

THE LINNAEAN SPECIES OF FLOWER FLIES
(DIPTERA: SYRPHIDAE)

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Abstract.—Linnaeus described 37 species of flower flies (Diptera: Syrphidae). His collection was studied, and the current status of all his flower fly names is given. Six new synonyms are established (*Scaeva annulipes* Zetterstedt = *Eriozona erratica* (Linnaeus), *Musca citrofasciata* DeGeer = *Xanthogramma festiva* (Linnaeus), *Xylota curvipes* Loew = *Chalcosyrphus femoratus* (Linnaeus), *Chrysogaster chalybeata* Meigen = *Chrysogaster cemiteriorum* (Linnaeus), *Musca nemorum* Linnaeus = *Eristalis arbustorum* (Linnaeus), and *Pipiza varipes* Meigen = *Pipizella viduata* (Linnaeus)); six misidentifications are corrected (*arcuatum* of authors = *Chrysotoxum fasciatum* (Müller), *conopseus* of authors = *Doros profuges* (Harris), *festivum* of authors = *Chrysotoxum arcuatum* (Linnaeus), *femoratus* of authors = *Chalcosyrphus valgus* (Gmelin), *nemorum* of authors = *Eristalis interrupta* (Poda) and *viduata* of authors = *Chrysogaster lucida* (Scopoli)); and 34 lectotypes are designated.

The science of taxonomy and the presently accepted system of nomenclature of living things are considered to have begun with the work of Carolus Linnaeus. He introduced a binomial system for the naming of organisms, and the 10th edition of his *Systema Naturae* (1758) is designated as the starting point for zoological nomenclature. Hence, an understanding of the Linnaean species is fundamental to taxonomy.

Linnaeus described 36 species of flower flies in 1758 and another in 1761. The Linnaean Collection (now deposited with the Linnaean Society, London) has been examined to ascertain whether the present concepts of these Linnaean species correspond to those of Linnaeus. The relevance of the Linnaean Collection to the understanding of his species as well as its history and curation has been reviewed by Day and Fitton (1978). We have accepted their approach completely. That there is no such thing as a Linnaean type (Mayr, 1969: 368) is a usage argument—The concepts and their names now in use must be preserved despite the correctness of the concepts or the priority of other names. One of us (Thompson, 1980, 1981a, 1981b) has delved into the usage argument and found it wanting.

Linnaeus did not specify the number of specimens upon which he based his

species. From his descriptions it is clear that at least one species was based on several specimens, and in his collection there are several syntypes for another 19 species. For these species lectotype designations are needed and have been made with one exception (*v. mellina* Linnaeus). In the remainder of the cases, where only a single specimen is now extant, we have also designated lectotypes as we reject the holotype approach (Crosskey, 1974: 272) and accept the reasoning of Vane-Wright (1975: 26). For the species first or later recorded from Sweden (Linnaeus, 1746, 1761), we have restricted their type-localities to that country even though their habitat in the 10th edition is given as "Europe."

Haliday (1851) studied the Linnaean Collection during the winter of 1847–1848. His conclusions were published but were apparently overlooked by most subsequent workers. While his observations and conclusions were usually the same as ours we have noted them under each species.

The Linnaean names are reviewed in alphabetical order. The format for each name is: specific name Author. Date: page (of original description) (Original genus). Type-locality: Place name. Present valid name and combination. Discussion of type(s) and nomenclature.

arbustorum Linnaeus. 1758: 591 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Eristalis arbustorum* (Linnaeus). In Diptera box 10, there is a female of *Eristalis tenax* (Linnaeus) with the Linnaean name label "20 arbustorum" (we have used the expression "Linnaean name label" in the sense of Day and Fitton (1978: 184)). We consider this specimen to be a substitution as it does not agree with the Linnaean descriptions of *arbustorum*. These descriptions (1758: 591; 1761: 444) clearly restrict the name to males of either *tenax* or *arbustorum* as the abdomen is described as "segmento primo secundoque latere ferrugineis." If Linnaeus were describing *tenax* and comparing it with his *nemorum* as is the case for *arbustorum* ("Similis *M. nemorum*, . . ."), we believe he would have mentioned the size difference. Linnaeus did mention size when he described *tenax*, the next species. This forces us to conclude that Linnaeus's *arbustorum* was the same size as his *nemorum*, and, therefore, his *arbustorum* must apply to *arbustorum* of authors. This conclusion also conforms to all subsequent interpretations of *arbustorum*. *Musca arbustorum* and *nemorum* Linnaeus refer to the male and female respectively of the same species (*v. nemorum*) as first noted by Illiger (1807: 441). Fallén (1817: 25) selected *arbustorum* as senior to *nemorum*.

