Checklist of the flower flies of Ecuador (Diptera, Syrphidae)

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Abstract
Syrphidae is one of the most speciose families of true flies, with more than 6,100 described species and worldwide distribution. They are important for humans acting as crucial pollinators, biological control agents, decomposers, and bioindicators. One third of its diversity is found in the Neotropical Region, but the taxonomic knowledge for this region is incomplete. Thus, taxonomic revisions and species checklists of Syrphidae in the Neotropics are the highest priority for biodiversity studies. Therefore, we present the first checklist of Syrphidae for Ecuador based on literature records, and provide as well the original reference for the first time species citations for the country. A total of 201 species were recorded for Ecuador, with more than 600 records from 24 provinces and 237 localities. Tungurahua, Pastaza, and Galápagos were the best sampled provinces. Although the reported Ecuadorian syrphid fauna only comprises 11.2 % of the described Neotropical species, Ecuador has the third highest flower fly diversity density after Costa Rica and Suriname. These data indicate the high species diversity for this country in such small geographic area.

Keywords
faunistics, hoverflies, Neotropical Region, species list, Syrphid fauna

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Introduction

Seventeen countries in the world are considered megadiverse, occupying less than 10% of the Earth's surface and comprising nearly 70% of the global biodiversity (Mittermeier et al. 2005). In this group, Ecuador is listed among the first places in the world ranking based on number of species per area unit for vascular plants, mammals, birds, reptiles and amphibians (Mittermeier and Mittermeier 1997, Brehm et al. 2008), but it is the megadiverse country with the smallest land area (Mittermeier et al. 2005). This makes Ecuador rank at the top, or near so, of the megadiversity list if diversity per unit area is taken into consideration. The geographic position of Ecuador and a series of biotic and abiotic elements have resulted in an extraordinary biological diversity in this nation. For instance, there are ca. 20,000 estimated plants in Ecuador, of which up to 5,000 are most likely endemics. In terms of vertebrate diversity, 1.3% of the global diversity of non-fish vertebrates is endemic to Ecuador (Mittermeier et al. 2005).

Insects are the most successful group of living organisms in our planet in number of species and different natural histories. From all known and described species on Earth, ca. 1.5–1.7 millions, between 65 and 75% are insects, and among the insect orders only four orders represent more than 80% of the species: Coleoptera, Lepidoptera, Diptera, and Hymenoptera (Adler and Foottit 2009). Despite being abundant and ubiquitous, insects are understudied in Ecuador and many new species and genera are waiting to be formally described (Dangles et al. 2009, Barragán et al. 2009). Furthermore, there is no estimate on the number of invertebrates for Ecuador, neither a checklist for most of the invertebrate groups present in this country (Salazar and Donoso 2014).

Diptera, which includes mosquitoes and true flies, comprises more than 153,000 described species (about 10–12% of the planet’s biodiversity) and has a rate of near 1,000 new species described per year (Pape and Thompson 2013). Diptera is not only rich in number of species, but also in morphology and structure, habitats use and human interactions (Courtney et al. 2009). Most recent studies in this country have focused mostly on Lepidoptera (Piñas and Manzano 1997, Bollino and Onore 2001, Piñas and Manzano 2003a, 2003b, Hilt and Fiedler 2005, Brehm 2005, Fiedler et al. 2007, Bodner et al. 2010), and Coleoptera (Celi et al. 2004, Moret 2005, Carpio et al. 2009, Carvajal et al. 2011, Domínguez et al. 2015, Thormann et al. 2016). Salazar and Donoso (2014) present some numbers for the invertebrate fauna of Ecuador and report 722 dipteran species from the literature, but this number is probably an underestimation, which was biased by the research focus of the previous works in Ecuador. Thus, the actual species number of species of Diptera for the country is far from being known.

Commonly called flower or hoverflies, the family Syrphidae is one of the most diverse in Diptera with more than 6,000 described species (Brown 2009), and the third taxon with most species in the Neotropical Region (Amorim 2009). Their coloration, from orange-brown in a few species to striking yellow and black patterns, causes them to be confused with bees or wasps (Hymenoptera). Adults of the family Syrphidae have the ability to hover and are associated with flowers, which are used as mating sites and food sources (pollen and nectar). Therefore, the imagoes are considered important pollinators of herbs,
Checklist of the flower flies of Ecuador (Diptera, Syrphidae)

shrubs, and arboreal plants in natural ecosystems as well as in agricultural areas (Speight and Lucas 1992, Marinoni and Thompson 2003, Pérez-Bañón et al. 2003, Ssymank and Kearns 2009, Inouye et al. 2015). Syrphid species have been used as bioindicators as well to assess biodiversity loss and the efficiency of restoration and conservation policies (Sommaggio 1999, Tscharntke et al. 2005, Ricarte et al. 2011, Sommaggio and Burgio 2014).

Larvae are very variable in structure, habits, and feeding modes, including fungal fruiting bodies, brood in nests of social Hymenoptera, dung, decaying wood and water bodies of several types (Rotheray 1993, Rotheray and Gilbert 1999, 2011). Larvae of some species can mine leaves and stems of numerous plant families, or even feed on pollen, and others are predators of arthropods (aphids, caterpillars, larvae of flies or beetles, adult flies, etc.) or are kleptoparasitic or parasitoids (Rojo et al. 2003, Weng and Rotheray 2008, Reemer and Rotheray 2009, Rotheray et al. 2000, Ureña and Hanson 2010, Zúñiga and Nishida 2011, Pérez-Lachaud et al 2014, Jordaens et al. 2015, Fleischmann et al. 2016, Dumbardon-Martial 2016). Due to their feeding mode, some syrphid species play an important role as biological control agents of pests (Greco 1998, Schmidt et al. 2004, Bergh and Short 2008, Bugg et al. 2008, Pineda and Marcos-García 2008, Nelson et al. 2012, Amorós-Jiménez et al. 2014, Eckberg et al. 2015) and as decomposers of organic matter (Lardé 1989, Rotheray et al. 2009, Martínez-Falcón et al. 2012).

Flower flies are distributed worldwide, with the exception of Antarctica and a few remote oceanic islands, and their greatest species diversity is found in the tropics (Vockeroth 1992, Reemer 2013, Reemer and Ståhls 2013). The classification of Neotropical Syrphidae has been largely reviewed by Vockeroth (1969), Thompson (1972, 1999) and Reemer (2014), but the taxonomy of Syrphidae is far from being complete in the Neotropical Region yet, and many new species remain to be described (Mengual and Thompson 2008, Mengual et al. 2009, Thompson et al. 2010, Mengual 2011, Mengual and Thompson 2011, Reemer 2010, 2014, 2016). Moreover, the almost absence of identification keys for Neotropical species makes difficult the elaboration of regional checklists or the discovery of new species to science (Thompson et al. 2010, Montoya et al. 2012). Previously, species lists based on single surveys (Campos 1960, Linsley and Usinger 1966, Linsey 1977), for specific taxa (genus *Toxomerus* Macquart, 1855 by Gerdes, 1974a), or for limited areas, such as Galapagos Islands (Sinclair 2015, Sinclair et al. 2016), have been published for Ecuador.

Amorim (2009) considers Syrphidae among the still underexplored dipteran families in the Neotropical Region, and Ecuador among the most poorly collected areas in South America. Nevertheless, there have been some efforts during the last years to teach Syrphidae taxonomy to young students via workshops and courses with the great help of F.C. Thompson (USNM, National Museum of Natural History, Smithsonian Institution) as a coordinator (Colombia 2006, Peru 2008, Ecuador 2012), with the purpose to educate new taxonomists that may help to elucidate the thrilling evolutionary history of this group. As a fruit from these workshops, a strong collaboration among the authors was established years ago to study the flower flies of Ecuador. Currently, there is no species list for Ecuadorian flower flies that can help as a starting point, and the existing records are few and scattered thorough the literature. Conse-
sequently, a species checklist of the family Syrphidae in Ecuador for further biodiversity studies was the highest priority. In this survey, we present the first species checklist of Syrphidae for Ecuador based on literature records and provide as well the original reference for the first time species citations for the country of Ecuador.

**Materials and methods**

Thompson et al. (1976) was used as the primary source to check for species cited previously for Ecuador. Based on that keystone publication and Thompson et al. (2010), we reviewed all the published literature up to date in order to find references to Ecuadorian syrphids. Moreover, bibliographic searches were performed in public and scientific journal databases such as Google Scholar, Scopus, ISI Web of Knowledge, BioOne, Redalyc, Scielo, BioOne, ScienceDirect, and ResearchGate. Our keywords in English and Spanish for the searches were invertebrates, Ecuador, Diptera, Syrphidae, Neotropics, distribution, flower flies and hoverflies. In addition, we studied representative collections of Ecuador, i.e. Museo de Zoología de la Pontificia Universidad Católica del Ecuador (QCAZ) and Museo de la Escuela Politécnica Nacional.

To illustrate the flower fly records in a geographic map we used the coordinates available in the literature. For the localities without geographic coordinates we used Google Earth * to obtain them. Figure 1 was created using QGIS software (QGIS Development Team, 2009).

![Figure 1. Distribution map of flower fly records in Ecuador.](image-url)
Results

A total of 201 species plus four unidentified species and two misidentified taxa, belonging to 51 syrphid genera and subgenera, have been recorded up to date for Ecuador. More than 600 records from 24 provinces and 237 different localities of Ecuador are given in Table 1. Although there are records from all the Ecuadorean provinces, they do not show an even collecting effort for the whole country. Tungurahua (with 80 collecting events), Pastaza (72), and Galápagos (60) are the best sampled provinces, while the flower fly records for Orellana (3), Los Ríos (2), Santa Elena (2), Santo Domingo de Los Tsáchilas (2), and Esmeraldas (1) provinces are almost anecdotal. In terms of geographic Ecuadorean regions, the Sierra of Ecuador and the Galapagos Islands have been more extensively sampled and studied (Table 1 and Figure 1). On the other hand, the Costa Region, North and South Amazonia, and Austral Region of Ecuador have been little explored (Figure 1).

