

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

Sweden. *Chrysotoxum arcuatum* (Linnaeus). In Diptera box 10, there is a female of *Chrysotoxum festivum* of authors with the Linnaean name label "arcuata 28." As the Linnaean descriptions fit this specimen much better than they do *arcuatum* of authors, especially with regards to abdominal markings, we consider the Linnaean specimen as a syntype. Linnaeus described the abdomen as "*abdomine cingulis quatuor arcuatis flavis.*" *Chrysotoxum festivum* of authors has four yellow bands, whereas *arcuatum* of authors has broad apical bands in addition to the basic four bands of *festivum* of authors. This specimen is designated lectotype and has been so labeled. Thus, *Chrysotoxum festivum* of modern authors (Sack, 1930: 226; Coe, 1953: 39; Séguy, 1961: 120; Stackelberg, 1970: 37) is *arcuatum* Linnaeus, and *arcuatum* of these authors should be known as *fasciatum* Müller (1764: 85). Early authors who correctly identified *arcuatum* Linnaeus were Fabricius (1775: 767, 1781: 427, 1787: 337, 1794: 293, 1805: 184), DeGeer (1776: 125), Gmelin (1790: 2872), Fallén (1817: 5), Meigen (1822: 168), Macquart (1829: 347, 1834: 489), Zetterstedt (1838: 588, 1843: 636, 1852: 4300, 1855: 4644, 1859: 5074), Loew 1840: 26, 1841: 38), Rondani (1857: 203), Bonsdorf (1861: 211) and Malm (1863: 10). The first author to consider "*arcuatum* of Fabricius" a synonym of *festivum* and "*arcuatum* of Linnaeus" as a different species was Haliday (1851: 140). He was followed by Walker (1851: 264), Loew (1856: 612), Schiner (1856: 403, 1862: 255) and Verrall (1901: 650) among others. Why Haliday made the switch is not clear. He merely stated that while the type was as indicated above (= *festivum* of authors), it was nevertheless clear that Linnaeus in his description meant another species ("*Doch ist es klar, dass Linné in seiner Beschreibung eine andere Species meint, wahrscheinlich hortense Mg. oder marginatum Mg. . .*"). However, as Haliday does not cite the edition of Linnaeus he used, it is not possible to check the exact "Linnaean" description that he believed referred to *fasciatum* Müller (= *festivum* of authors). In fact it may be that Haliday did not use any authentic edition of Linnaeus (v. *diophthalma*).

bicincta Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Chrysotoxum bicinctum* (Linnaeus). In Diptera box 10, there are a male and two females, one headless, of *Chrysotoxum bicinctum* (Linnaeus). The male bears the Linnaean name label "bicincta 27." All specimens are considered syntypes, and the male is designated lectotype and has been so labeled. Haliday's (1851: 140) conclusions are the same as ours except that he also noted that one female had the unpublished MS name of "*sesquimaculata.*"

bombylans Linnaeus. 1758: 591 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Volucella bombylans* (Linnaeus). In Diptera box 9, there are three female specimens of *Volucella bombylans* (Linnaeus). One female bears the Linnaean name label "14. bombylans" and is of the *Bombus lapidarius* (Linnaeus) color form. This specimen is designated lectotype and has been so labeled. All these specimens are considered syntypes. Our observations agree with those of Haliday (1851: 139).

cemiteriorum Linnaeus. 1758: 597 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Chrysogaster cemiteriorum* (Linnaeus). In Diptera box 13, there is a headless male of *Chrysogaster chalybeata* Meigen (NEW SYNONYM) with the Linnaean name label "coemiteriorum 61." We accept this specimen as a syntype and designate it as lectotype. The male genitalia has been dissected. The

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 substernaceous 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 *Cheilosia* 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), *cremteriorum* (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 devius* (Linnaeus). We found no labeled or unlabeled material of this species. Haliday likewise did not find this species represented in the Linnaean collection. Doctor

Persson wrote that there is no type material of *devius* Linnaeus in either Stockholm or Uppsala (DeGeer Collection and the Royal Collections of Ulriksdal and Drottningholm), the other two known sources of Linnaean material. One of us (Speight) is revising the European species of *Microdon* and will discuss the proper application of this name in another publication.

diophthalma Linnaeus. 1758: 593 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Spilomyia diophthalma* (Linnaeus). In Diptera box 10, there is a male of *Spilomyia diophthalma* (Linnaeus) with the Linnaean name label "diophthalma 31." This specimen is designated lectotype and has been so labeled.