Haliday (1851: 139) noted that the labeled specimen was a female *Eristalis tenax* and that there was an associated male *tenax* also. He stated the Linnaean description was of a male *tenax*. He then reviewed the use of the name *arbustorum*: Schrank (1781: 445) used it in the sense of *tenax*; Fabricius (1775: 776, etc.) merely copied the Linnaean characters; Müller (1776: 174) gave a citation to Schaeffer (1766: 1pl. 17, fig. 5), which is a *Tachina* species; and Rossi (1790: 285) described a smaller insect which is known as *arbustorum* of Meigen. Despite his conclusion that the name *arbustorum* should apply to *tenax*, Haliday (in Walker 1851) continued to use it in the sense of Meigen and all later authors.

arcuata Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to

specimen does conform to the brief original description, but is at variance with the longer *Fauna Svecica* description (1761: 454). The original description described *cemiteriorum* as similar to *Eristalinus sepulchralis* (Linnaeus) but smaller. The 1761 description described it as similar to *Melanophora roralis* (Linnaeus) (Rhinophoridae) (which is the same size as a *Chrysogaster* species) but three times larger and with anterior tibiae substaceous and halter white. Also the 1761 description gives the habitat as "cadaveribus." We consider the 1761 description erroneous as it is at variance with the original description, the material in the Linnaean Collection, and most interpretations of the name. Almost all early authors (Panzer, 1801: 17; Fallén, 1817: 55; Meigen, 1822: 268; Macquart, 1829: 193, 1834: 562; Loew, 1840: 30, 1843: 246; Walker, 1851: 276; Schiner, 1862: 270; and Strobl, 1893: 192) until Verrall considered *cemiteriorum* to apply a *Chrysogaster* species, usually as the senior synonym of *solstitialis* Fallén. Zetterstedt (1843: 817) considered the Linnaean description inadequate and used the name *solstitialis* instead. Haliday (1851: 144) identified the labeled specimen as probably the same as *Chrysogaster coemeteriorum* of Meigen. He also noted that there were two *Cheilisia* specimens next to the labeled specimen, one without a head. Verrall (1901: 204) rejected the use of *cemiteriorum* for any syrphid on the basis of the 1761 description. Modern workers have followed Verrall and ignored the Linnaean name. In light of the identity of the type of *cemiteriorum*, we feel that the name must again be used. Linnaeus spelled the species name three ways: *cemiteriorum* (1758), *cremiteriorum* (1761) and *coemeteriorum* (1767 and on name label). All subsequent authors have used the *coemeteriorum* spelling, which is the one most nearly correct if Linnaeus based his name on the Latin "coemeterium" (cemetery). However, as there is no evidence in the original publication of Linnaeus's derivation of his name, the original spelling must be maintained.

conopsoides Linnaeus. 1758: 590 (*Musca*). Type-locality: Europe. *Ceriana conopsoides* (Linnaeus). In Diptera box 9, there is a headless male of *Ceriana conopsoides* (Linnaeus) with the Linnaean name label "conopsoides 13." This specimen is designated lectotype and has been so labeled. Haliday (1851: 138) stated that the lectotype was a specimen of "*Syrphus conopseus* Mg." (= *Doros profuges* (Harris)).

The Linnaean name is the basis for two names now in use for two different species. Fabricius (1775: 768) unjustly emended *conopsoides* Linnaeus to *conopseus* and changed its application from a *Ceriana* species to that of a *Doros* species. He later described the true *conopsoides* as his *clavicornis* (1794: 227, 1798: 557). While some early authors followed Fabricius (Gmelin, 1790: 2868, Rossi, 1790: 289), most correctly applied the name in the Linnaean sense (Müller, 1764: 80, 1776: 172; Schrank, 1781: 440; and de Villers, 1789: 414). Illiger (1807: 446) was the first to point out the dual use of the name. After Illiger, most authors used both the Linnaean name and its emendation. As *conopseus* Fabricius is an emendation its type is that of *conopsoides*, and the name is a synonym. The oldest available name for *Doros conopseus* of authors is *profuges* Harris (1780: 81).

devia Linnaeus. 1761: 446 (*Musca*). Type-locality: Sweden. *Microdon devia* (Linnaeus). We found no labeled or unlabeled material of this species. Haliday likewise did not find this species represented in the Linnaean collection. Doctor

