



The families of the suborder Brachycera Schiner, 1862 (Insecta: Diptera): Part 2

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Abstract

Most Diptera belong to the Brachycera, a group characterized by the reduction or fusion of antennal segments to eight or fewer and by modifications to the larval head and mouthparts. The larvae of most species are predatory, although there are a few parasitoid groups as well. From a methodological point of view, the research was conducted using bibliometric and content analysis approaches. Bibliometrics is guided by the principle of analyzing scientific or technical activity through quantitative studies of publications, that is, through this approach. Document analysis was used as a data collection method to gather information from theoretical books, banks, university dissertations, scientific journals, documents, and digital platforms.

Keywords: Cyclorrhapha; Muscomorpha; Parasitoids; Predator; Schizophora

1. Introduction

The Brachycera are generally of no medical or veterinary concern; and Muscomorpha, or “circular-seamed” flies, is often called Cyclorrhapha. The Muscomorpha infraorder, in turn, is divided into the Aschiza and Schizophora, and the latter is divided into two sections: the Acalyptratae and Calyptratae [1].

Objective

The objective is to describe Brachycera families (Insecta Diptera).

2. Methods

From a methodological point of view, the research was conducted using bibliometric and content analysis approaches. Bibliometrics is guided by the principle of analyzing scientific or technical activity through quantitative studies of publications, that is, through this approach. Document analysis was used as a data collection method to gather information from theoretical books, banks, university dissertations, scientific journals, documents, and digital platforms.

3. Family Helosciomyzidae

3.1. Distribution

Helosciomyzidae is a small family of flies currently composed of 28 valid species, arranged in 11 genera. The family has a distribution restricted to the Southern Hemisphere, with greater diversity in the Australian/Oceanic region. Helosciomyzidae It is assumed that the family has a relictual distribution, presenting disjunct clades between the Australian/Oceanic region and the southern cone of the Neotropical region, as occurs with several other groups of dipterans with a circo-Antarctic distribution (Figure 1) [2-3].

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Sources: debu01089079 and https://v3.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxid=979021

Figure 1 *Scordalus* sp.

3.2. Description

CuA2+A1 distinctly or slightly thickened in the basal third and becoming abruptly attenuated, but visibly reaching the wing margin or not; three or four differentiated postgenal setae (the specimens analyzed have four postgenal setae, but it is difficult to say whether this is the species' pattern or is due to the low number of known specimens); also found asymmetry in the postgenal setae for an individual of *Sciogriphoneura* Malloch, 1933. The ventral character of the anterior and posterior basitarsus, without a terminal rounded projection, cannot be assessed as there are no males known for the species [3-5].

3.3. Systematic

This family includes the following genera and species.

- Genus *Cobergius* Barnes, 1981: *C. vittatus* (Macquart, 1851),
- Genus *Dasysciomyza* Barnes, 1981: *D. setuligera* (Malloch, 1922).
- Genus *Eurotocus* Steyskal in Steyskal & Knutson, 1979 and *E. australis* Steyskal & Knutson, 1979.
- Genus *Helosciomyza* Hendel, 1917: Some species: *H. anaxantha* Steyskal & Knutson, 1979, *H. australica* Steyskal & Knutson, 1979, *H. bickeli* McAlpine, 2012, *H. driesseni* McAlpine, 2012, *H. fuscinervis* (Macquart, 1851), *H. macalpinei* Steyskal & Knutson, 1979, *H. nevoissi* McAlpine, 2012, *H. obliqua* McAlpine, 2012 and *H. subacuta* McAlpine, 2012.
- Genus *Luta* McAlpine, 2012: *L. luteipennis* (Steyskal & Knutson, 1979) [3-7].
- Genus *Napaeosciomyza* Barnes, 1981: *N. rara* (Hutton, 1901), *N. spinicosta* (Malloch, 1922), and *N. subspinicosta* (Tonnoir & Malloch, 1928).
- Genus *Neosciomyza* Barnes, 1981: *N. anhecta* (Steyskal in Steyskal & Knutson, 1979) and *N. peckorum* McAlpine, 2012.
- Genus *Polytocus* Lamb, 1909: *P. costatus* Harrison, 1976 and *P. spinicosta* Lamb, 1909.
- Genus *Sciogriphoneura* Malloch, 1933: *S. Brunne* Steyskal, 1977, *S. nigriventris* Malloch, 1933.
- Genus *Scordalus* Barnes, 1981 and *S. femoratus* (Tonnoir & Malloch, 1928).
- Genus *Xenosciomyza* Tonnoir & Malloch, 1928: *X. prima* Tonnoir & Malloch, 1928 and *X. turbotti* Harrison, 1955 [3-7].