Haliday's (1851: 141) discussion of *diophthalma* is confusing. He noted that there was a male of "*Milesia saltuum* Mg." (= *diophthalma* of Zetterstedt and other authors). Then he stated that Linnaeus cited "Schaeffer Icones pl. 77, f. 4" which is "*Calimorpha dominula*" (sic, = *Callimorpha*, Lepidoptera: Arctiidae), but he believed that the "pl. 77" was a printer's error for plate 87 which is of a *Chrysotoxum* species, probably *marginatum* (= *fasciolatum* DeGeer). However, he declared that Schaeffer's figure (pl. 87, fig. 4) is poor and DeGeer (1776: 124) as well as Harris (1776: pl. 60) give better ones. He concluded by stating that Schaeffer figured *diophthalma* on plate 17, figure 8 and 9. This discussion is confusing to us. Linnaeus did not cite Schaeffer under *diophthalma* (Linnaeus, 1758: 593, 1761: 446, 1767: 986) nor did Müller (1775: 961, German translation of 12th edition) and Gmelin (1790: 2873, 13th edition) (also Turton, 1800: 647). This discussion makes us suspect Haliday's other statements about Linnaeus' work.

erratica Linnaeus. 1758: 593 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Eriozona (Megasyrphus) erratica* (Linnaeus). In Diptera box 11, there is a female of *Eriozona annulipes* (Zetterstedt) with the Linnaean name label "erratica 34." This specimen is designated lectotype and has been so labeled. There is a second headless and unlabeled specimen of a *Chrysotoxum* species associated with the lectotype. This other specimen is clearly not a type as it does not conform to the original description. *Musca erratica* Linnaeus has been a forgotten name. It has been cited only once (Haliday, 1851: 142) since its original description apart from its citations in various editions of Linnaeus' *Systema Naturae* (Linnaeus, 1767: 986, Gmelin, 1790: 2874) and various catalogs. Haliday (1851: 142) identified the labeled specimen as a variety of "*Syrphus grossulariae* Mg." and gave a Latin description of the specimen. Despite this lack of usage, we feel that the name should be used instead of *annulipes* Zetterstedt (NEW SYNONYM). *Musca erratica* Linnaeus is not included in *Fauna Suecica*, which suggests that Linnaeus may have received the species from some other locality. The species does, however, occur in Sweden. Hence, we have restricted the type-locality accordingly.

fallax Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Blera fallax* (Linnaeus). In Diptera box 10, there is a female of *Blera fallax* (Linnaeus) with the Linnaean name label "fallax 24." This specimen is designated lectotype and has been so labeled. Our observations agree with those of Haliday (1851: 140).

femorata Linnaeus. 1758: 595 (*Musca*). Type-locality: Europe, here restricted to

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 arista) (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 capitis . . .*" (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

species (*Chrysotoxum*). What Scopoli wrote about the antenna of *festiva* indicates that he was confused ("Antennae nigrae, longitudine sua thoracis latitudinem aequantes, setula ex apice articuli medii, non vero terminali LINN." = Antennae black, length is equal to thoracic latitude (=width), arista out of apex of middle segment, not truly terminal as in Linnaeus), and later authors should have ignored this statement. Unfortunately Haliday and Schiner did not. They made the switch from short-antennad species to long on the basis of Scopoli, and all subsequent authors accepted their interpretation without question. Haliday (1851: 141) also called attention to Illiger (1807: 450). Illiger first noted the confusion over the application of the name *festiva* Linnaeus. He considered that the name applied to the long-antennad species (*Chrysotoxum*) (again based on Scopoli?) and renamed the short-antennad species (*Xanthogramma*) as his *philanthina*. Examination of the Linnaean types and descriptions, along with the history of the usage of the name, clearly shows that *festivum* (Linnaeus) applies to a short-antennad species (*Xanthogramma*). *Chrysotoxum festivum* of authors is *arcuatum* (Linnaeus).