Table 1. Checklist of Syrphidae species recorded from Ecuador, with the Ecuadorean province, locality, altitude (when cited in the original reference), and the original reference for Ecuador.

| Species                  | Province    | Locality (Altitude masl) | References for Ecuador |
|--------------------------|-------------|--------------------------|------------------------|
| Alipumilio femoratus     | Pastaza     | Puyo                     | Rotheray et al. 2000: 137|
| Allograpta annulipes     | Pastaza     | Santa Inés, Río Pastaza (1200) | Fluke 1942: 16 (as *A. geminata*) |
| Allograpta browni        | Imbabura    | Cuicocha (3200)          | Fluke 1942: 18          |
| Allograpta exotica       | Tungurahua  | Baños                    | Fluke 1942: 19          |
|                          | Tungurahua  | Juive                    | Fluke 1942: 19          |
|                          | Ecuador     |                          | Fluke 1950a: 146 (as *Syrphus exotica*) |
| Allograpta falcata       | Tungurahua  | Baños (1800)             | Fluke 1942: 16          |
|                          | Tungurahua  | Baños (2200)             | Fluke 1942: 16          |
|                          | Galápagos   | Española                 | Sinclair and Peck 2002; Sinclair et al. 2016: 87 |
| Allograpta neoplendens   | Galápagos   | Floreana                 | Sinclair et al. 2016: 87|
|                          | Galápagos   | Genovesa                 | Sinclair et al. 2016: 87|
|                          | Galápagos   | Isabela                  | Sinclair and Peck 2002; Sinclair 2015; Sinclair et al. 2016: 87|
|                          | Galápagos   | Marchena                 | Sinclair 2015           |
|                          | Galápagos   | Pinta                    | Sinclair and Peck 2002; Sinclair et al. 2016: 87 |
|                          | Galápagos   | San Cristóbal            | Curran 1934: 153; Linsley and Usinger 1966: 168; Linsley 1977: 39; Sinclair and Peck 2002; Sinclair et al. 2016: 87 |
|                          | Galápagos   | Santa Cruz               | Boada 2005: 84; Sinclair 2015; Sinclair et al. 2016: 87 |
|                          | Galápagos   | Santa Fé                 | Sinclair 2015           |
|                          | Galápagos   | Santiago                 | Curran 1934: 153; Linsley and Usinger 1966: 168; Linsley 1977: 39; Sinclair and Peck 2002; Sinclair et al. 2016: 87 |
|                          | Galápagos   | Thomson 1869: 501 (as *Syrphus splendens*) |
| Species                              | Province     | Locality          | References for Ecuador |
|--------------------------------------|--------------|-------------------|-------------------------|
| *Allograpta neotropica* Curran, 1936 | Tungurahua   | Baños             | Fluke 1942: 20          |
|                                      | Pastaza      | Santa Inés        | Fluke 1942: 20          |
| *Allograpta obliqua* (Say, 1823)    | Tungurahua   | Baños             | Fluke 1942: 19          |
|                                      | Carchi       | Tulcán            | Campos 1960: 25         |
|                                      | Chimborazo   | Riobamba          | Campos 1960: 25         |
| *Allograpta tectiforma* Fluke, 1942 | Imbabura     | Cuicocha (3200)   | Fluke 1942: 19          |
|                                      | Imbabura     | Cuicocha (3500)   | Fluke 1942: 19          |
|                                      | Ecuador      |                   | Fluke 1950a: 146        |
| *Allograpta teligera* Fluke, 1942   | Tungurahua   | Baños (1800)      | Fluke 1942: 18          |
| *Argentinomyia agonis* (Walker, 1849)| Galápagos    |                   | Walker 1849: 588;       |
|                                      |              |                   | Linsley 1977: 39        |
|                                      | Galápagos    | Floreana          | Sinclair and Peck 2002; |
|                                      |              |                   | Sinclair 2015           |
|                                      | Galápagos    | Isabela           | Sinclair and Peck 2002; |
|                                      |              |                   | Sinclair et al. 2016: 85|
|                                      | Galápagos    | Pinta             | Sinclair and Peck 2002; |
|                                      |              |                   | Sinclair et al. 2016: 85|
|                                      | Galápagos    | San Cristóbal    | Sinclair 2015           |
|                                      |              |                   |                         |
|                                      | Galápagos    | Santa Cruz        | Boada 2005: 86;         |
|                                      |              |                   | Sinclair 2015           |
|                                      |              |                   | Sinclair et al. 2016: 85|
| *Argentinomyia altissima* (Fluke, 1945) | Imbabura    | Cuicocha (3200)   | Fluke 1945: 20          |
|                                      | Ecuador      |                   | Fluke 1958: 266         |
| *Argentinomyia bolivariensis* (Fluke, 1945) | Bolívar     | Hda. Talahua (3100) | Fluke 1945: 19          |
|                                      | Ecuador      |                   | Fluke 1958: 266         |
| *Argentinomyia browni* (Fluke, 1945)  | Bolívar      | Hda. Talahua (3100) | Fluke 1945: 19          |
|                                      | Ecuador      |                   | Fluke 1958: 266         |
| *Argentinomyia festiva* (Fluke, 1945) | Tungurahua   | Baños (1800)      | Fluke 1945: 10          |
| *Argentinomyia longicornis* (Walker, 1836) | Pastaza     | Puyo (3000)       | Fluke 1945: 4           |
| *Argentinomyia luculenta* (Fluke, 1945) | Tungurahua   | Baños (2300)       | Fluke 1945: 18          |
|                                      | Tungurahua   | Pondoa (2800)     | Fluke 1945: 18          |
| *Argentinomyia opaca* (Fluke, 1945)  | Chimborazo   | Urbina (3650)     | Fluke 1945: 11          |
|                                      | Ecuador      |                   | Fluke 1958: 266         |
| *Argentinomyia rex* (Fluke, 1945)    | Bolívar      | Hda. Talahua (3100) | Fluke 1945: 22          |
|                                      | Ecuador      |                   | Fluke 1958: 266         |
| *Argentinomyia tropica* (Curran, 1937) | Tungurahua   | Baños (2300)       | Fluke 1945: 17          |
| *Clariphunula latifacies* Shannon, 1927 | Bolívar     | Hda. Talahua (3100) | Fluke 1942: 4           |
|                                      | Ecuador      |                   | Fluke 1950a: 146        |
| *Copestyllum* (Copestyllum) otonaeensis Rotheray & Hancock, 2007 | Cotopaxi | Otona | Rotheray et al. 2007: 290 |
| *Copestyllum* (Copestyllum) tapia Rotheray & Hancock, 2007 | Cotopaxi | Otona | Rotheray et al. 2007: 307 |
| *Copestyllum* (Phalacrocyra) araceorum Ricarte & Rotheray, 2015 | Cotopaxi | Otona | Ricarte et al. 2015: 13 |
| *Copestyllum* (Phalacrocyra) beatricea (Hull, 1950) | Azuay | Cuenca (2650) | Fluke 1951b: 15 (as Volucella ecuadorea) |
|                                      | Tungurahua   | Baños             | Fluke 1951b: 15 (as Volucella ecuadorea) |
|                                      | Imbabura     | Cuicocha (3300)   | Fluke 1951b: 15 (as Volucella ecuadorea) |
|                                      | Ecuador      |                   | Hull 1950: 236           |
| Species | Province | Locality (Altitude masl) | References for Ecuador |
|---------|----------|--------------------------|------------------------|
| *Copestylum* *(Phalacromya)* *brunneum* (Thunberg, 1789) | Chimborazo | Huigra | Campos 1960: 27 (as *Volucella esuriens*) |
| *Copestylum* *(Phalacromya)* *bulboum* (Fluke, 1951) | Cañar | Azogues | Campos 1960: 27 (as *Volucella esuriens*) |
| *Copestylum* *(Phalacromya)* *campsi* (Curran, 1939) | Tungurahua | Minza Chica (3750) | Fluke 1951b: 25 |
| *Copestylum* *(Phalacromya)* *chaetophorum* (Williston, 1887) | Guayas | Isla Puná, Puerto Grande | Curran 1939: 8 |
| *Copestylum* *(Phalacromya)* *curranii* (Fluke, 1951) | Pichincha | Guayllabamba | Rotheray et al. 2009: 714 |
| *Copestylum* *(Phalacromya)* *fulvicorne* (Bigot, 1883) | Guayas | San Eduardo | Campos 1960: 27 |
| *Copestylum* *(Phalacromya)* *hambletoni* (Fluke, 1951) | Ecuador | Thompson et al. 1976: 77 |
| *Copestylum* *(Phalacromya)* *multipunctatum* Rotheray & Hancock, 2009 | Pichincha | Guayllabamba | Rotheray et al. 2009: 704 |
| *Copestylum* *(Phalacromya)* *nigripes* (Bigot, 1857) | El Oro | Chillacocha | Campos 1960: 29 (as *Phalacromyia concolor*) |
| *Copestylum* *(Phalacromya)* *placivum* (Hull, 1943) | Pastaza | Santa Inés | Hull 1943b: 31 |
| *Copestylum* *(Phalacromya)* *rufoscutellare* (Philippi, 1865) | Chimborazo | Mirador | Campos 1960: 29 |
| *Copestylum* *(Phalacromya)* *scintillans* (Hull, 1949) | Galápagos | San Cristóbal (730) | Sinclair et al. 2016: 83 |
| *Copestylum* *(Phalacromya)* *sica* (Curran, 1953) | Pichincha | Guayllabamba | Rotheray et al. 2009: 720 |
| *Copestylum* *(Phalacromya)* *splendens* (Townsend, 1897) | Pichincha | Cotocollao | Campos 1960: 27 (as *Volucella opalina*) |
| *Copestylum* *(Phalacromya)* *viridigaster* (Hull, 1943) | Ecuador | Thompson et al. 1976: 41 |
| *Dasysyrphus* aff. *(lotus)* (Williston, 1889) | Pichincha | Pichincha (3300) | Fluke 1942: 3 |
| *Dolichogyna chilensis* (Walker, 1836) | Azuay | Narihuía | Campos 1960: 29 |
| *Dolichogyna mulleri* Fluke, 1951 | Azuay | Girón | Fluke 1951a: 472 |
| *Eosalpingogaster* *nigriventris* (Bigot, 1883) | Guayas | Isla Puná, Puerto Grande (253) | Fluke 1937: 11 (as *Salpingogaster lipoeta*) |
| *Eristalis* *(Eoseristalis)* *bogotensis* Macquart, 1842 | Ecuador | Thompson et al. 1976: 101 |
| *Napo* | Pichincha | Antisamilla to Pinatura (3350) | Thompson 1997: 223 |
| *Pichincha* | Santa Catalina Expt. Station (2780) | Thompson 1997: 223 |
| *Pichincha* | Quito (2850) | Thompson 1997: 223 |
| Species | Province | Locality (Altitude masl) | References for Ecuador |
|---------|----------|--------------------------|-------------------------|
| **Eristalis (Eoseristalis) bogotensis**<br>Macquart, 1842<br> | Chimborazo | 8 mi NE of Tixan<br>Chimborazo | Thompson 1997: 223<br>Chimborazo | Lago Zurucuchu<br>Tungurahua | Ambato (2700)<br>Carchi | Troya<br>Carchi | Tulcan (2800)<br>Carchi | El Ángel (2700)<br>Cañar | El Tambo (2800)<br>Pichincha | Pomasqui (2200)<br>Pichincha | Valle de Machachi (2900)<br>Loja | Loja (2500)<br>Azuay | Tarqui (2800)<br>Azuay | 28 km S of Cuenca (2500–2800)<br>Azuay | Cuenca (2200) |
| **Eupeodes (Metasyrphus) rojasi**<br>Marneff, 1999<br> | Azuay | Gualaduisa Road (2150)<br>Tungurahua | Baños<br>Bolívar | Chota River, Carchi (2000)<br>Imbabura | NW Ibarra, Taguando River (1650–1900)<br>Carchi | El Ángel (2700)<br>Carchi | 10 km SW Túlcan (2900)<br>Imbabura | 3km N Ibarra, Yaguacocha (1950)<br>Pichincha | Pichincha, 2km W Cayambe (2300) |
| **Fazia alta** (Curran, 1936)<br> | Tungurahua | Baños<br>Tungurahua | Juive<br>Ecuador | | | | | | | |
| **Fazia altissima** (Fluke, 1942)<br> | Tungurahua | Volcán<br>Tungurahua, Minza Chica (3200)<br>Tungurahua | Poodoa (2800)<br>Pichincha | Páramo del Cerro, Paschoa (3300)<br>Pichincha | Hda. San Rafael, Río San Pedro (2700)<br>Pichincha | Uyumbicho (2650)<br>Pichincha | Hda. San Rafael (3000)<br>Imbabura | Cuicocha (3200)<br>Ecuador | | Pastaza | Puyo (1000)<br>Pichincha | Uyumbicho (2700)<br>Imbabura | Cuicocha (3200) | Fluke 1942: 14
| Species                        | Province        | Locality                        | References for Ecuador |
|-------------------------------|-----------------|---------------------------------|------------------------|
| *Fazia argentipila* (Fluke, 1942) | Tungurahua     | Baños, Runtun trail (2100)      | Fluke 1942: 14         |
|                               | Pichincha       | Hda. San Rafael (3000)          | Fluke 1942: 14         |
|                               | Azuay           | Cuenca (2500)                   | Fluke 1942: 14         |