4. Study selection

4.1. Study 1

Sciogriphoneura brunnea Steyskal, 1977.

Sciogriphoneura brunnea Steyskal, 1977 [*S. brunnea*: Steyskal 1977: 1] (description, catalogue, in Dryomyzidae); Barnes 1981: 66 (review); Mathis & Sueyoshi 2011: 224 (catalogue); Pereira-Colavite. 2013: 3 (catalog) [8].

The genus *Sciogriphoneura* Malloch, 1930, was transferred to the family Helosciomyzidae based on *Sciogriphoneura nigriventris* Malloch, 1933. For 13 characters we distinguish Helosciomyzidae from its other related groups, Dryomyzidae and Helcomyzidae. The definition of *Sciogriphoneura* based on *S. nigriventris* involves a convex scutellum, a characteristic not observed in the examined specimens of *S. brunnea*. In the lateral view, the scutellum appears

rectilinear from the basal to apical region, while, in the posterior view, it forms from the lateral regions in the direction of the middle [8].

5. Family Lonchopteridae

Body symmetry bilaterally symmetric; preyed on by *Pipistrellus kuhlii* (Kuhl, 1817); diurnal behavioral circadian rhythm; multicellular cellularity; holometabolous mode of development; feeding structure sucking mouthparts; first appearance Lutetian age; benthic marine habitat; the number of fossil occurrences 1; the number of public records in bold 341; supporting structures and enclosures exoskeleton visits flowers of *Anthriscus sylvestris* subsp. *sylvestris* (L.) Hoffm (Apiacea) [9].

5.1. Description

The head is rounded, with outer vertical bristles, inner vertical bristles, ocellar bristles, interfrontal bristles, and bristles. The mesonotum scutellum and legs have well developed bristles. The radial vein R has three branches R1, R2+3, R4+5. The median vein M is furcating M1, M2 (Figure 2) [9-12].



Sources: © Copyright Malcolm Storey 2011-2118.3 and <https://www.discoverlife.org/20/q?search=Lonchopteridae>

Figure 2 *Lonchoptera lutea* Panzer, 1809

5.2. Biology

Lonchopteridae are common in moist, shady, grassy areas, where the larvae are found within decaying vegetation. One species, *Lonchoptera bifurcata* (Fallén, 1810), is cosmopolitan in distribution and may have been transported via shipments of vegetables. The larvae are found within decaying vegetation [9-12].

5.3. Systematic

- **Genus:** *Homolonchoptera* Yang, 1998, *Lonchoptera* Meigen, 1803, *Neolonchoptera* Vaillant, 1989 and *Spilolonchoptera* Yang, 1998.
- **Genus Lonchoptera:** *Lonchoptera bifurcata* (Fallén, 1810) and *Lonchoptera lutea* Panzer, 1809, *Lonchoptera tristis* Meigen, 1824.
- **Genus Neolonchoptera** Vaillant, 1989: *Neolonchoptera nevadica* Vaillant, 1989.

Family of Diptera with about 20 species known in the Palearctic region. Only three species have been recorded in the Iberian Peninsula. These are very common dipterans on grass in humid and shady areas [9-12].

The first appointment of this family for Aragón.

Lonchoptera bifurcata (Fallen, 1810).

Material studied: Barcelona: Caldes de Montbuí, 7.11.1986 0/1, 12.3.1986 0/1 (J.I. Czech leg.). Zaragoza: Pina de Ebro, 12.1.1991 0/1 (sis aliar-salad dishes), 9.3.1991 0/1 (light trap), 21.7.1992 0/1 (on *Medicago sativa*), 20.7.1993 0/1 (light trap) (J. Blasco leg.) [9-12].

Lonchoptera lutea Panzer, 1809.

Material studied: Barcelona: Barcelona, 7.10.1996 1/0 (store window); Caldes de Montbuí, 3/12/1986 0/1 (J.I. Checa leg.), 5/31/1994 2/0 (light trap) (C. Torras leg.); Cantonigrós, 6/15/1991 1/3 (grass next to river, shady). Zaragoza: Pina de Ebro, 9.3.1991 1/1 (sabinar-romeral dishes), 22.5.1991 0/1 (light trap), 24.5.1991 0/1 (Malaise trap), 15.7.1991 0/1 (trap black light) (J. Blasco leg.). The first appointment of this family for Aragón [9-12].