florea Linnaeus. 1758: 591 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Myathropa florea* (Linnaeus). In Diptera box 10, there is a male of *Myathropa florea* (Linnaeus) with the Linnaean name label "floralis 18." This specimen is designated lectotype and has been so labeled. One other unlabeled female specimen is also present in the collection. Our observations agree with those of Haliday (1851: 139), except that the abdomen was lacking when he examined the type and it has now been reattached.

glaucia Linnaeus. 1758: 593 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Leucozona (Ischyrosyrphus) glaucia* (Linnaeus). In Diptera box 11, there are two female specimens of *Leucozona glaucia* (Linnaeus), one with the Linnaean name label "glaucia 35." The labeled specimen is designated lectotype and has been so labeled. Our observations agree with those of Haliday (1851: 142). Haliday noted that Fabricius misapplied this name to *laternaria* Müller, leading Meigen to redescribe the true *glaucia* as his *nobilis*, and that Zetterstedt correctly identified *glaucia*, but redescribed *laternaria* as his *mutata*.

inanis Linnaeus. 1758: 595 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Volucella inanis* (Linnaeus). In Diptera box 12, there is a male of *Volucella inanis* (Linnaeus) with the Linnaean name label "inanis 47." This specimen is designated lectotype and has been so labeled. Our observations agree with those of Haliday (1851: 143).

intricaria Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Eristalis (Eoseristalis) intricaria* (Linnaeus). In Diptera box 10, there is a female of *Eristalis intricaria* (Linnaeus) with the Linnaean name label "intricata 22." This specimen is designated lectotype and has been so labeled. When Vockeroth examined the Collection in 1969 before its re-curation, there were several other specimens of the same species near the lectotype. These specimens have now been moved to Diptera box 17. Our observations agree with those of Haliday (1851: 139).

lappona Linnaeus. 1758: 591 (*Musca*). Type-locality: Sweden. *Sericomyia lappona* (Linnaeus). In Diptera box 10, there are two male specimens of *Sericomyia lappona* (Linnaeus), one of which has the Linnaean name label "lappona

- 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. *Leucozonia* (*s.s.*) *lucorum* (Linnaeus). In Diptera box 10, there is a headless male of *Leucozonia 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.
- menthastris* Linnaeus. 1758: 594 (*Musca*). Type-locality: here restricted to Sweden (no specific locality given in 1758). *Sphaerophoria menthastris* (Linnaeus). In Diptera box 11, there is a female of a *Sphaerophoria* species with the Linnaean name label "menthastris 41." In 1969 before the collection was re-curated, there was another unlabeled female next to the labeled specimen. Both specimens belong to the *menthastris* 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 *menthastris* 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