|                               | Tungurahua      | Baños, San Pablo (2200)         | Fluke 1942: 14         |
|                               | Bolívar         | Hda. Talahua (3100)             | Fluke 1942: 14         |
|                               | Ecuador         |                                 | Fluke 1950a: 145       |
| *Fazia colombia* (Curran, 1925) | Tungurahua     | Baños (2100)                    | Fluke 1942: 13         |
|                               | Azuay           | Cuenca (2500)                   | Fluke 1942: 13         |
|                               | Pichincha       | Pichincha (2700)                | Fluke 1942: 13         |
|                               | Morona Santiago | Sucía (900)                     | Fluke 1942: 13         |
|                               | Ecuador         |                                 | Fluke 1950a: 146       |
| *Fazia decemmaculata* (Shannon, 1927) | Ecuador       |                                 | Thompson et al. 1976: 34 (as *F. bullaephora*); Mengual et al. 2009: 17 (as *F. bullaephora*) |
| *Fazia fasciata* (Curran, 1932) | Tungurahua     | Juive (1900)                    | Fluke 1942: 13         |
|                               | Tungurahua      | Baños (1900)                    | Fluke 1942: 13         |
|                               | Imbabura        | Cuicocha (3200)                 | Fluke 1942: 13         |
|                               | Ecuador         |                                 | Fluke 1950a: 146       |
| *Fazia fascifrons* (Macquart, 1846) | Bolívar        | Hda. Talahua (3100)             | Fluke 1942: 12 (as *Epistrophe armillata*) |
|                               | Ecuador         |                                 | Fluke 1950a: 145 (as *Epistrophe armillatus*) |
| *Fazia imitator* (Curran, 1925) | Tungurahua     | Río Mapoto (1400)               | Fluke 1942: 11         |
|                               | Tungurahua      | Volcán, Tungurahua, Minza Chica (3200) | Fluke 1942: 8          |
|                               | Bolívar         | Hda. Talahua (3100)             | Fluke 1942: 8          |
|                               | Ecuador         |                                 | Fluke 1950a: 146       |
| *Fazia micrura* (Osten Sacken, 1877) | Morona Santiago | Sucía                           | Fluke 1942: 14         |
|                               | Morona Santiago | Macas                           | Fluke 1942: 14         |
|                               | Carchi          | Tulcán                          | Campos 1960: 26 (as *Sphaerophoria picticauda*) |
| *Fazia remigis* (Fluke, 1942) | Tungurahua      | Volcán, Tungurahua, Minza Chica (3200) | Fluke 1942: 9          |
|                               | Bolívar         | Hda. Talahua (3100)             | Fluke 1942: 9          |
|                               | Ecuador         |                                 | Fluke 1950a: 145       |
| *Fazia roburoris* (Fluke, 1942) | Bolívar         | Hda. Talahua (3100)             | Fluke 1942: 11         |
|                               | Ecuador         |                                 | Fluke 1950a: 146       |
| *Hypselosyrphus marshalli* Reemer, 2013 | Napo           | Tiputini Diodiversity Station   | Reemer 2013: 28        |
| *Leucopodella broadica* (Hull, 1943) | El Oro         | Piñas (1506)                    | Hull 1943i: 73         |
| *Leucopodella delicatula* (Hull, 1943) | Tungurahua     | Baños                           | Hull 1943i: 78         |
| Species                                      | Province | Locality           | References for Ecuador                                      |
|----------------------------------------------|----------|--------------------|-------------------------------------------------------------|
| *Leucopodella gracilis* (Williston, 1891)    | Ecuador  |                    | Thompson et al. 1976: 46 (as *L. asthenia*)                 |
| *Leucopodella zenilla* (Hull, 1943)          | Bolívar  | Hda. Talahua (3100) | Hull 1943g: 77                                              |
| *Lycasirrhyncha nitens* Bigot, 1859          | Ecuador  |                    | Montoya et al. 2012: supplementary material page 3; Montoya et al. 2016: 492 |
| *Mallota aberrans* Shannon, 1927             | Napo     | 7 km S of Bacza (2000) | Thompson and Zumbado 2002: 93                              |
| *Mallota nigra* Shannon, 1927                | Pastaza  | Santa Inés         | Shannon 1927: 17                                            |
| *Mallota rubicunda* Curran, 1940             | Pastaza  |                    | Curran 1940: 13                                              |
| *Meromacrus laconicus* (Walker, 1852)        | Guayas   | Isla Puná (253)    | Blatch et al. 2003: 26                                       |
| *Meromacrus panamensis* Curran, 1930         | Guayas   | San Eduardo        | Campos 1960: 29                                             |
| *Meromacrus pratorum* (Fabricius, 1775)      | Ecuador  |                    | Thompson et al. 1976: 113                                    |
| *Meropidia rufa* Thompson, 1983              | Morona   | Limón Indanza (900) | Hippa and Thompson, 1983: 110                                |
| *Microdon* (**Chymophila**) fulgens Wiedmann, 1830 | Guayas | Guayaquil, San Eduardo | Campos 1960: 24                                      |
| *Microdon* (**Microdon**) violaceus (Macquart, 1842) | Guayas | Durán              | Campos 1960: 24                                             |
| *Microdon sp.*                               | Guayas   | env. of Guayaquil  | Campos 1960: 24                                             |
| *Mixogaster thecla* (Hull, 1954)             | Ecuador  |                    | Thompson et al. 1976: 59                                    |
| *Ocyptamus* (**Calistigma**) elhona (Shannon, 1927) | Ecuador |                    | Thompson et al. 1976: 17                                    |
| *Ocyptamus* (**Hermesomyia**) wulpianus (Lynch Arribalzaga, 1891) | Pastaza | Puyo (1250)         | Hull 1943a: 50 (as Baccha phobifer)                         |
| *Ocyptamus* (**Hermesomyia**) cultratus (Austen, 1893) | Pastaza | Puyo (1000)        | Hull 1943d: 91                                               |
| *Ocyptamus* (**Hermesomyia**) saffrona (Hull, 1943) | Pastaza |                    | Hull 1943g: 78 (as *Baccha satyra*)                         |
| *Ocyptamus* (**Hermesomyia**) zilla (Hull, 1943) | Pastaza |                    | Hull 1943j: 215                                              |
| Species | Province | Locality (Altitude masl) | References for Ecuador |
|---------|----------|--------------------------|------------------------|
| Ocyptamus (Orphnabaccha) cerberus (Hull, 1943) | Imbabura | Cuicocha | Hull 1943g: 67 |
| Ocyptamus (Orphnabaccha) opacus (Fluke, 1950) | Tungurahua | Volcán Tungurahua (2800) | Fluke 1950b: 444 |
|         | Tungurahua | Baños (1900) | Fluke 1950b: 444 |
|         | Napo-Orellana | Sumaco [as Río Zumac] (1400) | Fluke 1950b: 444 |
| Ocyptamus (Orphnabaccha) pteronis (Fluke, 1942) | Tungurahua | Volcán Tungurahua, Minza Chica (3200) | Fluke 1942: 5 |
|         | Bolívar | Hda. Talahua | Fluke 1942: 5 |
|         | Ecuador | | Fluke 1950a: 145 |
| Ocyptamus (Orphnabaccha) trabis (Fluke, 1942) | Tungurahua | Volcán Tungurahua, Runtun (2900) | Fluke 1942: 6 |
|         | Imbabura | Cuicocha (3200) | Fluke 1942: 6 |
|         | Pichincha | Páramo de Pasacho | Fluke 1942: 6 |
|         | Ecuador | | Fluke 1950a: 145 |
| Ocyptamus (Orphnabaccha) virga (Fluke, 1942) | Imbabura | Cuicocha (3200) | Fluke 1942: 7 |
| Ocyptamus (Orphnabaccha) volcanus (Fluke, 1942) | Pastaza | Santa Inés, Río Pastaza (1200) | Fluke 1942: 7 |
| Ocyptamus (Pipunculosyrphus) scintillans (Hull, 1943) | Guayas | Morro (1500) | Hull 1943e: 136 |
| Ocyptamus (Styxia) ebis (Hull, 1943) | Bolívar | Hda. Talahua | Hull 1943g: 66 |
| Ocyptamus sp. | Guayas | Guayaquil, San Eduardo | Campos 1960: 24 |
| Ornidia major Curran, 1930 | Ecuador | | Thompson et al. 1976: 69; Thompson 1991: 255 |
|         | Galápagos | | Peck 1996 |
|         | Galápagos | Isabel | Peck et al. 1998: 228; Causton et al. 2006: 135; Sinclair 2015; Sinclair et al. 2016: 84 |
|         | Galápagos | San Cristóbal | Peck et al. 1998: 228; Causton et al. 2006: 135; Sinclair 2015; Sinclair et al. 2016: 84 |
|         | Galápagos | Santa Cruz | Sinclair 2015 |
|         | Ecuador | | Thompson et al. 1976: 69; Thompson 1991: 257 |
| Ornidia obea (Fabricius, 1775) | Guayas | Guayaquil | Campos 1960: 26 |
|         | Guayas* | El Salado | Campos 1960: 26 |
|         | Guayas | San Eduardo | Campos 1960: 26 |
|         | Guayas | Durán | Campos 1960: 26 |
|         | Guayas | Naranjito | Campos 1960: 26 |
|         | Guayas | San Rafael | Campos 1960: 26 |
|         | Guayas | Barraganetal | Campos 1960: 26 |
|         | Guayas | Bucay | Campos 1960: 26 |
|         | Guayas | Posorja | Campos 1960: 26 |
|         | Guayas | Playas del Morro | Campos 1960: 26 |
|         | Guayas | Naranjal | Campos 1960: 26 |
|         | Zamora | Chinchipe | Valle del Zamora | Campos 1960: 26 |
| Species                  | Province | Locality (Altitude masl) | References for Ecuador |
|--------------------------|----------|--------------------------|------------------------|
| *Ornidia obesa* (Fabricius, 1775) | Loja     | Loja                      | Campos 1960: 26         |
|                          | Esmeraldas | Telembí, Río Cayapas     | Campos 1960: 27         |
| *Palpada aemula* (Williston, 1891) | Ecuador  | Montoya et al. 2012: supporting information, page 5; Montoya et al. 2016: 498 |
| *Palpada albifrons* (Wiedemann, 1830) | Galápagos | Santa Cruz                | Sinclair 2015           |
|                          | Galápagos | Floreana                  | Sinclair et al. 2016: 81|
|                          | Galápagos | Isabel                    | Sinclair et al. 2016: 81|
|                          | Galápagos | Marchena                  | Sinclair et al. 2016: 82|
|                          | Guayas    | San Eduardo               | Campos 1960: 28         |
|                          |           |                          | (as *Eristalis albiceps*)|
| *Palpada atrimana* (Loew, 1866) | Ecuador  | Montoya et al. 2016: 496  |
| *Palpada conica* (Fabricius, 1805) | Napo     | Tená                      | Morales and Marinoni 2009: 320 |
|                          | Zamora   | Chinchipe                 | Morales and Marinoni 2009: 320 |
| *Palpada cosmia* (Schiner, 1868) | Ecuador  | Thompson et al. 1976: 104 |
| *Palpada erratica* (Curran, 1930) | Azuay    | Morales and Marinoni 2009: 332 |
|                          | Sucumbios | Morales and Marinoni 2009: 332 |
| *Palpada fasciata* (Wiedemann, 1819) | Ecuador  | Thompson et al. 1976: 105 |
|                          | Guayas    | Guayaquil                 | Campos 1960: 28         |
|                          | Guayas    | San Eduardo               | Campos 1960: 28         |
| *Palpada funerea* (Rondani, 1851) | Ecuador  | Río Napo                  | Rondani 1851: 357       |
| *Palpada furcata* (Wiedemann, 1819) | Pichincha | Quito                     | Macquart 1855: 110 (as *Eristalis quitensis*) |
|                          | Ecuador  | Thompson et al. 1976: 106 |
| *Palpada geniculata* (Fabricius, 1805) | Guayas    | Guayaquil                 | Campos 1960: 28         |
|                          |           | (as *Eristalis obsoletus*)|
| *Palpada macula* (Sack, 1941) | Ecuador  | Thompson et al. 1976: 106 |
| *Palpada mexicana* (Macquart, 1847) | Ecuador  | Thompson et al. 1976: 110 |
|                          |           | (as *Palpada testacea*hornis*)|
| *Palpada monticola* (Röder, 1892) | Carchi   | 10 km SW Tulcan (2900)    | Thompson 1997: 232 (as *Palpada eristaloides*) |
|                          | Carchi   | Troya (2950)              | Thompson 1997: 232 (as *Palpada eristaloides*) |