Sweden. *Chalcosyrphus* (*Xylotomima*) *femoratus* (Linnaeus). In Diptera box 11, there is a female of *Chalcosyrphus curvipes* (Loew) (NEW SYNONYM) with the Linnaean name label "femorata 46." This specimen is designated lectotype and has been so labeled. In 1854 Loew split the species concept of *femorata* Linnaeus into two: His *curvipes* and "*femorata* Linnaeus." Unfortunately he did not have access to the Linnaean type, and his restriction of *femorata* was apparently arbitrary. The oldest name for *femorata* of Loew and later authors appears to be *Musca valga* Gmelin (1790: 2879), with *volvulus* Fabricius (1794: 295) as a junior synonym.

festiva Linnaeus. 1758: 593 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Xanthogramma festivum* (Linnaeus). In Diptera box 11, there is a male *Xanthogramma citrofasciatum* (DeGeer) (NEW SYNONYM) with the Linnaean name label "festiva 33." This specimen is designated lectotype and has been so labeled. There are two unlabeled male *festivum* specimens associated with the lectotype. These are probably syntypes.

The name *festivum* is associated today with a *Chrysotoxum* species. This usage stems from Haliday (1851) and Schiner (1856). The specimens in the Linnaean Collection are undoubtedly types. The Linnaean descriptions (1758, 1761) are of a species with a short antenna (that is, a *Xanthogramma* species; *Chrysotoxum* species have long antennae). The diagnoses (the 1758 description is the same as the 1761 diagnosis) form a key to species. Species #21–30 (1758) or #1805–1809 (1761) are diagnosed as "*Musca* (species name) *antennis setariis elongatis* . . ." (species with elongate antennae); followed by "*Musca* . . . *setariis nuda* (species with bare aristae) (species #31–33 (1758), #1810–1812 (1761)); then "*Musca* . . . *setariis nudiscula* . . ."; "*Musca* . . . *setariis subtomentosa* . . ."; etc. All the species with long antennae are in the first group, and those with short antennae are in the following groups. *Musca festiva* is placed in a short antenna group. In his *Fauna Suecica*, Linnaeus gave descriptions in addition to the diagnoses. When Linnaeus described the antennae of *Chrysotoxum arcuatum* (Linnaeus), he wrote "*Antennae nigrae, longitudine capitii* . . ." (Antennae black, length of head), but for *festiva* he wrote "*Antennae nigrae, capite longiores, subclavates cum arista laterali* . . ." (Antennae black, head longer, subclavate with arista lateral). "*Longior (es)*" is a comparative and refers to head, not antennae. That *festiva* refers to a short-antennad species was confirmed by DeGeer (1776: 118), who wrote that *festiva* was (and is) identical to his *citrofasciata*. DeGeer knew Linnaeus and his collections well, and most of DeGeer's material was identified by Linnaeus. Besides DeGeer, virtually all the earlier workers (Fabricius, 1775: 769, 1781: 430, 1787: 339, 1794: 300, 1805: 242; de Villers, 1789: 444; Gmelin, 1790: 2874; Schrank, 1803: 116; Fallén, 1817: 38; Meigen, 1822: 297, 1838: 130; Macquart, 1829: 214, 1834: 550; Zetterstedt, 1843: 692, 1849: 3127; 1852: 4304; Walker, 1849: 577; Rondani, 1857: 185; Bonsdorf, 1861: 230; Malm, 1863: 23) followed DeGeer and applied the name *festiva* to a short-antennad species (*Xanthogramma*). The exceptions were Scopoli (1763: 355), Geoffroy (in Fourcroy 1785: 479), Haliday (1851: 141), Walker (1851: 264) and Schiner (1856: 403, 1857: 297, 1862: 255). These authors applied the name to a long-antennad