- Volucella bombylans* (Linnaeus). The name as well as its synonym, *Syrphus apiarius* Fabricius (1781: 422), should be removed from Syrphidae.
- nemorum* Linnaeus. 1758: 591 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Eristalis arbustorum* (Linnaeus). In Diptera box 10, there is a female of *Eristalis arbustorum* (Linnaeus) with the Linnaean name label "nemorum 19." This specimen is designated lectotype and has been so labeled. The almost universal interpretation of *nemorum* is as a distinct species. Only Illiger (1807: 441) and Fallén (1817: 25) identified *nemorum* and *arbustorum* as the different sexes of the same species. However, not only does the Linnaean type support this synonymy of *nemorum* and *arbustorum*, but also the Linnaean descriptions confirm it. While the diagnoses (1758 description and 1761 diagnosis) can apply to the females of either *arbustorum* Linnaeus or *nemorum* of authors, the 1761 description can only apply to the female of *arbustorum*, especially when the comparative description of *arbustorum* is also considered. The two key points are: 1) "Abdomen nigrum, ultrinque juxta basin seu in primo & secundo segmento luteum . . ." (the lateral pale area runs from the base of the first (=2nd tergum) to that of the 2nd (=3rd); and 2) the emphasis Linnaeus put on the white abdominal incisures. The females of *nemorum* of authors tend to be dark, the spot on the tergum is small and always broadly isolated from the 3rd tergum by an apical dark fascia, and the pale incisures are usually very narrow, indistinct or absent. These key points, however, conform to the female of *arbustorum*. The valid name for *nemorum* of authors is *interrupta* (Poda) (1761: 118).
- Haliday (1851: 139) identified the labeled specimen as a female of *Eristalis nemorum* of Meigen. Associated with the labeled specimen, Haliday noted that there was another female of "nemorum," a female of "cryptarum Mg." and under these three females there were two "nemorum" and a large label with the remark "Seething 1797."
- noctiluca* Linnaeus. 1758: 593 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Pipiza noctiluca* (Linnaeus). In Diptera box 11, there is a female of *Pipiza noctiluca* (Linnaeus) with the Linnaean name label "noctiluca 36." This specimen is designated lectotype and has been so labeled. Haliday (1851: 142) identified the lectotype as "*Pipiza geniculata* Mg."
- oestracea* Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Eristalis (Eoseristalis) oestracea* (Linnaeus). In Diptera box 10, there is a female *Eristalis oestracea* (Linnaeus) with the Linnaean name label "oestriformis 23." This specimen, despite the difference in the name, is designated lectotype and has been so labeled. In 1969, there was a male near the lectotype, but intermixed with the *intricaria* types. This second specimen has now been moved to Diptera box 17. Haliday (1851: 139) noted that there were two females, one labeled, and one male associated with the name "oestriformis." Further, he noted that Meigen misapplied the name *oestracea* to a *Cheilosia* species, perhaps due to an error as to the size of the species in Linnaeus' subsequent description (1761: 445). He gave *rupestris* Panzer as the valid name for *Cheilosia oestracea* of Meigen as he believed Harris' name, *illustrata*, to be unavailable.
- pendula* Linnaeus. 1758: 591 (*Musca*). Type-locality: here restricted to Sweden (no specific locality given 1758). *Helophilus pendulus* (Linnaeus). In Diptera box 10, there is a female of *Helophilus pendulus* (Linnaeus) with the Linnaean

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,

Linnaeus in his descriptions of other *Conops* species emphasized leg color as a character (for example, under *Conops flavipes* (1758: 604) he wrote "*Pedes flavi (nec, ut praecedentiis, ferruginei) fasciis nigris*"). As Haliday was able to study only part of the Linnaean Collection, he left no notes on *rostrata* (Haliday, 1851: 131).

scripta Linnaeus. 1758: 594 (*Musca*). Type-locality: here restricted to Sweden (no specific locality given in 1758). *Sphaerophoria scripta* (Linnaeus). In Diptera box 11, there is a male of *Sphaerophoria scripta* (Linnaeus) with the Linnaean name label "scripta 42" and one unlabeled male of the same species. Vockeroth (1971: 1634) designated the unlabeled specimen as lectotype. Our observations agree with those of Haliday (1851: 142).

segnis Linnaeus. 1758: 595 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Xylota segnis* (Linnaeus). In Diptera box 11, there is a male of *Xylota tarda* Meigen with the Linnaean name label "segnis 45." There are three unlabeled *Xylota* specimens (2 of *segnis*, 1 *tarda*) associated with the labeled specimen. These are probably syntypes. A male specimen of *segnis* Linnaeus is designated lectotype and has been so labeled. Our observations agree with those of Haliday (1851: 142).

sepulchralis Linnaeus. 1758: 596 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Eristalinus (s.s.) sepulchralis* (Linnaeus). In Diptera box 12, there is a female of *Eristalinus sepulchralis* (Linnaeus) with the Linnaean name label "sepulchralis 55." This specimen is designated lectotype and has been so labeled. Haliday (1851: 143) noted that the specimen with the Linnaean label was *sepulchralis* of authors; that there were two specimens of "*Musca rudis* Meigen" (= *Eurithia anthophila* (Robineau-Desvoidy) (Tachinidae)) next to the type; and that there were another two specimens of *sepulchralis* labeled "Anglia, Hudson."