|                          | Azuay    | Cerro Tinajillas (3100)   | Thompson 1997: 232 (as *Palpada eristaloides*) |
|                          | Napo     | 0°22'S 78°8'W (3500)     | Thompson 1997: 232 (as *Palpada eristaloides*) |
| *Palpada pusilla* (Macquart, 1842) | Ecuador  | Thompson et al. 1976: 108 |
|                          | Guayas    | Durán                     | Campos 1960: 28         |
|                          |           | (as *Eristalis tricolor*) |
| *Palpada pusio* (Wiedemann, 1830) | Ecuador  | Thompson et al. 1976: 108 |
| *Palpada ruficeps* (Macquart, 1842) | Ecuador  | Thompson et al. 1976: 108 |
| *Palpada rufiventris* (Macquart, 1846) | Ecuador  | Thompson et al. 1976: 108 |
|                          | Napo     | Morales and Marinoni 2009: 344 |
|                          | Pastaza  | Morales and Marinoni 2009: 344 |
|                          | Guayas    | Guayaquil                 | Campos 1960: 28         |
|                          | Guayas    | El Salado                 | Campos 1960: 28         |
|                          | Guayas    | San Eduardo               | Campos 1960: 28         |
|                          | Guayas    | Durán                     | Campos 1960: 28         |
|                          | Guayas    | Yaguachi                  | Campos 1960: 28         |
|                          | Guayas    | Naranjito                 | Campos 1960: 28         |
|                          | Guayas    | San Rafael                | Campos 1960: 28         |
| *Palpada scutellaris* (Fabricius, 1805) | Napo     | Morales and Marinoni 2009: 344 |
|                          | Pastaza  | Morales and Marinoni 2009: 344 |
|                          | Guayas    | Guayaquil                 | Campos 1960: 28         |
|                          | Guayas    | El Salado                 | Campos 1960: 28         |
|                          | Guayas    | San Eduardo               | Campos 1960: 28         |
|                          | Guayas    | Durán                     | Campos 1960: 28         |
|                          | Guayas    | Yaguachi                  | Campos 1960: 28         |
|                          | Guayas    | Naranjito                 | Campos 1960: 28         |
|                          | Guayas    | San Rafael                | Campos 1960: 28         |
| Species                          | Province | Locality (Altitude masl) | References for Ecuador |
|---------------------------------|----------|--------------------------|------------------------|
| **Palpada scutellaris**         | Guayas   | Bucay                    | Campos 1960: 28        |
| (Fabricius, 1805)               | Guayas   | Posorja                  | Campos 1960: 28        |
|                                 | Guayas   | Isla Puná, Puerto Grande | Campos 1960: 28        |
| **Palpada supranufts**           | Imbabra  | S Oravalo (3100–3300)    | Thompson 1999: 345     |
| Thompson, 1999                   | Napo     | Papallacta (2900)        | Thompson 1999: 345     |
|                                 | Pichincha | 28 miles S Quito         | Thompson 1999: 345     |
|                                 | Cañar    | Pimo (3200)              | Thompson 1999: 345     |
| **Palpada urotentia** (Curran, 1930) | Ecuador |                          | Thompson et al. 1976: 110 |
| **Palpada vinetorum** (Fabricius, 1799) | Galápagos | Españaola                | Sinclair et al. 2016: 82 |
|                                 | Galápagos | San Cristóbal           | Sinclair et al. 2016: 82 |
|                                 | Galápagos | Santa Cruz               | Linsley 1977: 39; Sinclair 2015; Sinclair et al. 2016: 82 |
|                                 | Ecuador  |                          | Thompson et al. 1976: 110 |
|                                 | Guayas   | Guayaquil                | Campos 1960: 28        |
|                                 | Guayas   | San Eduardo              | Campos 1960: 28        |
| **Pelecinobaccha adpersa**      | Napo     | Jatun Sacha Biol. Res. 6 km E Misahualli (450) | Miranda et al. 2014: 18 |
| (Fabricius, 1805)               | Napo     | Jatun Sacha Biol. Res. 6 km E Misahualli (450) | Miranda et al. 2014: 22 |
| Miranda, 2014                   | Pastaza  | Pompeya, Napo R.         | Miranda et al. 2014: 24 |
| **Pelecinobaccha andrettiae**   | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 26 |
| Miranda, 2014                   | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 30 |
| **Pelecinobaccha avispas**      | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 30 |
| Miranda, 2014                   | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 30 |
| **Pelecinobaccha brevipennis**  | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 30 |
| (Schiner, 1868)                 | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 30 |
| **Pelecinobaccha clarapex**     | Pichincha | Río Palenque Station (250) | Miranda et al. 2014: 33 |
| (Wiedemann, 1830)               | Napo     | Jatun Sacha Biol. Res. 6 km E Misahualli (450) | Miranda et al. 2014: 62 |
| **Pelecinobaccha dracula**      | El Oro   | Piñas (1200)             | Hull 1943j: 215 (as Baccha nerissa); Hull 1949; 162 (as Baccha nerissa) |
| (Hull, 1943)                    | Napo     | Jatun Sacha Biol. Res. 6 km E Misahualli (450) | Miranda et al. 2014: 49 |
| **Pelecinobaccha ida** (Curran, 1941) | Napo     | 7 km S Baeza             | Miranda et al. 2014: 62 |
| **Pelecinobaccha ovipositoria** | Napo     | Jatun Sacha Biol. Res. 6 km E Misahualli (450) | Miranda et al. 2014: 62 |
| (Hull, 1943)                    | Napo     | Jatun Sacha Biol. Res. 6 km E Misahualli (450) | Miranda et al. 2014: 62 |
| **Pelecinobaccha pilipes**      | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 67 |
| (Schiner, 1868)                 | Napo     | Coca, Napo R. (250)      | Miranda et al. 2014: 67 |
| **Pelecinobaccha transatlantica** | Napo     | Lago Agrio, 41 km W      | Miranda et al. 2014: 78 |
| (Schiner, 1868)                 | Napo     | Lago Agrio, 41 km W      | Miranda et al. 2014: 78 |
|                                 | Orellana | Yasuni Research Stn. (250) | Miranda et al. 2014: 78 |
|                                 | Pastaza  | Santa Clara               | Miranda et al. 2014: 78 |
| **Pelecinobaccha transatlantica** | Napo     | Puerto Misahualli (350)  | Miranda et al. 2014: 78 |
| (Schiner, 1868)                 | Pastaza  | Pompeya, Napo R.         | Miranda et al. 2014: 78 |
| **Penadon aureus** (Hull, 1944) | Napo     | Jatun Yacu, Río Naxo, Watershed (700) | Hull 1944a: 36 |
| Species                                      | Province     | Locality (Altitude masl) | References for Ecuador |
|----------------------------------------------|--------------|--------------------------|------------------------|
| **Platycheirus (Carposcalis)**               |              |                          |                        |
| *chalconotus* (Philippi, 1865)               | Chimborazo   | Riobamba (2700)          | Fluke 1945: 16         |
|                                              | Azuay        | Cuenca (2500)            | Fluke 1945: 16         |
|                                              | Imbabura     | Cuicocha (3200)          | Fluke 1945: 16         |
|                                              | Azuay        | Cuenca (2500)            | Fluke 1945: 16         |
|                                              | Bolívar      | Hda. Talahua (3100)      | Fluke 1945: 16         |
| **Platycheirus (Carposcalis)**              |              |                          |                        |
| *ecuadoriensis* (Fluke, 1945)               | Chimborazo   | Riobamba (2700)          | Fluke 1945: 16         |
|                                              | Chimborazo   | Riobamba (2800)          | Fluke 1945: 16         |
|                                              | Pichincha    | Uyumbichico (2650)       | Fluke 1945: 16         |
|                                              | Pichincha    | Chillo Valley, Hda. Teno (2500) | Fluke 1945: 16 |
|                                              | Ecuador      |                          | Fluke 1958: 265        |
| **Platycheirus (Carposcalis)**              |              |                          |                        |
| *inflatifrons* (Fluke, 1945)                | Bolivar      | Hda. Talahua (3100)      | Fluke 1945: 21         |
|                                              | Ecuador      |                            | Fluke 1958: 265        |
| **Platycheirus (Carposcalis)**              |              |                          |                        |
| *punctulatus* (Wulp, 1888)                  | Ecuador      | (2100–3300)              | Fluke 1945: 15         |
| **Platycheirus (Carposcalis)**              |              |                          |                        |
| *saltanu* (Enderlein, 1938)                 | Ecuador      | (4200)                   | Fluke 1945: 15         |
| **Platycheirus (Carposcalis)**              |              |                          |                        |
| *scutigera* (Fluke, 1945)                  | Pichincha    | Uyumbichico (2700)       | Fluke 1945: 20         |
| **Platycheirus (Carposcalis)**              |              |                          |                        |
| *stegnus* (Say, 1829)                      | Santa Elena  | La Rinconada             | Campos 1960: 24        |
|                                              | Chimborazo   | Alausí                    | Campos 1960: 24        |
|                                              | Carchi       | El Ángel                  | Campos 1960: 24        |
|                                              | Pichincha    | Castatagua               | Campos 1960: 24        |
|                                              | Carchi       | Tulcán                    | Campos 1960: 24        |
| **Pseudodoros (Dioprosopa)**                |              |                          |                        |
| *clavatus* (Fabricius, 1794)                | Galápagos    | Baltra                    | Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Española                  | Kassebeer 2000: 83; Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Genovesa                  | Kassebeer 2000: 83; Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Floreana                  | Smith 1877: 84 (as Syrphus albomaculatus); Coquillett 1901: 374; Linsley and Usinger 1966: 168; Linsley 1977: 39; Kassebeer 2000: 83; Sinclair 2015; Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Isabel                    | Curran 1934: 154; Linsley and Usinger 1966: 168; Linsley 1977: 39; Kassebeer 2000: 83; Sinclair 2015; Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Pinta                     | Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Marchena                  | Linsley 1977: 39; Sinclair 2015; Sinclair et al. 2016: 89 |
|                                              | Galápagos    | San Cristóbal             | Curran 1934: 154; Linsley and Usinger 1966: 168; Linsley 1977: 39; Sinclair 2015; Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Rábida                    | Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Santiago                  | Coquillett 1901: 374; Linsley and Usinger 1966: 168; Linsley 1977: 39; Kassebeer 2000: 83 |
|                                              | Galápagos    | Santa Fé                  | Sinclair et al. 2016: 89 |
|                                              | Galápagos    | Bartolomé                 | Kassebeer 2000: 83     |
|                                              | Galápagos    | Seymour Norte             | Johnson 1924: 88       |
|                                              | Galápagos    | Santa Cruz                | Linsley 1977: 39; Kassebeer 2000: 83; Sinclair 2015; Sinclair et al. 2016: 89 |
|                                              | Galápagos    |                          | Thomson 1869: 548 (as Baccha facialis) |
### Checklist of the flower flies of Ecuador (Diptera, Syrphidae)