- 16." This specimen is designated lectotype and has been so labeled. The second male lacks a head. Our observations agree with those of Haliday (1851: 139).
- lucorum* Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Leucozona* (*s.s.*) *lucorum* (Linnaeus). In Diptera box 10, there is a headless male of *Leucozona lucorum* (Linnaeus) with the Linnaean name label "lucorum 25." This specimen is designated lectotype and has been so labeled. Our observations agree with those of Haliday (1851: 0).
- mellina* Linnaeus. 1758: 594 (*Musca*). Type-locality: here restricted to Sweden (no specific locality given in 1758). *Melanostoma mellinum* (Linnaeus). In Diptera box 17, there are 4 females. The labeled specimen and one other are *Platycheirus* species. Of the other two, one is apparently *Melanostoma scalare* (Fabricius), and the other *Melanostoma mellinum* of authors. The original description refers to three different abdominal patterns. Hence, we accept all these specimens as syntypes, but leave the selection of lectotype to a future revisor. The Scandinavian species of *Melanostoma* are now being revised by Andersson, Nielsen and Hippa. Haliday (1851: 142) identified the labeled female as *Platycheirus peltatus* Meigen, the two *Melanostoma* specimens as *scalare* and *mellinum*, but did not mention the fourth specimen.
- menthastri* Linnaeus. 1758: 594 (*Musca*). Type-locality: here restricted to Sweden (no specific locality given in 1758). *Sphaerophoria menthastri* (Linnaeus). In Diptera box 11, there is a female of a *Sphaerophoria* species with the Linnaean name label "menthastri 41." In 1969 before the collection was re-curated, there was another unlabeled female next to the labeled specimen. Both specimens belong to the *menthastri* species group, but could not be identified to species. Hence, Vockeroth (1971: 1632) decided to maintain the usage of this name in his sense (Vockeroth, 1963). We follow this interpretation. Haliday (1851: 142) identified the labeled female as *menthastri* of Meigen and the unlabeled female as *taeniatus* of Meigen.
- mutabilis* Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Microdon mutabilis* (Linnaeus). In Diptera box 10, there is a male *Sericomyia silentis* (Harris) with the Linnaean name label "mutabilis 29." In 1969, there was a female of *Microdon mutabilis* (Linnaeus) below this labeled specimen. This second specimen has the head of a *Helophilus* species glued on. The labeled specimen is considered to be mislabeled and not a type as it in no way agrees with the Linnaean descriptions. The glued-on head of the associated specimen is likewise excluded as being part of a *mutabilis* type. The glued-on head was not attached to the female when Haliday studied the collection in 1847-1848 (Haliday, 1851: 140). The Linnaean descriptions clearly described *mutabilis* as having long antennae among other characters which the *Sericomyia* and *Helophilus* material lack. We consider the *Microdon mutabilis* body to represent type material and designate it as lectotype; it has been so labelled. Our observations agree with those of Haliday (1851: 140).
- mystacea* Linnaeus. 1758: 591 (*Musca*). *Mesembrina mystacea* (Linnaeus) (Muscidae). In Diptera box 9, there is a specimen of *Mesembrina mystacea* (Linnaeus) with the Linnaean name label "mystacea 15" and a holotype label. *Musca mystacea* Linnaeus was placed in combination with *Syrphus* by Fabricius (1775: 762). Since that time the name has been used by some authors as either a species of *Volucella* (Haliday, 1851: 139) or a variety or synonym of

name label "pendula 17." This specimen is designated lectotype and has been so labeled. There are two other female specimens associated with the lectotype. One is unlabeled, and the other is labeled "Angl. Huds." The first is probably a syntype, but the second is clearly not a type because of the locality label. Our observations agree with those of Haliday (1851: 139).

pellucens Linnaeus. 1758: 595 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Volucella pellucens* (Linnaeus). In Diptera box 12, there is a female of *Volucella pellucens* (Linnaeus) with the Linnaean name label "pellucida 48." This specimen, despite the difference in spelling, is designated lectotype and has been so labeled. There are also two other *pellucens* specimens associated with the lectotype. One is an unlabeled female, and the other, a male, is labeled "Derbysh. 1792." The first is probably a syntype, but the second is clearly not a type because of the locality label. Our observations agree with those of Haliday (1851: 143).

pipiens Linnaeus. 1758: 594 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Syritta pipiens* (Linnaeus). In Diptera box 11, there is a female of *Syritta pipiens* (Linnaeus) with the Linnaean name label "pipiens 44" and lacking its abdomen. There are two male *pipiens* specimens associated with the labeled specimen, both probably syntypes. One of these males is designated lectotype and has been so labeled. Our observations agree with those of Haliday (1851: 143).

pyrastris Linnaeus. 1758: 594 (*Musca*). Type-locality: here restricted to Sweden (no specific locality was given in 1758). *Scaeva pyrastris* (Linnaeus). In Diptera box 11, there is a headless male of *Scaeva pyrastris* (Linnaeus) with the Linnaean name label "pyrastr 39." This specimen is designated lectotype and has been so labeled. There are two male *pyrastris* specimens associated with the lectotype. One is unlabeled, and the other is labeled "Angl." The first is probably a syntype, but the second is clearly not a type because of the locality label. Our observations agree with those of Haliday except that he also noted an associated female and puparium.