sylvarum Linnaeus. 1758: 592 (*Musca*). Type-locality: Europe, here restricted to Sweden. *Xylota sylvarum* (Linnaeus). In Diptera box 10, there is a female of *Xylota sylvarum* (Linnaeus) with the Linnaean name label "sylvarum 26." This specimen is designated lectotype and has been so labeled. There is another unlabeled female *sylvarum* specimen associated with the lectotype. It is probably a syntype. Our observations agree with those of Haliday (1851: 140).

tenax Linnaeus. 1758: 591 (*Musca*). Type-locality: here restricted to Sweden (no specific locality was given in 1758). *Eristalis (s.s.) tenax* (Linnaeus). In Diptera box 10, there is a female of *Eristalis tenax* (Linnaeus) with the Linnaean name label "tenax 21." This specimen is designated lectotype and has been so labeled. In 1969, there was another unlabeled female *tenax* specimen associated with the lectotype. This specimen is probably a syntype and is now in Diptera box 17. Our observations agree with those of Haliday (1851: 139).

transfuga Linnaeus. 1758: 594 (*Musca*). Type-locality: Sweden. *Lejops (Anasimyia) transfuga* (Linnaeus). In Diptera box 11, there is a female of *Lejops transfuga* (Linnaeus) with the Linnaean name label "transfuga 40." This specimen is designated lectotype and has been so labeled. The lectotype is glued to a card. The status of this species has been clarified recently by Claussen and Torp (1980). Haliday (1851: 142) identified the lectotype as a male, otherwise our observations agree with his.

vespiformis Linnaeus. 1758: 593 (*Musca*). Type-locality: Europe, here restricted

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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LITERATURE CITED

- Bonsdorff, E. J. 1861. *Finlands Tvavingade Insekter, (Diptera) fortecknade, och i korthet beskrifne.* Helsingfors. xii + 37-301 pp.
- Claussen, C. and E. Torp. 1980. Untersuchungen uber vier europaische Arten der Gattung *Anasimyia* Schiner, 1864 (Insecta, Diptera, Syrphidae). *Mitt. Zool. Mus. Univ. Kiel* 1(4), 16 pp.
- Coe, R. L. 1953. Diptera, Syrphidae. *Handb. Ident. Br. Insects* 10(1), 98 pp.
- Crosskey, R. W. 1974. The British Tachinidae of Walker and Stephens (Diptera). *Bull. Br. Mus. (Nat. Hist.) Entomol.* 30: 267-308.
- Day, M. C. and M. G. Fitton. 1978. Re-curation of the Linnaean Hymenoptera (Insecta), with a reassessment of the taxonomic importance of the collection. *Biol. J. Linn. Soc.* 10: 181-198.
- DeGeer, C. 1776. *Mémoires pour servir à l'histoire des Insectes.* Vol. 6. Stockholm. 523 pp., 30 pls.