| Species | Province | Locality (Altitude masl) | References for Ecuador |
|---------|----------|--------------------------|------------------------|
| **Pseudodoros (Dioprosopa) clavatus** (Fabricius, 1794) | Azuay | 32 km W Santa Isabel (900) | Kassebeer 2000: 85 |
| | Manabí | Manta-Jipijapa rd. (150) | Kassebeer 2000: 85 |
| | Zamora Chinchipe | Zamora (1500) | Kassebeer 2000: 85 |
| | Zamora Chinchipe | Loja, San Pedro (1550) | Kassebeer 2000: 85 |
| **Pseudodoros (Dioprosopa) vockerothi** (Kassebeer, 2000) | Bolívar | Chota River, Carchi (1800) | Kassebeer 2000: 76 |
| | Imbabura | Ibarra, Yaguaracocha (2300) | Kassebeer 2000: 76 |
| | Loja | S. Pedro-Zaruma rd Loja (850–1100) | Kassebeer 2000: 76 |
| | Imbabura | Taguando R., NW Ibarra (1650–1900) | Kassebeer 2000: 76 |
| **Quichuana aff. quixotea** Hull, 1946 | Napo | Limoncocha | Ricarte et al. 2012: 129 |
| | Cotopaxi | Latacunga (330) | Miranda et al. 2014: 91 |
| **Relictanum crassum** (Walker, 1852) | Los Ríos | Rio Palenque (150) | Miranda et al. 2014: 91 |
| | Napo | Puerto Misahuallí (350) | Miranda et al. 2014: 91 |
| | Sucumbíos | Limoncocha (250) | Miranda et al. 2014: 91 |
| **Relictanum johnsoni** (Curran, 1934) | Napo | Coca, Napo R. (250) | Miranda et al. 2014: 93 |
| **Rhingia (Rhingia) longirostris** Fluke, 1943 | Bolívar | Hda. Talahua (3100) | Fluke 1943: 431 |
| **Rhingia (Rhingia) nigra** Macquart, 1846 | Ecuador | | Montoya et al. 2016: 506 |
| **Rhinoprosopa lucifer** (Hull, 1943) | El Oro | Piñas (1600) | Hull 1943j: 216 |
| **Rhinoprosopa naiata** (Bigot, 1884) | Carchi | R. Chota (2000) | Menguial 2015: 16 |
| **Rhopalosyrphus ecuadoriensis** Reemer, 2013 | Orellana | Yasuni Research Station | Reemer and Ståhls 2013a: 119 |
| **Salpingogaster brunni** Curran, 1941 | Tungurahua | Volcán Tungurahua, Minza Chica (3200) | Curran 1941: 286 |
| **Scaeva melanostoma** (Macquart, 1842) | Azuay | 2 km W Cayambe (2300) | Thompson et al. 1976: 9 |
| | Pichincha | 2 km W Cayambe (2300) | Kassebeer 1999: 99 |
| | Carchi | El Ángel (2700) | Kassebeer 1999: 99 |
| | Pichincha | Valle de Machachi (2900) | Kassebeer 1999: 99 |
| | Chimborazo | Riobamba | Campos 1960: 29; Kassebeer 1999: 99 |
| | Chimborazo env. of Riobamba | | Kassebeer 1999: 99 |
| **Scaeva occidentalis** Shannon, 1927 | Pichincha | Valle de Machachi (2900) | Kassebeer 1999: 101 |
| **Sterphus (Crepidomyia) chloroppyga** (Schiner, 1868) | Ecuador | | Schiner 1868: 366 (type-locality as “Colombien”, referring to Colombia, Ecuador, or Venezuela); Montoya et al., 2016: 504 |
| Species                          | Province | Locality (Altitude masl) | References for Ecuador |
|---------------------------------|----------|--------------------------|------------------------|
| Sterphus (Crepidomyia) plagiatus (Wiedemann, 1830) | Napo    | Napo River, Coca (250)    | Thompson 1973: 220     |
|                                 | Napo    | Napo River               | Thompson 1973: 220     |
|                                 | Pastaza | Napo River, Pompeya      | Thompson 1973: 220     |
| Sterphus (Telus) telus Thompson, 1973 | Azuay  | Taquii (2800)             | Thompson 1973: 198     |
| Stipomorpha guianica (Curran, 1925) | Morona Santiago | Limón Indanza (900) | Reemer 2013: 54        |
|                                 | Ecuador |                          | Thompson et al. 1976: 62 |
| Stipomorpha tenuicauda (Curran, 1925) | Napo    | Jatun Sacha Res., 6 km E Misahualli (450) | Reemer 2013: 70 |
| Stipomorpha zophera Reemer, 2013 | Napo    | Limoncocha               | Reemer 2013: 75        |
| Syrphus aff. lacyorum Thompson, 2000 | Morona Santiago | Rio Blanco           | Thompson et al. 2000: 39 |
| Syrphus reedi Shannon, 1927      | Zamora Chinchipe | Valle de Zamora           | Campos 1960: 25       |
| Syrphus shorae Fluke, 1950       | Tungurahua | Baños (1500–2100)         | Fluke 1942: 3 (as S. willistoni) |
|                                 | Tungurahua | Juive (1950)              | Fluke 1942: 3 (as S. willistoni) |
|                                 | Pichincha | Hda. San Rafael, Río San Pedro (2700) | Fluke 1942: 3 (as S. willistoni) |
|                                 | Ecuador   |                          | Fluke 1950a: 143 (as S. willistoni) |
| Talahua fervida (Fluke, 1945)    | Bolivar   | Hda. Talahua (3100)       | Fluke 1945: 23         |
|                                 | Ecuador   |                          | Fluke 1958: 266        |
|                                 | Pastaza   | Abitagua Oriente         | Gerdes 1974a: 14-15    |
|                                 | Tungurahua | Baños                   | Gerdes 1974a: 14-15    |
|                                 | Pastaza   | Cerro Obitahua          | Gerdes 1974a: 14-15    |
|                                 | Ecuador** | Conquista               | Gerdes 1974a: 14-15    |
|                                 | Tungurahua | Naguazo                 | Gerdes 1974a: 14-15    |
|                                 | Napo      | Napo Oriente            | Gerdes 1974a: 14-15    |
|                                 | Pastaza   | Obitahua Oriente        | Gerdes 1974a: 14-15    |
|                                 | Morona Santiago | Río Blanco            | Gerdes 1974a: 14-15    |
|                                 | Morona Santiago | Río Negro             | Gerdes 1974a: 14-15    |
|                                 | Tungurahua | Runtun                  | Gerdes 1974a: 14-15    |
|                                 | Chimbarrazo | Sangay Oriente          | Gerdes 1974a: 14-15    |
|                                 | Pastaza   | Puerto Santana           | Gerdes 1974a: 14-15    |
|                                 | Pastaza   | Sarayacu                | Gerdes 1974a: 14-15    |
|                                 | Pastaza   | Sarayacu Oriente        | Gerdes 1974a: 14-15    |
|                                 | Pastaza   | El Topo                 | Gerdes 1974a: 14-15    |
|                                 | Pichincha | Chaupi                  | Gerdes 1974a: 14-15    |
|                                 | Tungurahua | Ulvilla                 | Gerdes 1974a: 14-15    |
|                                 | Chimbarrazo | Chilicay               | Mengual 2011: appendix 1 |
|                                 | Chimbarrazo | Huigra                  | Mengual 2011: appendix 1 |
|                                 | El Oro     | Portovelo               | Mengual 2011: appendix 1 |
Checklist of the flower flies of Ecuador (Diptera, Syrphidae)