6. Study selection

6.1. Study 1

Lonchoptera lutea Tank, 1809.

Lonchoptera lutea is a fly from the spear fly family (Lonchopteridae).

Flies reach a body length of 2.0 to 3.0 millimeters. Its body is slender and cylindrical. A dark stripe runs down the middle of the back of the chest and abdomen. The posterodorsal setae on the rails tibia of the middle legs are noticeably shorter than the dorsal setae. On the tibiae of the forelimbs, there is a dorsal bristle in the basal third and another in the apical third. There are no posterodorsal setae developed there. The species can only be determined with certainty based on genital morphological examinations. The animals are spread throughout the Palearctic. They are found in grassy areas, from plains to mountainous areas [13-14].

7. Family Nothybidae

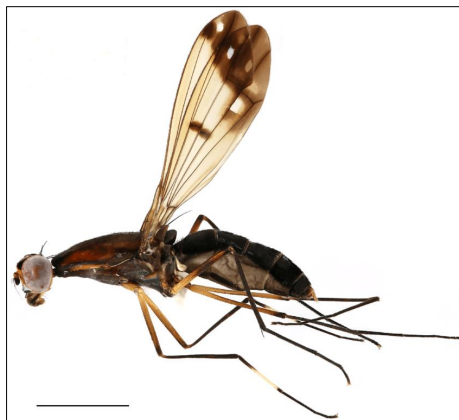
7.1. Biology

The biology of the Nothybidae is poorly known, and the larval habitat is unknown. Some species may be larviparous, as mature larvae have been found in preserved adult female specimens. Adults have been observed displaying complex hovering and courtship behavior [15-16].

Nothybidae is a family of Diptera. EOL Attributes: Has data attributes, including: Body symmetry bilaterally symmetric; diurnal behavioral circadian rhythm; multicellular cellularity; holometabolous mode of development; feeding structure sucking mouthparts [17-18].

7.2. Systematic

Suborder: Brachycera Bottom: Muscomorpha Section: Schizophora Subsection: Acalyptrata Superfamily: Diopsoidea Family: Nothybidae Genus: *Nothybus* Rondani, 1875 Type species: *Nothybus longithorax* Rondani, 1875 (Figure 3).



Source: https://www.researchgate.net/figure/Nothybus-biguttatus-Wulp-1896-habitus-female-lateral-Scale-bar-30-mm_fig6_349052617

Figure 3 *Nothybus biguttatus* Wulp, 1896, habitus, female, lateral

Species: *Nothybus absens* Lonsdale & Marshall, 2016 – southern China, *Nothybus acrobates* Frey, 1958 – Myanmar and Laos, *Nothybus biguttatus* Wulp, 1896 – Java, Nepal, Vietnam, *Nothybus cataractus* Lonsdale & Marshall, 2016 – Thailand and Laos, *Nothybus kempfi* (Brunetti, 1913) – India, Myanmar, Laos, Thailand, and Vietnam, *Nothybus kuznetsovorum* Galinskaya & Shatalkin, 2015 – Laos and Vietnam, *Nothybus lineifer* Enderlein, 1922 – Java, Malaysia, Sumatra, and Thailand, *Nothybus longicollis* (Walker, 1856) – Borneo, Malaysia, Papua New Guinea, *Nothybus magnus* Galinskaya &

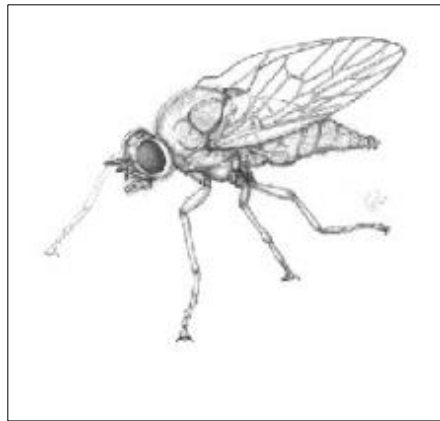
Shatalkin, 2017 – Thailand, *Nothybus procerus* Lonsdale & Marshall, 2016 - southern India, and *Nothybus sumatranus* Enderlein, 1922 – Malaysia, Sumatra, Thailand, and Vietnam [19-20].