- Fabricius, J. C. 1775. *Systema entomologiae, sistens insectorum classes, ordines, genera, species adiectis synonymis, locis, descriptionibus, observationibus.* Flensburgi et Lipsiae [=Flensburg and Leipzig]. 832 pp.
- . 1781. *Species insectorum exhibentes eorum differentiae specificas, synonyma, auctorum, loca natalia, metamorphosin.* Vol. 2. Hamburgi et Kilonii [=Hamburg and Kiel]. 517 pp.
- . 1787. *Mantissa insectorum sistens species nuper detectas.* Hafniae [=Copenhagen]. Vol. 2, 382 pp.
- . 1794. *Entomologia systematica emendata et aucta.* Vol 4. Hafniae [=Copenhagen]. 472 pp.
- . 1805. *Systema antliatorum secundum ordines, genera, species.* Brunsvigae [=Brunswick]. 373 pp. + 30 pp.
- Fallén, C. F. 1816-1817. *Syrphici Sveciae.* Lundae [=Lund]. Pp. 1-22 [1816], 23-62 [1817].
- Fourcroy, A. F. de 1785. *Entomologia parisiensis; sive Catalogus Insectorum quae in Agro Parisiensi reperiuntur; Secundum methodum Geoffroeanam in sectiones, genera & species distributus: Cui addita sunt nomina trivialia & fere trecentae novae Species.* Paris. viii + 544 pp.
- Gmelin, J. F. 1790. *Caroli a Linné, Systema naturae per regna tria naturae, secundum classe, ordines, genera, species; cum characteribus, differentiis, synonymis, locis.* Ed. 13. Vol. 1: *Regnum Animale, Pt. 5.* Lipsiae [=Leipzig]. Pp. 2225-3020.
- Haliday, A. H. 1851. *Sendschreiben von Alexis H. Haliday an C. A. Dohrn über die Dipteren der in London befindlichen Linneischen Sammlung.* Stettin. *Entomol. Ztg.* 12: 131-145.
- Harris, M. 1776-[1780]. *An exposition of English insects with curious observations and remarks wherein each insect is particularly described, its parts and properties considered, the different sexes distinguished, and the natural history faithfully related.* London "1776". *Decad I*, pp. 1-40, 2 pls. + pls. 1-10 (1776); *Decad II*, pp. 41-72, pls. 11-20 (?1776); *Decads III, IV, V*, pp. 73-99, 100-138, 139-166, pls. 21-30, 31-40, 41-50 + 1 pl. (?1780).
- Illiger, J. C. W. 1807. Vol. 2, 511 pp., 9 pls. *In* [Hellwig, J. C. L. and J. C. W. Illiger], *Fauna Etrusca. Sistens Insecta quae in provinciis Florentina et Pisana praesertim collegit Petrus Rossius.* (Mantissae priore parte adjecta), itemrum edita et annotatis perpetuis aucta. 2 vols. Helmstadtii [=Helmstadt].
- Linnaeus, C. 1746. *Fauna Svecica sistens Animalia Sveciae Regni: Qvadrupedia, Aves, Amphibia, Pisces, Insecta, Vermes, distributa per classes & Ordines, Genera & species. Cum differentiis specierum, synonymis auctorum, nominibus incolarum, locis habitationum, descriptionibus Insectorum.* Stockholmiae [=Stockholm]. [xxviii] + 411 pp., 2 pls.
- . 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species,*

