. London, British Museum (Natural History). p. 483-487.
- Hardy, D.E. 1989. Family Pipunculidae. In: Evenhuis, N. (Ed.). *Catalogue of the Diptera of Australasia and Oceania*. Honolulu, Bishop Museum. p. 433-436.
- Hough, G. de N. 1901. Studies in Diptera Cyclorrhapha. 1. The Pipunculidae of the United States. *Proceedings of the Boston Society of Natural History*, 29: 77-86.
- International Commission on Zoological Nomenclature (ICZN). 1961. Opinion 597. *Prothechus* Rondani, 1856, and *Alloneura* Rondani, 1856 (Insecta, Diptera); suppressed under the Plenary Powers. *Bulletin of the Zoological Nomenclature*, 18: 230-235.
- International Commission on Zoological Nomenclature (ICZN). 2002. Opinion 2000 (Case 3132) *Eudorylas* Aczél, 1940 and *Microcephalops* De Meyer, 1989 (Insecta, Diptera): conserved by the designation of *Pipunculus fuscipes* Zetterstedt, 1844 as the type species of *Eudorylas*. *Bulletin of the zoological Nomenclature*, 59(2): 143-144.
- Kehlmaier, C.; Dierick, M. & Skevington, J.H. 2014. Micro-CT studies of amber inclusions reveal internal genital features of big-headed flies, enabling a systematic placement of *Metaneprocercus* Aczél, 1948 (Insecta: Diptera: Pipunculidae). *Arthropod Systematics and Phylogeny*, 72(1): 23-36.
- Kozánek, M. 1992. Contribution to the pipunculid fauna of Mongolia (Diptera: Pipunculidae). *Akita (Kyoto Entomological Society), New Series*, 131: 116.
- Kuznetsov, S.Y. 1995. Neodorylas gen. n., with a key to the world genera, new synonymy and notes on the higher classification of the Pipunculidae (Diptera). *International Journal of Dipterological Research*, 6: 321-333.
- Loew, E. 1872. Diptera Americae septentrionalis indigena. Centuria Decima. *Berliner Entomologische Zeitschrift*, 16(1): 49-124.
- Macquart, P.-J.-M. 1834. Insectes Diptères du Nord de la France. Athéricères: créophiles, oestrides, myopaires, conopasaires, cénopiniens, céphalopsides. *Memoires de la Société (Royale) des Sciences, de l'agriculture et des arts à Lille*, 1833: 137-368.
- Malloch, J.R. 1913. New American dipterous insects of the Family Pipunculidae. *Proceedings of the United States National Museum*, 43: 291-299.
- Motamedinia, B.; Skevington, J.H.; Kelso, S. & Kelmahier, C. 2021. The first comprehensive, multigene molecular phylogeny for big-headed flies (Diptera: Pipunculidae). *Zoological Journal of the Linnean Society*, 195(4): 1200-1218. <https://doi.org/10.1093/zoolinnean/zlab094>.
- Pauli, T.; Burt, T.O.; Meusemann, K.; Bayless, K.; Donath, A.; Podsiadlowski, L.; Mayer, C.; Kozlov, A.; Vasilikopoulos, A.; Liu, S.; Zhou, X.; Yeates, D.; Misof, B.; Peters, R.S. & Mengual, X. 2018. New data, same story: phylogenomics does not support Syrphoidea (Diptera: Syrphidae, Pipunculidae). *Systematic Entomology*, 43(3): 447-459. <https://doi.org/10.1111/syen.12283>.
- Rafael, J.A. 1987. Two new genera of Pipunculidae (Diptera) from the New World: *Metadorylas*, gen. n., and *Elmohardyia*, gen. n., with new synonyms, designation of lectotypes and revalidation of a species. *Revista Brasileira de Entomologia*, 31(1): 35-39.
- Rafael, J.A. 1988a. Pipunculidae (Diptera) da região neotropical. I. Redescrição de *Chalarus chilensis* Collin, comb. n. e descrição de duas espécies novas da Amazônia. *Revista Brasileira de Entomologia*, 5(1): 1-9.
- Rafael, J.A. 1988b. Considerações sobre a filogenia de Nephrocerinae e descrição do macho de *Protonephrocercus chiloensis* Collin, 1931 (Diptera: Pipunculidae). *Revista Brasileira de Entomologia*, 32(3/4): 465-470.
- Rafael, J.A. 1988c. Pipunculidae (Diptera) neotropicais do gênero *Elmohardyia* Rafael. *Acta Amazonica*, 18(1-2): 223-264.
- Rafael, J.A. 1990a. Revisão das espécies neotropicais do gênero *Chalarus* Walker (Diptera, Pipunculidae). *Iheringia, Série Zoologia*, 70: 45-53.
- Rafael, J.A. 1990b. Revisão das espécies neotropicais do gênero *Elmohardyia* Walker (Diptera: Pipunculidae). *Iheringia, Série Zoologia*, 70: 45-53.
- Rafael, J.A. 1990c. As espécies neotropicais de *Metadorylas* Rafael (Diptera: Pipunculidae). *Boletim do Museu Paraense Emílio Goeldi, série Zoologia*, 6(2): 127-164.