The Nothybidae in a separate superfamily, Nothyboidea, from all other Schizophora, because he thought it was the only Schizophora group with the male post abdomen symmetrical and therefore not circumvented. In this he was mistaken, for in many Schizophora families, the male post abdomen (particularly in the reduced protandrial segments 6-8) is symmetrical. Currently, the superfamily Nothyboidea was modified into Diopsoidea formed by the families Diopsidae, Gabryidae, Megamerinidae, Nothybidae, Psilidae, Somatiidae, Strongylophthalmyiidae, Syringogastridae and Tanypezidae [21-22].

8. Family Oreoleptidae

8.1. Phylogeny and Description

The Tabanomorpha infraorder that most authors admit is monophyletic and traditionally, the infraorder includes the families Rhagionidae, Athericidae, Tabanidae, Vermileonidae, and the recently described family Oreoleptidae. In addition to these families, others have controversial positioning among the Tabanomorpha (Family Oreoleptidae) (Figure 4) [23-32].



Source: https://www.zoology.ubc.ca/bcdiptera/Order%20Diptera%20Text%20Files/family_descriptions.htm

Figure 4 Family Oreoleptidae

Oreoleptidae is a family of flies. The family was established in 2005 based on the type species *Oreoleptis torrenticola* Zloty, Sinclair & Pritchard (Diptera: Tabanomorpha: Oreoleptidae) placed in the monotypic genus *Oreoleptis* Zloty, Sinclair & Pritchard, 2005. The only known species was collected in the Rocky Mountains, where larvae grow in torrential streams [23-32].

Females are larger than males. The first antennal segment is shorter than the second both segments are covered with setae. The antennal rod is located at the apex. The eyes are almost naked, with scattered hairs. In males, the eyes touch. The mesonotum and scutellum are covered with long semi-erect setae. There is a backboard. Cell r1 on the wings is open. The coxae of the front legs are one and a half times longer than the coxae of the middle and hind legs. The front thighs are the shortest, and the rear thighs are the longest [23-32].

8.2. Biology

They stand apart due to the aedeagal tines and other male reproductive parts which indicate a clear similarity to the. The adults are dull grey with stylate antennae. Larvae have also been found in groundwater wells. The larvae are crocheted false legs arising from abdominal segments 2-7. The larvae have hollow mandibular hooks. The larvae develop in rivers and streams with fast currents. It is also found in groundwater wells at depths of up to 10. They feed on mayfly larvae [23-33].

8.3. Distribution

The family Oreoleptidae was previously described from the Northern Rocky Mountains of the USA and Canada. However, as part of a broad, multidisciplinary study by the Yakama Nation, 30 larvae of *O. torrenticola* were collected

at multiple sites within the Twisp River of the Cascade Mountains in Okanogan County, Washington. This finding represents a substantial range extension for the species [32-33].

9. Family Pallopteridae

Pallopteridae, or flutter-wing flies, because of the striking vibration of the wings in many species) is a family of Diptera. Over 50 species in 15 genera are found in the temperate regions of the Northern and Southern hemispheres (Figures 5A-5B) [34].



Sources: <https://en.wikipedia.org/wiki/Pallopteridae> and File:Palloptera scutellata (Pallopteridae) - (imago), Elst (Gld), the Netherlands.jpg

Figure 5A *Palloptera ustulata* Fallén, 1820



Sources: <https://en.wikipedia.org/wiki/Pallopteridae> and File:Palloptera scutellata (Pallopteridae) - (imago), Elst (Gld), the Netherlands.jpg

Figure 5B *Palloptera scutellata* (Macquart, 1835)

9.1. Description

They have spots on their wing's dark smoky apical spots. The head is semispherical and the postvertical bristles on the head are parallel or divergent. The arista is bare or has a short pubescence. The mesonotum has 4 to six pairs of dorso-central bristles. Tibiae without subapical bristles. The costa is interrupted near the end of the subcosta. The subcosta reaches the costa [34-38].

9.1.1. EOL has data for attributes including

Body symmetry bilaterally symmetric; is eaten by *Chaetura vauxi* (Townsend, 1839) brown swift; diurnal behavioral circadian rhythm; multicellular cellularity; holometabolous mode of development; feeding structure sucking mouthparts; temperate habitat [34-38].