- cum characteribus, differentiis, synonymis, locis. Ed. 10, Vol. 1. Holmiae [=Stockholm]. 824 pp.
- . 1761. Fauna Svecica sistens Animalia Sveciae Regni: Mammalia, Aves, Amphibia, Pisces, Insecta, Vermes. Distributa per Classes & ordines, genera & species, cum differentiis specierum, synonymis auctorum, nominibus incolarum, locis natalium, descriptionibus insectorum. Editio Altera. Stockholmiae [=Stockholm]. [49] + 578 pp., 2 pls.
- . 1767. Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Ed. 12 (ref.). Holmiae. Vol. 1, Pt. 2, pp. 533–1327.
- Loew, H. 1840. Bemerkungen über die in der Posener Gegend einheimischen Arten mehrerer Zweiflügler-Gatt. Öffentl. Prüf. Schüler K. Friedrich-Wilhelms-Gymasiums Posen 1840, 40 pp., 1 pl. [Also published as "Ueber die im Grosherzogthum Posen aufgefundenen Zweiflügler; ein Beitrag zur genaueren Kritischen Bestimmung der europäischen Arten. Isis (Oken's) 1840: 512–538, pl. 1.]
- . 1841. Ueber die Gattung *Chrysotoxum*. Stettin. Entomol. Ztg. 2: 136–141, 155–160.
- . 1843. Bemerkungen über die bekannten europäischen Arten der Gattung *Chrysogaster* Meig. Stettin. Entomol. Ztg 4: 204–212, 240–255, 258–281, 1 pl.
- . 1854. Neue Dipteren, pp. 1–24. In his Neue Beiträge zur Kenntniss der Dipteren, 2. Berlin. 24 pp.
- . 1856. Ueber die Fliegengattungen *Microdon* und *Chrysotoxum*. Verh. Zool.-Bot. Ver. Wien 6: 599–622.
- . 1856. Neue Beiträge zur Kenntniss der Dipteren. Vierter Beitrag. Programm K. Realschule Meseritz 1856: 1–57. [Also issued as a separate with same title and pagination under the imprint Berlin, 1856.]
- Macquart, J. 1829. Insectes Diptères du nord de la France. Syrphies. Mém. Soc. R. Sci. Agric. Arts, Lille 1827/1828: 149–371, 4 pls. [Also published separately as his "Insectes Diptères du nord de la France, vol. 4, 223 pp., 4 pls., Lille, 1829.]
- . 1834. Histoire naturelle des Insectes.—Diptères, Tome, premier. Diptera, Vol. 1. 578 pp., 12 pls. In [Roret, N. E., ed.], (Collection des suites à Buffon). Paris.
- Malm, A. W. 1860. Anteckningar ofver Syrphici i Skandinavien och Finland, med särskildt afseende på de arter och former, hvilka blifvit fuuna i Göteborgs och Bohus län. Kungl. Veternskap-och Vitterhets Samhalles Handlingar Goteborg 8: 1–81 (1863). [We date this work from 1860 as we have a pre-print dated 9 February 1860: The pre-print states it is a reprint from volume 7 of the above serial, but the article did not appear in that volume, but the next one instead.]
- Mayr, E. 1969. Principles of Systematic Zoology. New York, St. Louis, San Francisco. xi + 428 pp.
- Meigen, J. W. 1822. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. Hamm. Vol. 3, x + 416 pp., pls. 22–32.
- . 1838. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. Hamm. Vol. 7: "oder Supplementband", xii + 434 pp., pls. 67–74.
- Müller, O. F. 1764. Fauna insectorum Fridrichsdalina, sive methodica descriptio insectorum agri Fridrichsdalensis, sulm characteribus genericis et specificis, nominibus trivialibus, locis natalibus, iconibus allegatis, novisque pluribus speciebus additis. Hafniae et Lipsiae [=Copenhagen and Leipzig]. xxiv + 96 pp.
- . 1776. Zoologiae Danicae prodromus, seu Animalium Daniae et Norvegiae indigenarum characteres, nomina, et synonyma imprimis popularium. Havniae [=Copenhagen]. xxxii + 274 pp.
- Müller, P. L. S. 1775. Vollständiges Natursystem nach der [Linné'] zwölften lateinischen Ausgabe und nach Anleitung des holländischen Houttuynischen Werks mit einer ausführlichen Erklärung ausgefertigt. Vol. 2, pt. 5. Nürnberg.
- Panzer, G. W. F. 1801. Faunae insectorum germanicae initia oder Deutschlands Insecten. Nürnberg. H. 82, 2 pp., 24 pls.
- Poda, N. von 1761. Insecta musei Graecensis, quae in ordines, genera et species juxta Systema Naturae Caroli Linnaei. Berlin (W. Junk Facsimile ed. 1915). 127 + [xii] pp., 2 pls.
- Rondani, C. 1857. Dipterologiae Italicae prodromus. Vol. 2: Species Italicae ordinis dipteroorum in genera characteribus definita, ordinatim collectae, methodo analitica distinctae, et novis vel minus cognitis descriptis. Pars prima: Oestridae, Syrphidae [sic], Conopidae. Parmae [=Parma]. 264 pp., 1 fig.