| Species | Province | Locality (Altitude masl) | References for Ecuador |
|---------|----------|--------------------------|------------------------|
| *Toxomerus antiopa* (Hull, 1951) | Bolívar | Hda. Talahua (3100) | Hull 1951: 5 |
| | Chimbó | Urbina (3650) | Hull 1951: 5 |
| *Toxomerus aquilinus* Sack, 1941 | Ecuador | | Metz and Thompson 2001: 233 |
| *Toxomerus arcifer* (Loew, 1866) | Ecuador | | Thompson et al. 1976: 48 |
| *Toxomerus brevifacies* (Hull, 1943) | Tungurahua Baños, Runtun trail | Hull 1943g: 20 |
| | Imbabura Cuicocha | Hull 1943g: 20 |
| | Pastaza San Francisco | Hull 1943g: 20 |
| | Tungurahua Juive | Hull 1943g: 20 |
| | Tungurahua Baños | Hull 1943g: 20; Gerdes 1974a: 19 |
| | Azuay Cuenca | Hull 1943g: 20 |
| | Tungurahua Baños | Gerdes 1974a: 19; Gerdes 1975: 20 |
| | Pichincha Chaupi | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Ecuador** Conquista | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Obitagua | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Santiago Río Blanco | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Santiago Río Negro | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Tungurahua Runtun | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Chimbó Sangay Oriente | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Sarayacu | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Sarayacu Oriente | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Topo | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Tungurahua Ulvilla | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Abitagua Oriente | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Tungurahua Naguazo | Gerdes 1974a: 20; Gerdes 1975: 20 |
| | Pastaza Puerto Santa | Gerdes 1974a: 20; Gerdes 1975: 20 |
| *Toxomerus claracuneus* (Hull, 1942) | Pastaza Rio Margaritas, Rio Pastaza (1250) | Hull 1942: 107 |
| | Ecuador** Conquista | Gerdes 1974a: 22 |
| | Pastaza Puerto Santa | Gerdes 1974a: 22 |
| *Toxomerus crockeri* (Curran, 1934) | Galápagos Floreana | Curran 1934: 155; Linsley and Usinger 1966: 168; Linsley 1977: 39; Sinclair and Peck 2002; Sinclair 2015; Sinclair et al. 2016: 91 |
| | Galápagos Isabela | Curran 1934: 155; Linsley and Usinger 1966: 168; Linsley 1977: 39; Peck 1994; Sinclair and Peck 2002; Boada 2005: 80; Sinclair 2015; Sinclair et al. 2016: 91 |
| | Galápagos Pinta | Sinclair and Peck 2002 |
| *Toxomerus cucurbitus* (Coquillett, 1901) | Galápagos San Cristóbal | Curran 1934: 155; Linsley and Usinger 1966: 168; Linsley 1977: 39; Sinclair and Peck 2002; Sinclair et al. 2016: 91 |
| | Galápagos Santiago | Coquillett 1901: 374 (as Mesogramma duplicata); Curran 1934: 155; Linsley and Usinger 1966: 168; Linsley 1977: 39; Sinclair and Peck 2002 |
| | Galápagos Española | Sinclair et al. 2016: 91 |
| | Galápagos Pinta | Sinclair et al. 2016: 91 |
| | Galápagos Santa Cruz | Curran 1934: 155; Boada 2005: 85; Sinclair 2015; Sinclair et al. 2016: 91 |
| Species                  | Province          | Locality (Altitude masl) | References for Ecuador                                                                 |
|-------------------------|-------------------|--------------------------|----------------------------------------------------------------------------------------|
| *Toxomerus dispar* (Fabricius, 1794) | Tungurahua       | Baños                    | Hull 1943f: 26 (as *Mesogramma basilaris* var. bifida); Gerdes 1974a: 17               |
|                         | Napo              | Napo Oriente             | Gerdes 1974a: 17 (as *Toxomerus basilaris*)                                            |
|                         | Morona Santiago   | Río Blanco               | Gerdes 1974a: 17 (as *Toxomerus basilaris*)                                            |
|                         | Ecuador           |                          | Menguál 2011: 13                                                                        |
| *Toxomerus duplicatus* (Wiedemann, 1830) | Pichincha        | Pichincha                | Hull 1943f: 18 (as *Mesogramma arcturus*)                                             |
|                         | Pichincha        | Tío Loma                 | Campos 1960: 25                                                                       |
|                         | Napo              | Napo Oriente             | Gerdes 1974a: 23                                                                       |
|                         | Azuay             | Cuenca (2500)            | Hull 1943g: 20                                                                         |
|                         | Tungurahua        | Baños (2200)             | Hull 1943g: 20                                                                         |
|                         | Pichincha        | Pichincha (2500)         | Hull 1943g: 20                                                                         |
|                         | Pichincha        | Hda. San Rafael, Río San Pedro | Hull 1943g: 20; Gerdes 1974a: 26                                                      |
|                         | Pichincha        | Uyumbichico              | Hull 1943g: 20; Gerdes 1974a: 26                                                       |
|                         | Tungurahua        | Baños, Río Pablo (2200)  | Hull 1943g: 20                                                                         |
|                         | Tungurahua        | Baños, Runtun            | Hull 1943g: 20                                                                         |
|                         | Chimbórazo        | Ríobamba (2700)          | Hull 1943g: 20                                                                         |
|                         | Pichincha        | Aloag                    | Gerdes 1974a: 26; Gerdes 1975: 22                                                      |
|                         | Tungurahua        | Baños                    | Gerdes 1975: 22                                                                         |
|                         | Pastaza           | Obitagua                 | Gerdes 1974a: 26; Gerdes 1975: 22                                                      |
|                         | Morona Santiago   | Río Blanco               | Gerdes 1974a: 26; Gerdes 1975: 22                                                      |
|                         | Pichincha        | Chaupi                   | Gerdes 1974a: 26                                                                       |
|                         | Tungurahua        | Ulvilla                  | Gerdes 1974a: 26                                                                        |
|                         | Morona Santiago   | Río Negro                | Gerdes 1974a: 26; Gerdes 1975: 22                                                      |
|                         | Tungurahua        | Runtun                   | Gerdes 1974a: 26; Gerdes 1975: 22                                                      |
| *Toxomerus ecuadoreus* (Hull, 1943) | Pastaza           | Cerro Obitahua           | Gerdes 1974a: 31                                                                         |
|                         | Napo              | Napo Oriente             | Gerdes 1974a: 31                                                                         |
|                         | Pastaza           | Puyo Oriente             | Gerdes 1974a: 31                                                                         |
|                         | Chimbórazo        | Sangay Oriente           | Gerdes 1974a: 31                                                                         |
|                         | Pastaza           | 1.5 km S Puyo, Río Pido Grande | Menguál 2011: appendix 1                                                                     |
|                         | Tungurahua        | 32 km E Baños (1560)     | Menguál 2011: appendix 1                                                                     |
|                         | Napo              | Tena                     | Menguál 2011: appendix 1                                                                     |
|                         | Napo              | Santa Cecilia            | Menguál 2011: appendix 1                                                                     |
|                         | Napo              | 60 km W LagoAguas        | Menguál 2011: appendix 1                                                                     |
|                         | Zamora Chinchipe  | Zumbí                    | Menguál 2011: appendix 1                                                                     |
|                         | Zamora Chinchipe  | Cumbaratza               | Menguál 2011: appendix 1                                                                     |
|                         | Zamora Chinchipe  | Yantzaza                 | Menguál 2011: appendix 1                                                                     |
| *Toxomerus flaviplurus* (Hall, 1927) | Zamora Chinchipe  | Zumbí                    | Menguál 2011: appendix 1                                                                     |
|                         | Pastaza           | Cerro Obitahua           | Gerdes 1974a: 31                                                                         |
|                         | Napo              | Napo Oriente             | Gerdes 1974a: 31                                                                         |
| *Toxomerus floralis* (Fabricius, 1789) | Ecuador         |                          | Thompson and Thompson 2007: 324                                                          |
|                         | Napo              | Napo Oriente             | Gerdes 1974a: 35                                                                         |
| Species                               | Province         | Locality (Altitude masl) | References for Ecuador                          |
|---------------------------------------|------------------|--------------------------|------------------------------------------------|
| *Toxomerus hieroglyphicus* (Schiner, 1868) | Tungurahua      | Baños                    | Gerdes 1974a: 37; Menguial 2011: appendix 1     |
|                                       | Ecuador         |                          | Thompson et al. 1976: 51; Menguial 2011: 16    |
|                                       | Pastaza         | Cerro Obitahua           | Gerdes 1974a: 37                               |
|                                       | Pastaza         | Obitahua Oriente         | Gerdes 1974a: 37                               |
|                                       | Morona Santiago | Río Blanco               | Gerdes 1974a: 37                               |
|                                       | Tungurahua      | Runtun                   | Gerdes 1974a: 38                               |
|                                       | Chimborazo      | Sangay Oriente           | Gerdes 1974a: 38                               |
|                                       | Pastaza         | Abitagua Oriente         | Gerdes 1974a: 38                               |
|                                       | Ecuador**       | Conquista                | Gerdes 1974a: 38                               |
| *Toxomerus idalius* (Hull, 1951)      | Pastaza         | Puyo (1000)              | Hull 1951: 12; Hull 1951: 13 (as *Mesogramma idalia leda*) |
|                                       | Pastaza         | Río Pastaza, San Francisco (1200) | Hull 1951: 13 (as *Mesogramma idalia leda*); Hull 1951: 18 (as *Mesogramma eurydice*) |
| *Toxomerus insignis* (Schiner, 1868)  | Ecuador         |                          | Thompson et al. 1976: 50 (as *T. elongatus*); Metz and Thompson 2001: 235 |
|                                       | Tungurahua      | Baños                    | Gerdes 1974a: 29 (as *Toxomerus elongatus*)    |
|                                       | Napo            | Napo Oriente             | Gerdes 1974a: 29 (as *Toxomerus elongatus*)    |
|                                       | Tungurahua      | Ulvilla                  | Gerdes 1974a: 29 (as *Toxomerus elongatus*)    |
|                                       | Pastaza         | Abitagua                 | Gerdes 1974a: 29 (as *Toxomerus elongatus*)    |
|                                       | Pastaza         | Sarayacu                 | Gerdes 1974a: 29 (as *Toxomerus elongatus*)    |
|                                       | Pastaza         | Abitagua                 | Gerdes 1974a: 29 (as *Toxomerus elongatus*)    |
| *Toxomerus lacrymosus* (Bigot, 1884)  | Napo            | Napo Oriente             | Gerdes 1974a: 40                               |
|                                       | Pastaza         | Obitahua Oriente         | Gerdes 1974a: 40                               |
|                                       | Nariño (Colombia)** | Piedrancha               | Gerdes 1974a: 40                               |
|                                       | Chimborazo      | Sangay Oriente           | Gerdes 1974a: 40                               |
|                                       | Pastaza         | Sarayacu                 | Gerdes 1974a: 40                               |
| *Toxomerus laenas* (Walker, 1852)     | Ecuador         |                          | Thompson et al. 1976: 53 (as *T. nitidiventris*) |
| *Toxomerus marginatus* (Say, 1823)    | Cañar-Chimborazo | Quinua-Loma              | Campos 1960: 25                                |
|                                       | Pichincha       | Casitagua                | Campos 1960: 26                                |
|                                       | Carchi          | El Vínculo               | Campos 1960: 26                                |
|                                       | Azuay           | Borma                    | Campos 1960: 26                                |
|                                       | Santa Elena     | La Rinconada             | Campos 1960: 26                                |
| *Toxomerus minutus* (Wiedemann, 1830) | Cañar-Chimborazo | Quinua-Loma              | Campos 1960: 26                                |
|                                       | Santo Domingo de los Tsáchilas | Santo Domingo de los Colorados | Campos 1960: 26                              |
|                                       | Carchi          | Tulcán                   | Campos 1960: 26                                |
|                                       | Loja            | Loja                     | Campos 1960: 26                                |
| *Toxomerus nasutus* Sack, 1941        | Pichincha       | Úyumbichico (2700)       | Hull 1951: 8 (as *Mesogramma ultima*)           |
|                                       | Tungurahua      | Baños (2500)             | Hull 1943c: 36 (as *Mesogramma sylpha*)         |
|                                       | Tungurahua      | Baños (1800)             | Hull 1943c: 36 (as *Mesogramma sylpha*)         |
|                                       | Tungurahua      | Baños                    | Gerdes 1975: 14                                |
|                                       | Pichincha       | Chaupi                   | Gerdes 1974a: 42; Gerdes 1975: 14               |
|                                       | Ecuador**       | Conquista                | Gerdes 1974a: 42; Gerdes 1975: 14               |
|                                       | Tungurahua      | Naguazo                  | Gerdes 1974a: 42; Gerdes 1975: 14               |
|                                       | Napo            | Napo Oriente             | Gerdes 1974a: 42; Gerdes 1975: 14               |
| Species              | Province                  | Locality (Altitude masl)                           | References for Ecuador                        |
|----------------------|---------------------------|----------------------------------------------------|------------------------------------------------|
| Toxomerus nasutus     | Pastaza                   | Obitagua                                          | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Pastaza                   | Obitahua                                          | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Pastaza                   | Abitagua Oriente                                  | Gerdes 1974a: 42                               |
|                      | Pastaza                   | Cerro Obitahua                                    | Gerdes 1974a: 42                               |
|                      | Manabi*                   | San José                                          | Gerdes 1974a: 42                               |
|                      | Tungurahua                | El Topo                                            | Gerdes 1974a: 43                               |
|                      | Morona Santiago           | Río Blanco                                         | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Morona Santiago           | Río Negro                                          | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Tungurahua*               | Runtun                                             | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Chimborazo                | Sangay                                             | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pastaza                   | Puerto Santana                                     | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pastaza                   | Sarayacu                                          | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pastaza                   | Sarayacu Oriente                                  | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pichincha*                | Yunguilla                                          | Gerdes 1974a: 44; Gerdes 1975: 14              |
| Toxomerus norma       | Ecuador                   |                                                    | Thompson et al. 1976: 52 (as T. mulio); Metz and Thompson 2001: 239 (as T. mulio) |
|                      | Pastaza                   | Río Margaritas (1250)                              | Hull 1942: 106                                 |
|                      | Morona Santiago           | Sucúa, Río Blanco (950)                            | Hull 1942: 106                                 |
|                      | Pastaza                   | Puyo                                               | Hull 1942: 106                                 |
|                      | Pastaza                   | Río Mapeto                                         | Hull 1942: 106                                 |
|                      | Pastaza                   | Obitahua                                          | Gerdes 1974a: 46                               |
|                      | Chimborazo                | Obitahua Oriente                                  | Gerdes 1974a: 46                               |
|                      | Chimborazo                | Sangay Oriente                                     | Gerdes 1974a: 46                               |
|                      | Pastaza                   | Sasayacu Oriente                                   | Gerdes 1974a: 46                               |
|                      | Pichincha*                | Yunguilla                                          | Gerdes 1974a: 46                               |
| Toxomerus parvulus    | Ecuador                   |                                                    | Thompson et al. 1976: 55 (as T. slossonae)      |
|                      | Pichincha                | Aloag (2600)                                       | Gerdes 1974b: 280                              |
| Toxomerus pictus      | Chimborazo                | Cerro Obitahua                                     | Gerdes 1974a: 48                               |
|                      | Chimborazo                | Sangay Oriente                                     | Gerdes 1974a: 48                               |
|                      | Napo                      | Napo Oriente                                       | Gerdes 1974a: 49                               |
| Toxomerus picudus     | Orellana                  | Estación Tiputini (227)                            | Mengual 2011: 21                               |
|                      | Galápagos                 | Floreana                                           | Sinclair 2015                                  |
|                      | Galápagos                 | Isabela                                            | Sinclair 2015                                  |
|                      | Galápagos                 | Santa Cruz                                         | Sinclair et al. 2016: 93                        |
|                      | Galápagos                 | San Cristóbal                                      | Sinclair 2015                                  |
|                      | Galápagos                 | Santiago                                           | Sinclair et al. 2016: 93                        |
|                      | Tungurahua                | Baños                                              | Gerdes 1974a: 51                               |
|                      | Napo                      | Napo Oriente                                       | Gerdes 1974a: 51                               |
|                      | Narino [Colombia]**      | Piedrancha                                         | Gerdes 1974a: 51                               |
|                      | Pastaza                   | Sarayacu                                           | Gerdes 1974a: 51                               |
| Toxomerus politus     | Ecuador                   |                                                    | Thompson et al. 1976: 53; Metz and Thompson 2001: 241 |
|                      | Species                   |                                                    |                                                 |
|                      | Province                  | Locality (Altitude masl)                           | References for Ecuador                        |
|                      | Pastaza                   | Obitahua                                          | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Pastaza                   | Abitagua Oriente                                  | Gerdes 1974a: 42                               |
|                      | Pastaza                   | Cerro Obitahua                                    | Gerdes 1974a: 42                               |
|                      | Manabi*                   | San José                                          | Gerdes 1974a: 42                               |
|                      | Tungurahua                | El Topo                                            | Gerdes 1974a: 43                               |
|                      | Morona Santiago           | Río Blanco                                         | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Morona Santiago           | Río Negro                                          | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Tungurahua*               | Runtun                                             | Gerdes 1974a: 42; Gerdes 1975: 14              |
|                      | Chimborazo                | Sangay                                             | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pastaza                   | Puerto Santana                                     | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pastaza                   | Sarayacu                                          | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pastaza                   | Sarayacu Oriente                                  | Gerdes 1974a: 43; Gerdes 1975: 14              |
|                      | Pichincha*                | Yunguilla                                          | Gerdes 1974a: 44; Gerdes 1975: 14              |
| Toxomerus norma       | Ecuador                   |                                                    | Thompson et al. 1976: 52 (as T. mulio); Metz and Thompson 2001: 239 (as T. mulio) |
|                      | Pastaza                   | Río Margaritas (1250)                              | Hull 1942: 106                                 |
|                      | Morona Santiago           | Sucúa, Río Blanco (950)                            | Hull 1942: 106                                 |
|                      | Pastaza                   | Puyo                                               | Hull 1942: 106                                 |
|                      | Pastaza                   | Río Mapeto                                         | Hull 1942: 106                                 |
|                      | Pastaza                   | Obitahua                                          | Gerdes 1974a: 46                               |
|                      | Chimborazo                | Obitahua Oriente                                  | Gerdes 1974a: 46                               |
|                      | Chimborazo                | Sangay Oriente                                     | Gerdes 1974a: 46                               |
|                      | Pastaza                   | Sasayacu Oriente                                   | Gerdes 1974a: 46                               |
|                      | Pichincha*                | Yunguilla                                          | Gerdes 1974a: 46                               |
| Toxomerus parvulus    | Ecuador                   |                                                    | Thompson et al. 1976: 55 (as T. slossonae)      |
|                      | Pichincha                | Aloag (2600)                                       | Gerdes 1974b: 280                              |
| Toxomerus pictus      | Chimborazo                | Cerro Obitahua                                     | Gerdes 1974a: 48                               |
|                      | Chimborazo                | Sangay Oriente                                     | Gerdes 1974a: 48                               |
|                      | Napo                      | Napo Oriente                                       | Gerdes 1974a: 49                               |
| Toxomerus picudus     | Orellana                  | Estación Tiputini (227)                            | Mengual 2011: 21                               |
|                      | Galápagos                 | Floreana                                           | Sinclair 2015                                  |
|                      | Galápagos                 | Isabela                                            | Sinclair 2015                                  |
|                      | Galápagos                 | Santa Cruz                                         | Sinclair et al. 2016: 93                        |
|                      | Galápagos                 | San Cristóbal                                      | Sinclair 2015                                  |
|                      | Galápagos                 | Santiago                                           | Sinclair et al. 2016: 93                        |
|                      | Tungurahua                | Baños                                              | Gerdes 1974a: 51                               |
|                      | Napo                      | Napo Oriente                                       | Gerdes 1974a: 51                               |
|                      | Narino [Colombia]**      | Piedrancha                                         | Gerdes 1974a: 51                               |
|                      | Pastaza                   | Sarayacu                                           | Gerdes 1974a: 51                               |
| Toxomerus politus     | Ecuador                   |                                                    | Thompson et al. 1976: 53; Metz and Thompson 2001: 241 |
|                      | Species                   |                                                    |                                                 |
| Species               | Province      | Locality                  | References for Ecuador                         |
|-----------------------|---------------|---------------------------|------------------------------------------------|
| *Toxomerus productus* (Curran, 1930) | Morona Santiago | Macas, Río Upano (1000)   | Hull 1951: 10 (as *Mesogramma cyrilla*)         |
|                       | Ecuador       |                           | Curran 1930: 5                                  |
|                       | Napo          | Napo Oriente              | Gerdes 1974a: 53; Gerdes 1975: 16               |
|                       | Pastaza       | Obitahua                  | Gerdes 1974a: 53; Gerdes 1975: 16               |
|                       | Chimborazo    | Sangay                    | Gerdes 1974a: 53; Gerdes 1975: 16               |
|                       | Pastaza       | Sarayacu                  | Gerdes 1974a: 53; Gerdes 1975: 16               |
|                       | Pastaza       | Sarayacu                  | Gerdes 1974a: 54; Gerdes 1975: 16               |
|                       | Pastaza       | Sarayacu Oriente          | Gerdes 1974a: 54; Gerdes 1975: 16               |
|                       | Pastaza       | Río Negro                 | Gerdes 1974a: 54; Gerdes 1975: 16               |
|                       | Pastaza       | Baños                     | Gerdes 1974a: 54; Gerdes 1975: 16               |
|                       | Morona Santiago | Río Blanco             | Gerdes 1974a: 54; Gerdes 1975: 16               |
|                       | Pastaza       | Runtun                    | Gerdes 1974a: 54; Gerdes 1975: 16               |
|                       | Pastaza       | Sarayacu Oriente          | Gerdes 1974a: 54; Gerdes 1975: 16               |
| *Toxomerus rombicus* (Giglio-Tos, 1892) | Azuay         | Cuenca                    | Campos 1960: 25                                 |
|                       | Ecuador       |                           | Thompson et al. 1976: 50 (as *T. flavus*), 54;  |
|                       |               |                           | Metz and Thompson 2001: 246                      |
|                       | Tungurahua    | Baños                     | Gerdes 1974a: 33 (as *Toxomerus flavus*)        |
|                       | Ecuador**     | Conquista                 | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
|                       | Pastaza       | Río Blanco                | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
|                       | Manabí*       | San José                  | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
|                       | Narino        | Piedranca                 | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
|                       | [Colombia]**  |                           | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
|                       | Pastaza       | Runtun                    | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
|                       | Pastaza       | Sarayacu                  | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
|                       | Pastaza       | Soledad                   | Gerdes 1974a: 34 (as *Toxomerus flavus*)        |
| *Toxomerus saphiridiceps* (Bigot, 1884) | Galápagos     | Santa Cruz                | Boada 2005: 86                                 |
|                       | Guayas        | San Eduardo               | Campos 1960: 26                                 |
|                       | Guayas        | Guayaquil                 | Campos 1960: 26                                 |
|                       | Guayas        | Durán                     | Campos 1960: 26                                 |
| *Toxomerus steatogaster* (Hull, 1941) | Morona Santiago | Sucía, Río Blanco and Río Upano (950) | Hull 1943f: 21 (as *Mesogramma steatornis*)  |
|                       | Pastaza       | Puyo (1000)               | Hull 1943f: 21 (as *Mesogramma steatornis*)  |
|                       | Napo          | Napo Oriente              | Gerdes 1974a: 55                                 |
|                       | Ecuador       |                           | Thompson et al. 1976: 55                         |
|                       | Pastaza       | Baños                     | Hull 1943c: 35; Gerdes 1974a: 57                 |
|                       | Pastaza       | Cerro Obitahua            | Gerdes 1974a: 57                                 |
|                       | Pastaza       | Obitahua Oriente          | Gerdes 1974a: 57                                 |
|                       | Morona        | Río Blanco                | Gerdes 1974a: 57                                 |
|                       | Chimborazo    | Sanqay Oriente            | Gerdes 1974a: 57                                 |
|                       | Pichincha     | Chaupi                    | Gerdes 1974a: 57                                 |
| *Toxomerus sylvaticus* (Hull, 1943) | Guayas        | Guayaquil, San Eduardo    | Campos 1960: 25                                 |
| *Toxomerus tibicen* (Wiedemann, 1830) | Tungurahua    | Baños (2000)              | Hull 1942: 104                                  |
| *Toxomerus tubularius* (Hull, 1942) | Guayas        |                           |                                                 |
Some original locality names were difficult to place in the current administrative divisions of Ecuador. The Río Pastaza (= Pastaza river) runs through two Ecuadorian provinces, i.e. Pastaza and Morona Santiago, and we used Pastaza province for this locality. On the other hand, Quinua Loma is a locality situated between two provinces, Cañar and Chimborazo, and we listed both provinces in Table 1.