9.2. Biology (I can't seem to fix this paragraph)

Adults have been found on flowers and low hanging branches in shady habits. L larvae are phytophagous some speciepreying on beetles Cerambycidae and Scolytidae. One species is recorded as preying on larvae of Cecidomyiidae. Som have been found in flower buds and stems. *Toxonevra superba* (Loew, 1861) has been described as an excellent-looking little fly. It is quite elegant among other flies, with the distinctive black spot and the thick black line leading along its wingspan. It appears almost to have horns based on its appearance. *Toxonevra superba* is non-toxic and does not normally pose a threat to human health. There is no need to worry too much [34-38].

9.2.1. *Pseudopyrgota* is a genus of Diptera in the family Pallopteridae.

Body symmetry bilaterally symmetric; circadian rhythm; diurnal behavior; multicellular cellularity; holometabolous mode of development; feeding structure sucking mouthparts; *Pseudopyrgota*: *Pseudopyrgota caudata* Malloch, 1933 [34-38].

9.3. Systematic

Subfamilies: Eurygnathomyiinae and Pallopterinae.

Genus: *Aenigmatomyia* Malloch, 1933, *Eurygnathomyia* Czerny, 1904, *Gorbunia* Ozerov, 1993, *Heloparia* Enderlein, 1912, *Homaroides* Malloch, 1933, *Morgea* Hennig (1967), *Neomaorina* Miller, 1945, *Palloptera* Fallén, 1820, *Pallopterites* Hennig, 1967, *Pseudopyrgota* Malloch, 1933, *Sciochthis* Malloch, 1933, *Temnosira* Enderlein, 1936, *Toxoneura* Macquart, 1835 and *Toxonevra* Macquart, 1835 [34-38].

10. Study selection

10.1. Study 1

10.1.1. Pallopteridae in Spain.

Toxoneura modesta (Meigen, 1830).

Spain: Teruel, Valdelinares, 40°23'17.9"N, 0°38'37.6"W, edge of pine forest, 1890 m a.s.l., 15.6. – 5.7.2014, 1 male, beer trap, Leopoldo Castro's leg.

Toxoneura usta (Meigen, 1826).

Spain: Teruel, Valdelinares, 40°23'17.9"N, 0°38'37.6"W, edge of pine forest, 1890 m a.s.l., 15.6. – 5.7.2014, 4 males 1 female, beer trap, Leopoldo Castro's leg.

Source: Dr. Miguel Carles-Tolrà (Barcelona, Spain) [39].

Toxoneura muliebris (Harris, 1780).

Palloptera muliebris: Morge, 1984.

Toxoneura muliebris: Merz, 1997.

Distribution. Extant specimens are known from the west and southwest of Europe (Austria, Andorra, Belgium, Great Britain, France (incl. Corsica), Germany, Ireland, Italy (incl. Sicily), Portugal, Spain, Switzerland), and Israel. Both extant and fossil records from Italy [40-45].

Toxoneura? *pluvia* (Dürrenfeldt, 1968), comb. n.

Oxyna? *pluvia* Dürrenfeldt, 1968: 48 (*Oxyna?*); *Palloptera?* sp. near *umbellatarum* (Fabricius, 1775).

Distribution. Germany (Upper Pliocene).

Palloptera? sp. near *umbellatarum* (Fabricius, 1775). [40-45].

Pallopterites electrica Hennig, 1967.

Morgea mcalpinei Hennig, 1967.

Glaesolonchaea electrica Hennig, 1967 [40-45].

11. Family Paraleucopidae

The Paraleucopidae is a family of Acalyptratae flies elevated to the family level for the first time in 2019. Its placement within two Acalyptratae is uncertain. Based on morphological evidence, these forms are proposed as belonging to the Asteioinea superfamily within the Opomyzoidea superfamily. Currently, it is inserted superfamily Sphaeroceroidea (Figure 6) [34-39].



Source: <https://www.flickr.com/photos/63075200@N07/40166255274/>

Figure 6 *Palloptera scutellata* (Macquart, 1835) pinned female - Castor Hanglands, Northamptonshire

Genus: *Mallochianamyia* Santos-Neto, 1996, *Paraleucopis* Malloch, 1913 and *Schizostomyia* Malloch, 1934. Some researchers propose a new family of flies (Diptera), Paraleucopidae, which includes the genera *Paraleucopis* Malloch, 1913, *Mallochianamyia*, and *Schizostomyia*, from America, and undescribed Australian members. New species of *Paraleucopis* are described, including one from Chile [34-39].