ribesii Linnaeus. 1758: 593 (*Musca*). Type-locality: here restricted to Sweden (no specific locality was given in 1758). *Syrphus ribesii* (Linnaeus). In Diptera box 11, there is a female *Syrphus ribesii* (Linnaeus) with the Linnaean name label "38 ribesii." This specimen is designated lectotype and has been so labeled. It also bears a lectotype label affixed by M. C. D. Speight in 1980. There are also two other female *ribesii* specimens without labels. These specimens are probably syntypes. Our observations agree with those of Haliday (1851: 142).

rostrata Linnaeus. 1758: 604 (*Conops*). Type-locality: Germany. *Rhingia rostrata* (Linnaeus). In Diptera box 23, there is a female of *Rhingia*, possibly *campestris* Meigen, with the Linnaean genus label "Conops" and species label "rostrata." There are two male *Rhingia campestris* Meigen specimens associated with the labeled specimen. One is unlabeled, and the other is labeled "Norwich 1811 in floribus." These males are not considered types; one because of its locality label and both because they don't conform to the original description. As the identity of female is questionable, no lectotype is now designated. However, there is no question as to the identity of *Conops rostrata* Linnaeus as Linnaeus described one character which separates *rostrata* from all other European species of *Rhingia*, the entirely pale tibiae (*Tibiae flavescens*). Likewise,

to Sweden. *Temnostoma vespiforme* (Linnaeus). In Diptera box 11, there is a male of *Temnostoma vespiforme* (Linnaeus) with the Linnaean name label "vespiformis 32." This specimen is designated lectotype and has been so labeled. There is another headless and unlabeled male *vespiforme* specimen associated with the lectotype. It is probably a syntype. Haliday (1851: 141) identified the second specimen as a female, but otherwise our conclusions agree with his.

viduata Linnaeus. 1758: 598 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Pipizella viduata* (Linnaeus). In Diptera box 14, there is a male of *Pipizella varipes* (Meigen) (NEW SYNONYM) with the Linnaean name label "viduata." This specimen is designated lectotype and has been so labeled. The male genitalia has been dissected and studied. This name was first definitely applied to a syrphid fly by Fallén (1817: 56), who used it for an *Eristalis* species (*Eristalis sensu* Fallén included *Cheilosia*, *Chrysogaster*, *Leucozona*, *Blera*, *Lejota*, *Tropidia*, and *Portevinia*; largely a collection of dark tuberculate faced species). Meigen (1822: 269) restricted the name to a *Chrysogaster* species, and all subsequent authors have accepted this interpretation. While the original description does conform to both a *Chrysogaster* and *Pipizella* species, there is nothing in that description to exclude the *Pipizella* interpretation. Hence, we accept the specimen in the Linnaean Collection as type and have restricted the name accordingly. *Musca lucida* Scopoli (1763: 347) is an available name for *viduata* of authors (Stackelberg 1959: 899 among others). The description of *lucida* is of a small black fly, and the name has been listed as a questionable synonym of *Chrysogaster solstitialis* (Fallén) (Kertész, 1910: 32). We prefer, however, to use the name as valid for the reasons previously enumerated by Thompson (1981a: 471) for the use of the name *Conops clavata* Scopoli.

Haliday (1851: 145) identified the labeled specimen as an unknown species of *Paragus*. He gave descriptive notes on the specimen and noted that a specimen of an unknown species of *Cheilosia* was adjacent to the labeled specimen. Without good optical equipment and light, *Paragus* and *Pipizella* are quite similar. Thus, we assume that Haliday misidentified the specimen we here designate as lectotype.

Nomenclature is basic to science, being the system of names for concepts, without which communication would be impossible. To be efficient such a system should be stable, that is, only one name and always the same name for a concept. The design of a system to achieve nomenclatural stability has been one of the major endeavors of Curtis Sabrosky. That system is embodied in the *International Code of Zoological Nomenclature*, a set of rules which Curt has done much to perfect in their last two revisions. The code is administered by the *International Commission of Zoological Nomenclature*, of which Curt is a Commissioner and now serves as President. So, to Curtis Sabrosky, we dedicate this article in humble appreciation of his great contributions to nomenclature, as well as in thanks for the sage advice he has given us on nomenclature.

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