Most of the uncertainties on geographical localities come from Gerdes (1974a). For instance, Gerdes (1974a) named three localities as different ones, i.e. Obitagua, Obitahuia, and Abitagua, although we believe that they might refer to the same area. There is a single locality named Abitagua in Ecuador, but instead of assuming all being the same locality, we left the three names in Table 1. We are not sure if the locality San José (Gerdes 1974a) is the one currently situated in Manabí, and there are two localities named El Salado in Guayas (between 0 and 200 masl) and in Tungurahua (circa 2,000 masl). We listed El Salado in Guayas for the records of Campos (1960), as most of the records in that work were from Guayas, but we used Tungurahua for El Salado of Gerdes (1974a, 1975) for the record of *Toxomerus nasutus* Sack, 1941 because other records for this species are close to or over 2,000 masl. We had a similar problem with Yunguilla, a locality also found in two different provinces (Azuay and Pichincha), and we used Pichincha in

### Table 1

| Species                          | Province       | Locality (Altitude masl) | References for Ecuador       |
|----------------------------------|----------------|--------------------------|-------------------------------|
| *Toxomerus virgulatus* (Macquart, 1850) | Ecuador        |                          | Thompson et al. 1976: 49 (as *T. confusus*) |
| *Toxomerus watsoni* (Curran, 1930)   | Ecuador        |                          | Thompson et al. 1976: 56      |
| *Tuberculanostoma antennatum* (Fluke, 1943) | Bolívar, Talahua (3100)  | Fluke 1943: 426           |
|                                   | Ecuador        |                          | Fluke 1958: 266              |
| *Tuberculanostoma brownii* (Fluke, 1943) | Bolívar, Urbina (3650)  | Fluke 1943: 429           |
|                                   | Bolívar        | Hda. Talahuia (3100)     | Fluke 1943: 430              |
|                                   | Bolívar        | Cumbre de Tililac (4200) | Fluke 1943: 430              |
| *Tuberculanostoma cilium* (Fluke, 1943) | Tungurahua, Volcán Tungurahua, Minza Chica (3200) | Fluke 1943: 428 |
|                                   | Bolívar        | Hda. Talahuia (3100)     | Fluke 1943: 428              |
| *Tuberculanostoma pectinis* (Fluke, 1943) | Bolívar, Hda. Talahuia (3100) | Fluke 1943: 430 |
| *Ubristes ictericus* (Reemer, 2013)  | Sucumbíos      | Sach Lodge (270)         | Reemer 2013: 80               |
| *Xanthandrus (Xanthandrus) palliatus* (Fluke, 1945) | Bolívar, Hda. Talahuia (3100) | Fluke 1945: 22 |
|                                   | Tungurahua     | Volcán Tungurahua, Minza Chica (3200) | Fluke 1945: 22 |

Diego Marín-Armijos et al. / ZooKeys 691: 163–199 (2017)
this case because Gerdes had studied material from Pichincha but not from Azuay. All these records are marked with an asterisk (*) in the Province column of Table 1.