12. Family Platystomatidae

The Platystomatidae is a distinct family of flies in the Tephritoidea superfamily. Signaling flies have a worldwide distribution, found in all biogeographical realms, but predominantly in the tropics (Figure 7) [40-41].



Source: <http://www.icipe.org/content/insect-of-the-week-5Dec2022>

Figure 7 *Cladoderris convexa* Whittington, 2003

12.1. Description

The members of this family have variable sizes, from small to medium-sized, and bodies that are both slender and robust, generally with metallic colors. Its head has a reduced number of arrows and may or may not have windshields. The chest has a large prosternum and can be covered with hair or eyelashes. The legs of these insects are moderately developed and have wings with spots or dark bands. The female abdomen has a reduced or absent segment 6, while the males can have a reduced or absent sternum and can have surstiles and presses (structures to hold the female during

copulation). The family Platystomatidae includes some of the most unusual forms in the superfamily Tephritoidea [49-51].

12.2. Biology

Adults are found on tree trunks and foliage and are attracted to flowers, decaying substances, feces, sap, fruit, decaying snails, and even human sweat in the case of *Lamprogaster* Macquart and *Rivellia* Robineau-Desvoidy and dead snails. Regarding the biology of this family, we must turn to Anglo-Saxon scientific literature. In English, they are called signal flies or semaphore flies. Adults feed on juices such as nectar from flowers, decaying fruits, or excrement. It seems to me that the bulging mouthparts could allow them to sip juices more quickly to store them in the abdomen. *Platystoma* males offer females a drop of food that they regurgitate while copulating [49-51].

The larvae, in general, can be phytophagous or saprophagous depending on the species. Now, the larvae of some species can be predators. Regarding *Platystoma lugubre* (Robineau-Desvoidy, 1830), adults feed on nectar and excrement. And the larvae develop in excrement, corpses, and decomposing material [49-51].

12.3. Taxonomy

Platystomatidae is a family of insects distributed worldwide, with a greater presence in Africa, Asia, and Australia. 1,161 species and 138 genera have been described worldwide. In the Neotropical region, 26 species and four genera have been recorded. Very little is known about the biology of this family, and no one knows about the unripe stage of Neotropical species. In Colombia, only one species has been recorded. In Mexico, there is a record of 17 valid species of three genera belonging to a subfamily [49-51].

Habitats 6: dog 1, pool 1, mushroom 1, shadow 1, stump 1, window 1. Species 3: *Platystoma lugubre* (Robineau-Desvoidy, 1830): dog (20), stump (2), mushroom (1), window (1). Altitude: 0-200. *Platystoma tegularum* Loew, 1859: pool (1). Altitude: 300. *Rivellia syngenesiae* (Fabricius, 1781): shadow (1). Altitude: 900. Comment: From the data obtained, little can be deduced about the species of this family, except for *P. lugubre*, which is a coprophagous species [49-51].

13. Studies selections

13.1. Study 1

Platystoma Meigen, 1803, are small flies that reach a length of about 5 mm. The body is black speckled with small whitish or yellowish spots, while the eyes are usually red. They have a rather large proboscis. The wings are blackish with whitish spots.

Platystoma seminationis (Fabricius, 1775) can reach a body length of 0.22 to 0.26 in. In these flies, the intraocular space and epistomes are black and the eyes are reddish-brown. The thorax is grayish. The wings are translucent, grayish brown, with light spots. The abdomen is black, without punctuation. The tarsi are monochromatic black. The largest segments of the tarsus are reddish near the base or show reddish hair on the underside. Additionally, the dumbbells have a dark brown club.

Pogonortalis doclea Walker, 1849, inhabits suburban backyards and feeds on plants, and generally does not cause a major problem. *Rivellia* Robineau-Desvoidy, 1830 is a signal fly genus belonging to the family Platystomatidae. There are at least 140 species described. Adult Platystomatidae feeds on liquids that they absorb from decomposing meat, excrement, fruits, and nectar. *Rivellia* larvae feed on legume root nodules. *Rivellia syngenesiae* (Fabricius, 1781) feeding on bird excrement. *Rivellia* is a genus of signal flies [52].