- Rafael, J.A. 1992. Chapter 42. A review of the neotropical species of big-headed flies genus *Cephalosphaera* (Diptera, Pipunculidae). In: Quintero, D. & Aiello, A. (Eds.). *Insects of Panama and Mesoamerica: Selected studies*. Oxford University Press. p. 631-646.
- Rafael, J.A. 1993. Espécies de *Eudorylas* Aczél (Diptera, Pipunculidae) do México e América Central. *Revista Brasileira de Entomologia*, 37(4): 751-762.
- Rafael, J.A. 1995. Espécies de *Eudorylas* Aczél (Diptera, Pipunculidae) da América do Sul. *Revista Brasileira de Entomologia*, 39(4): 793-838.
- Rafael, J.A. & Ale-Rocha, R. 1997. Chilean Pipunculidae (Diptera). Key to genera, new records, description of a new species of *Eudorylas* Aczél and a catalog of the species. *Revista Chilena de Entomologia*, 24: 31-36.
- Rafael, J.A. & Skevington, J.H. 2010. Pipunculidae. In: Brown, B.V.; Borkent, A.; Cumming, J.M.; Wood, D.M.; Woodley, N.E. & Zumbado, M.A. (Eds.). *Manual of Central American Diptera*, Volume 2. Ottawa, NRC Research Press. p. 793-803.
- Ramos-Pastrana, Y.; Marques, D.W.A. & Rafael, J.A. 2022. *Cephalosphaera* Enderlein and *Neocephalosphaera* De Meyer (Diptera: Pipunculidae) of Colombia, with description of nine new species and an updated key to their Neotropical species. *Zootaxa*, 5178(4): 301-333.
- Rodríguez, H.C. & Rafael, J.A. 2012. *Pipunculidae (Diptera) of Latin America and the Caribbean: a catalog of species with notes on biology and pipunculid-host associations*. Lambert Academic Publishing. 48p.
- Rodríguez, H.C.; Rafael, J.A. & Virla, E.G. 2012. Argentinean species of *Chalarus* Walker (Diptera: Pipunculidae): new records and description of *Chalarus tani* n. sp. *Neotropical Entomology*, 41(2): 121-123. <https://doi.org/10.1007/s13744-011-0015-7>.
- Rondani, C. 1856. *Dipterologiae italicae prodromus. 1. Genera italica ordinis dipterorum ordinatim disposita et distincta et in familias et stirpes aggregata*. A. Parmae, Stoschi. 226p.
- Skevington, J.H. & Yeates, D.K. 2001. Phylogenetic classification of Eudorylini (Diptera: Pipunculidae). *Systematic Entomology*, 26(4): 421-452. <https://doi.org/10.1046/j.0307-6970.2001.00160.x>.
- Skevington, J.H.; Marques, D.W.A.; Burt, T.O.; Rodríguez, H.C. & Rafael, J.A. 2021. Revision of *Protonephrocercus* Collin (Diptera: Pipunculidae). *Revista de la Sociedad Entomológica Argentina*, 80(3): 21-30. <https://doi.org/10.25085/rsea.800303>.
- Souza, B.B. & Ale-Rocha, R. 2009. Descrição de uma espécie nova de *Cephalosphaera* Enderlein, 1936 da Amazônia (Diptera, Pipunculidae). *Acta Amazonica*, 39(4): 987-996.
- Stuardo, C. 1946. *Catálogo de los dípteros de Chile*. Santiago, Imprenta Universitaria. 250p.

- Tachi, T. 2014. Homology of the metapleuron of Cyclorrhapha, with discussion of the paraphyly of Syrphoidea (Diptera: Aschiza). *Insect Systematics & Evolution*, 45: 1-20. <https://doi.org/10.1163/1876312X-45012112>.
- Virla, E.G. & Rafael, J.A. 1996. Datos bionómicos preliminares y descripción de la hembra de *Cephalops penepauculus* (Hardy) (Diptera: Pipunculidae) un parasitoide de Delphacidae (Homoptera: Auchenorrhyncha) en Argentina. *CIRPON, Revista de Investigación*, 10(1-4): 33-36, 1994-1996.
- Walker, F. 1834. Observations on the British species of Pipunculidae. *The Entomological Magazine*, 2: 262-270.
- Westwood, J.O. 1840. Synopsis of the genera of British insects. In: *An introduction to the modern classification of insects*. London, Longman. v. 2, p. 125-154.
- Wiegmann, B.M.; Trautwein, M.D.; Winkler, I.S.; Barr, N.B.; Kim, J.W.; Lambkin, C.; Bertone, M.A.; Cassel, B.K.; Bayless, K.M.; Heimberg, A.M.; Wheeler, B.M.; Peterson, K.J.; Pape, T.; Sinclair, B.J.; Skevington, J.H.; Blagoderov, V.; Caravas, J.; Kutty, S.N.; Schmidt-Ott, U.; Kampmeier, G.E. & Yeates, D.K. 2011. Episodic radiations in the fly tree of life. *Proceedings of the National Academy of Sciences*, 108(14): 5690-5695. <https://doi.org/10.1073/pnas.1012675108>.
- Williston, S.W. 1893. List of Diptera of the Death Valley Expedition. In: *The Death Valley Expedition, a biological survey of parts of California, Nevada, Arizona and Utah*. Washington, Government Print Office. p. 253-256. (North American Fauna, 7). <https://www.biodiversitylibrary.org/item/83338#page/263/mode/1up>.