The locality Piedrancha belongs to Colombia (Nariño department), but it was left in Table 1 because Gerdes (1974a) listed it as Ecuador. Finally, we were not able to locate Conquista in Ecuador. These records are marked with two asterisks (**) in the Province column of Table 1.

For the elaboration of Tables 1 and 2, the most recent Syrphidae classification has been used (Mengual et al. 2008, 2009, Thompson 2012, 2013, Reemer and Ståhls 2013a, Miranda et al. 2014, 2016, Mengual 2015). Flower fly species recorded in Ecuador are listed in Table 1 in alphabetical order. Genera with the highest number of species were *Toxomerus* (38), *Ocyptamus* (22) and *Palpada* (21) (Table 2).

Four unidentified species are listed as such (*Microdon* sp., *Ocyptamus* sp. and two *Toxomerus* sp.), and three species are *affinis* to known species, *Dasysyrphus* aff. *lotus*, *Syrphus* aff. *lacyorum* and *Quichuana* aff. *quixotea*. Ricarte et al. (2012) reviewed the taxonomy of the genus *Quichuana* Knab, 1913 and mentioned one *Quichuana* species recorded for Ecuador (Ricarte et al. 2012: 129, Figure 84). The identity of this species was not stated by Ricarte et al. (2012), but personal communication with A. Ricarte revealed that it is *Quichuana aff. quixotea* (Hull 1946). Four specimens from Ecuador labelled as *Q. quixotea* are known to be deposited in the USNM collection. However, they show some morphological differences with the holotype that prevented Ricarte et al. (2012) to ascertain their identity (Antonio Ricarte, pers. comm.).

There was some ambiguity with *Peradon oligonax* (Hull, 1944) to either include it or not in the checklist. *Peradon oligonax* was described from Pto. America, Río Putumayo (Hull 1944c). Thompson et al. (1976: 66) indicated the type-locality as part of Ecuador, but Hull (1944c: 36) listed it as Brazil. Putumayo River forms part of Colombia’s border with Ecuador, as well as most of the frontier with Peru, and it ends as a tributary of the Amazon River in Brazil, but there it is known as Içá. Rasmussen (2016) gave details of the Cornell University expedition to South America (collectors of the type material) and he provided evidences that the expedition never went to Ecuador and the expedition was near Javary island (Santo Antônio do Içá) in the dates when the type material was collected. Thus, the type-locality is in Brazil and not in Ecuador, as indicated by Thompson et al. (1976).

Another uncertain taxon was *Priomerus gagathinus* Bigot, 1887, originally described from Loja. Thompson et al (1976) declared the type of this taxon as lost and did not recognize the species. Thompson (2015) indicated that the name *Priomerus* was preoccupied and its species currently belong to four different genera. He did not recognize either the species *gagathinus* Bigot. Thus, we did not list this species in Table 1.

In the literature, we found two doubtful species records, probably due to a misidentification. *Sphaerophoria (Sphaerophoria) sulphuripes* (Thomson, 1869) is a Nearctic species found along the west coast of the United States and Canada (Knutson 1973). Thompson et al. (1976: 38) listed one specimen identified as *S. sulphuripes* (with no details about the responsible of this identification) in The Natural History Museum
Table 2. Number of genera and species registered in Ecuador.

| Genus                   | Number of species in Ecuador |
|-------------------------|------------------------------|
| Alipumilio Shannon, 1927| 1                            |
| Allograpta Osten Sacken, 1875 | 9                            |
| Argentinomyia Lynch Arribalzaga, 1891 | 10                           |
| Claraplumula Shannon, 1927 | 1                            |
| Copestyhum Macquart, 1846 | 19                           |
| Dasyosyrphus Enderlein, 1938 | 1                            |
| Dolichogyna Macquart, 1842 | 2                            |
| Eosalpingogaster Hull, 1949 | 1                            |
| Eristalis Latreille, 1804 | 1                            |
| Eupeodes Osten Sacken, 1877 | 1                            |
| Fazia Shannon, 1927 | 12                           |
| Hypselosyrphus Hull, 1937 | 1                            |
| Leucopodella Hull, 1949 | 4                            |
| Lycastrirhyncha Bigot, 1859 | 1                            |
| Mallota Meigen, 1822 | 3                            |
| Meromacrus Rondani, 1848 | 3                            |
| Meropidia Hippa & Thompson, 1983 | 1                           |
| Microdon Meigen, 1803 | 3                            |
| Mixogaster Macquart, 1842 | 1                            |
| Ocyptamus Macquart, 1834 | 22                           |
| Ornidia Lepeletier & Serville, 1828 | 2                           |
| Palpada Macquart, 1834 | 21                           |
| Pelecinobaccha Shannon, 1927 | 10                          |
| Peradon Reemer, 2013 | 1                            |
| Platycheirus Lepeletier & Serville, 1828 | 7                           |
| Pseudodoros Becker, 1903 | 2                            |
| Quichuana Knab, 1913 | 1                            |
| Retictanum Miranda, 2014 | 2                            |
| Rhingia Scopoli, 1763 | 2                            |
| Rhinoprosopa Hull, 1942 | 2                            |
| Rhopalousyrphus Giglio-Tos, 1891 | 1                           |
| Salpingogaster Schiner, 1868 | 1                           |
| Staeve Fabricius, 1805 | 2                            |
| Sterphus Philippi, 1865 | 3                            |
| Stipomorpha Hull, 1945 | 3                            |
| Syrphus Fabricius, 1775 | 3                            |
| Talahua Fluke, 1945 | 1                            |
| Toxomerus Macquart, 1855 | 38                           |
| Tuberculostoma Fluke, 1943 | 4                           |
| Ubristes Walker, 1852 | 1                            |
| Xanthandrus Verrall, 1901 | 1                            |
Checklist of the flower flies of Ecuador (Diptera, Syrphidae)

187

BMNH, London, U.K.) from Ecuador with a question mark. This specimen might be mislabeled or it could be an Allograpta specimen, most likely a female, somehow similar to S. sulphuripes. We believe that S. sulphuripes does not occur in Ecuador and it was not included in Table 1. The other taxon that was misidentified is Eristalis (Eoseristalis) pertinax (Scopoli, 1763), identified by Campos (1960). This species ranges from Fennoscandia south to Iberia and the Mediterranean, and from Ireland through much of Europe into European parts of Russia and Turkey; apparently it is not known beyond the Urals (Speight 2016). We do believe that the record might be an Eristalis species, but not E. pertinax as it does not occur in the Neotropics. Thus, this record is not listed in Table 1.

Three species are not listed due to the uncertainty of their taxonomic identity. Syrphus excavatus (Rondani 1851: 359) and Syrphus fasciventris (Rondani 1851: 360), both described from Río Napo, are not included because the type material was not studied and the generic name is probably incorrect. The third species not included is Xanthandrus sp. (Curran 1934: 155; from Pinta Island, Galapagos). Sinclair et al. (2016) could not find the material studied by Curran to confirm if the specimen from Galapagos is truly Xanthandrus or Argentinomyia agonis (Walker 1849).

Discussion

Montoya et al. (2012) recorded 128 species of 40 different genera for Ecuador, indicating that Ecuador shares a high number of species with Brazil (29 species), Colombia (50) and Peru (29). The present work raises those numbers considerably, up to 201 identified species of 51 genera and subgenera. Based on previous studies, the Ecuadorian diversity of flower flies is comparable to the one from Peru (195 spp., 75 genera; Montoya et al. 2012), Costa Rica (228 species, 41 genera; Montoya et al. 2012) or Suriname (183 species, 36 genera; Reemer 2016). It is important to emphasize that Ecuador is one of the smallest countries in the Neotropics and South America, but it has one of the highest diversity densities for the Neotropics with ca. 7.2 species per 10,000 km2. This diversity density makes Ecuador the third top country after Costa Rica and Suriname, the two most explored and well-studied faunae in the Neotropics. It must also be pointed out that the present work is based only on records from the literature, and authors are sure that the flower fly diversity in Ecuador is higher.

This study confirms the argument of Montoya et al. (2012) when stating that “The understanding of the distribution and composition of Syrphidae in the Neotropical Region remains far from complete”. Since Thompson et al. (1976) there have been mostly taxonomic contributions on the Neotropical flower flies, but little faunistic studies have been published. Thompson (1999) provided a key to the Neotropical genera of Syrphidae, including a glossary of taxonomic terms and the description of a few new species, and Thompson (2006) compiled all the taxonomic knowledge of Neotropical flower flies up to that date, but those cannot be considered faunistic studies. In the Systema Dipterorum, Thompson (2013) had some distributional range notes for each species, but the fauna of the Neotropical countries has not been studied more thoroughly yet. The
syrphid fauna of three Neotropical countries have been recently revised: a catalogue for Colombia (Montoya 2016, see also Gutierrez et al. 2005), another online catalogue for Brazil (Morales and Marinoni 2017), and an extensive taxonomic study of the flower flies of Suriname (Reemer 2010, 2014, 2016). In addition, Thompson et al. (2010) gave a very comprehensive synopsis of the Central American Syrphidae.

Thompson et al. (2010) stated that ca. 1,800 flower fly species are described from the Neotropical Region, but other authors argue that this may be only half of the actual number of species (Reemer 2016). Thus, Ecuadorian syrphid fauna comprises roughly 11.2% of the described Neotropical species. Emulating the arguments of Reemer (2016), the syrphid fauna of Ecuador might be two to four times larger, up to 900 species, if we compare the known species of other taxa in this country with the total number of species in the Neotropical Region. Cárdenas et al. (2009) estimated that Ecuador has 16.3% of the Neotropical species of the family Tabanidae (Diptera). Mittermeier et al. (2005) calculated that the bird species present in Ecuador are ca. 47% of the total number of species in the Neotropics. With an estimate of 4,000 species of butterflies (Salazar and Donoso 2014, M. Espeland pers. comm.), Ecuador probably hosts half of the Neotropical diversity of this order. In other words, considering these numbers and the fact that Syrphidae is underexplored in Ecuador (Amorim 2009), we are far from having a good estimate of the total number of flower fly species for Ecuador.

We think that the inventory and study of the Syrphidae fauna are essential not only to describe new species from Ecuador, but also to help in the selection of areas to protect, based on species richness, and to improve the management of conservation areas in this country. Salazar and Donoso (2014) mentioned that the taxonomic complexity, the lack of experts for some groups, the high species richness, and the endemicity of many invertebrates in Ecuador make the study of its invertebrate fauna a major challenge in science. Moreover, Ecuador has two biodiversity hotspot regions: Tropical Andes and Tumbes-Chocó-Magdalena (Myers et al. 2000, Mittermeier et al. 2004). These regions are heavily threatened and need urgent conservation efforts. In such cases, faunistic studies should have priority to understand the biological diversity of those hotspots. Furthermore, the poor knowledge of the relationships between flower flies and their prey, as well as the unknown associations with host plants, make the study of this group essential 1) to improve our understanding about their roles in the ecosystem performance and organic matter decomposition, 2) to evaluate the biological richness of Ecuador in order to establish new management and control protocols over its natural resources, and 3) to revise the quarantine and international trade policies for preventing potential pest species dispersal and creating new banned species list.

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