14. Family Sciomyzidae

The Sciomyzidae family belongs to the typical flies of the order Diptera. They are commonly called swamp flies and in some cases flies that kill snails due to feeding on their larvae. The Huttoninidae, Phaeomyiidae, and Tetanoceridae are provisionally included in the Sciomyzidae [53-54].

14.1. Description

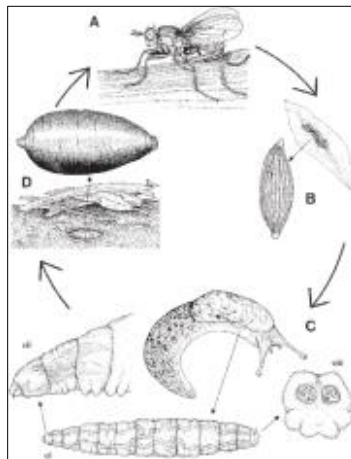
Sciomyzidae are small or medium-sized (2 to 14 mm), generally slender flies, with a predominantly opaque gray, brown, reddish, or yellow body, rarely glossy black. Hyaline wings, usually with dark spots or dark reticulated patterns. The

head is semi-spherical or round. The antennae are generally elongated, and the arista is pubescent or has shorter or longer hair. Ocelli and ocellar setae are present [55-56].

The post-vertical setae are divergent or parallel. There are one or two pairs of front setae that curve backward (the lower pair sometimes curves inward). Interfrontal setae are absent, but interfrontal setae are sometimes present. Vibrissae are absent. The wing is clear or with visible markings. The coast is continuous and the subcosta is complete. The crossed BM-Cu is present, and the anal cell is closed. Tibia almost always has a pre-apical dorsal bristle [57-58].

14.2. Biology

They are common along streams or puddles and in marsh regions. Adults feed on nectar or honeydew. The larvae parasitize or prey on snails and slugs. Most larvae are aquatic, but some are known to be terrestrial. The larvae feed on snails in all biogeographical areas. Adults are found mainly on the margins of lakes and rivers (7A-7B) [59-60].



Sources: https://www.researchgate.net/figure/Life-cycle-of-Tetanocera-plebeja-Loew-Sciomyzidae-Sciomyzinae-Tetanocerini_fig1_265612482 and <https://www.mapress.com/zt/article/view/zootaxa.5068.1.6>

Figure 7A Life cycle of *Tetanocera plebeja* Loew, 1862 (Sciomyzidae, Sciomyzinae, Tetanocerini), illustrating the habitus of the various life stages. (A) Adult fly; (B) eggs on leaf; (C) larva infesting *Deroceras reticulatum* (Müller, 1774) (Mollusca: Limacoidea: Agriolimacidae), with (ci) showing habitus of larva, (cii) lateral view of anterior end of larva, and (cii) posterior view of larva; (D) puparium on substrate (original; drawn from various sources, including Trelka and Foste, 1970)



Sources: https://www.researchgate.net/figure/Life-cycle-of-Tetanocera-plebeja-Loew-Sciomyzidae-Sciomyzinae-Tetanocerini_fig1_265612482 and <https://www.mapress.com/zt/article/view/zootaxa.5068.1.6>

Figure 7B *Dichetophora* Rondani, 1868

Diptera of the Sciomyzidae family are insects whose larval stages They are predators or parasitoids of terrestrial or aquatic molluscs. Research has been conducted to use these insects in the biological control of molluscs, which represent trematodes of medical importance. Some authors suggest the use of these flies in the biological control of *Biomphalaria glabrata* (Say, 1818) (Mollusca, Gastropoda) in Brazil, an important vector of schistosomiasis in this country, in areas where these dipterans are absent from the natural habitat of this Planorbidae [61-62].

The feeding behavior of larvae is very complex and presents great variation within the Sciomyzidae family, ranging from parasitoid behavior to predatory behavior of snails and other freshwater or terrestrial molluscs. Therefore, these flies are of great importance, as they can be used in the biological control of tropical or subtropical diseases caused by organisms that require the aquatic snail as an intermediate host. Parasitoid species consume large amounts of tissue before killing prey. After the snail dies, the larva continues to feed on the decomposing tissues, forming a pupa inside the shell. This type of behavior appears to be related to species from the Sciomyzini tribe. Predation is more related to species from the Tetanocerini tribe. According to observations made by researchers, they can kill prey in 10 to 20 minutes, eliminating around 23 snails during the three larval stages [62-63].

14.3. Distribution

Two species of Sciomyzidae of the genus *Sepedon* Latreille (Diptera: Sciomyzidae), macropui originating from Venezuela and ferruginous from Thailand, were introduced in Hawaii, to control the population of *Galba* Schrank, 1803 (= *Lymnaea*) *rididis*, a mollusc vector of *Fasciola gigantica* (Davis, 1972), on that island. The results were unsuccessful. Without a doubt, the possibilities of using Sciomyzidae in the biological control of *Schistosoma mansoni* Sambom, 1907 (Trematoda: Digenea) vectors are remote [64-65].

14.4. Systematic

Even though more than 180 species have been described, in Mexico there are reports of 33 valid species from 14 genera belonging to two tribes and a subfamily. In this catalog, the families Huttoninidae and Phaeomyiidae are considered synonyms of the family Sciomyzidae, 1830 [65-67].

Subfamilies: Huttoninidae Phaeomyiidae and Tetanoceridae.

- **Subfamily Sciomyzinae: Tribu Sciomyzini; Some genus:** *Apteromicra* Papp, 2004, *Atrichomelina* Cresson, 1920, and *Calliscia* Steyskal, 1975, *Oidematops* Cresson, 1920, *Parectinocera* Becker, 1919, *Pherbellia* Robineau-Desvoidy, 1830, *Pseudomelina* Malloch, 1933, *Psacadina* Enderlein, 1939, *Ethiolimnia* Verbeke, 1950, *Eulimnia* Tonnoir & Malloch, 1928, *Euthycera* Latreille, 1829, *Euthycerina* Malloch, 1933, *Eutrichomelina* Steyskal, in Steyskal & Knutson, 1975, *Guatemalaia* Steyskal, 1960, *Hedria* Steyskal, 1954, *Hoplodictya* Cresson, 1920, *Sepedonea* Steyskal, 1973, *Sepedonella* Verbeke, 1950, *Sepedoninus* Verbeke, 1950, *Shannonia* Malloch, 1933, *Steyskalina* Knutson, 1999, *Tetanocera* Duméril, 1800 and *Tetanoceroides* Malloch, 1933 1830 [65-67].
- **Tribu Tetanocerini:** *Anticheta* Haliday, 1838, *Chasmacryptum* Becker, 1907, *Coremacera* Rondani, 1856 and *Dichetophora* Rondani, 1868.
- **Subfamilia Huttonininae:** *Huttonina* Tonnoir & Malloch, 1928 and *Prosochaeta* Malloch, 1935.
- **Subfamilia Phaeomyiinae:** *Akebono* Sueyoshi, 2009 and *Pelidnoptera* Rondani, 1856.
- **Subfamilia Salticellinae:** *Salticella* Robineau-Desvoidy, 1830 [65-67].

15. Study selection

15.1. Study 1

Slugs are molluscs belonging to *Sarasinula linguaeformis* (Semper, 1885) (Molusca: Veronicellidae) In the Americas, 43 species of these animals have already been found and others still require more detailed studies to be classified. They feed on a wide variety of vegetables, and They can cause damage to bean, corn, soybean, and cassava crops, in addition to attacking fruit plants, gardens, home and commercial gardens.

In bean cultivation, slugs consume the leaves and damage the pods. In the initial stages of crop development, they can consume the seedlings, significantly reducing their stand. Each adult slug can consume up to 20% of a plant's leaves in one night, with a consequent reduction of up to 16% in crop yield.

15.2. Biological control

Molluscs from the Veronicellidae family, in high populations, can be vectors of human parasites. Thus, it was verified that the species *Sarasinula plebeia* (Fisher, 1868) is an intermediate host of the nematode *Angiostrongylus costaricensis* (Morera and Céspedes 1971), a parasite of the endothelial tissue of the human intestine. The infesting form of this parasite is released through the mucus secreted by slugs and people can acquire this worm by ingesting contaminated produce [68].

16. Conclusion

Recent research into the systematics of flies has demonstrated that there are four distinct taxonomic groupings, where the traditional morphological boundary based on size does not correspond to a marked phylogenetic distinction. The Brachycera are subdivided into 6 infraorders: Asilomorpha, Muscomorpha, Stratiomyomorpha, Tabanomorpha, Vermileonomorpha, and Xylophagomorpha.

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