- Sack, P. 1928–1932. 31. Syrphidae. In Lindner, E., ed., Die Fliegen der Palaearktischen Region. Bd. 4, pt. 6, pp. 1–48 [1928], 49–144 [1929], 145–240 [1930], 241–336 [1931], 337–451 [1932].
- Schaeffer, J. C. 1766–1779. Icones Insectorum circa Ratisbonam indigenorum coloribus naturam referentibus expressae. Natürlich ausgemahlte Abbildungen Regensburgscher Insecten. Regensburg Vol. 1, pt. 1, vi + 50 pp., pls. 1–50 (1776); vol. 1, pt. 2, vi + 50 + xi pp., pls. 51–100 (no date); vol. 2, pt. 1, iv + 50 pp., pls. 101–150 (no date); vol. 2, pt. 2, vi + 50 + vi pp., pls. 151–200 (no date); vol. 3, iv + 80 + vi pp., pls. 201–280 [1779].
- Schiner, J. R. 1856. Scriptores austriaci rerum dipterologicarum. Eine Revision der von österreichischen Entomologen aufgeführten Dipteren. Verhandl. Zool.-Bot. Ver., Wien 6: 399–424.
- . 1857. Diptera Austriaca. Aufzählung aller im Kaiserthume Oesterreich bisher aufgefundenen Zweiflügler. III. Die österreichischen Syrphiden. Verh. K.-k. Zool.-Bot. Ges. Wien 7: 279–506.
- . 1860–1862. Fauna Austriaca. Die Fliegen (Diptera). Wein. Vol. 1, lxxx + 674 pp. H. 1, pp. 1–72; h. 2, pp. 73–184, pl. 1 (1860). H 3/4, pp. 185–368; h. 5, pp. 369–440 (1861). H 6/7, pp. 441–656; h. 8 (part), pp. 657–674 + i–lxxx, pl. 2 (1862).
- Schrank, F. P. 1781. Enumeratio insectorum Austriae indigenorum. Augustae Vindelicorum [=Vienna?]. xxiv + 548 + [4] pp., 4 pls.
- . 1803. Fauna Boica. Durchgedachte Geschichte der in Baiern einheimischen und zahmen Thiere. Landshut. Vol. 3, Pt. 1, 272 pp.
- Scopoli, J. A. 1763. Entomologia carniolică exhibens insecta carnioliae indigene et distributa in ordines, genera, species, varietates methodo Linnaeana. Vindobonae [=Vienna]. 421 pp.
- Séguy, E. 1961. Diptères Syrphides de l'Europe occidentale. Mém. Mus. Natl. Hist. Nat. (A, Zool.) 23: 1–248.
- Stackelberg, A. A. 1970. 49. Sem. Syrphidae—Zhurchalki. [Fam. Syrphidae—Hover Flies], pp. 11–96. In Stackelberg, A. A. and E. P. Nartshuk, eds., vol. 5, Dvukrylye, blokhi [Flies, fleas.] 2nd part, 943 pp. In G. Ya. Bei-Bienko, ed., Opredelitel Nasekomich Europejskoi tsasti SSSR. [Keys to the Insects of the European USSR.] Leningrad.
- Strobl, G. 1893. Die Dipteren von Steiermark. Mitt. Naturwiss. Ver. Steiermark 29: 1–199 [1892].
- Thompson, F. C. 1980. The problem of old names as illustrated by *Brachyopa* “conica Panzer,” with a synopsis of the Palaearctic species of *Brachyopa*. Entomol. Scand. 11: 209–216.
- . 1981a. The flower flies of the West Indies (Diptera: Syrphidae). Mem. Entomol. Soc. Wash. 9, 200 pp.
- . 1981b. Nomenclature of the European species of *Neoascia* Meigen (Diptera: Syrphidae). Entomol. Scand. 12: 470–478.
- . In Press. (Revised list of British Syrphidae (Diptera)).
- Turton, W. 1800. A general system of nature, through the three grand kingdoms, of animals, vegetables, and minerals: Systematically divided into their several classes, orders, genera, species, and varieties, with their habitations, manners, economy, structure and peculiarities. Translated from Gmelin's last edition of the celebrated Systema Naturae, by Sir Charles Linné: Amended and enlarged by the improvements and discoveries of later naturalists and Societies, with appropriate copper-plates. Swansea. Vol. III, 784 pp. (See Thompson 1981a: 183 for dating.)
- Vane-Wright, R. I. 1975. The Butterflies named by J. F. Gmelin (Lepidoptera: Rhopalocera). Bull. Br. Mus. (Nat. Hist.) Entomol. 32: 17–64, 6 pls.
- Verrall, G. H. 1901. Platypezidae, Pipunculidae, and Syrphidae of Great Britain. In Verrall, G. H., British Flies, Vol. 8. London. [vi] + 691 pp.
- de Villers, C. J. 1789. Caroli Linnaei entomologia, faunae suecicae descriptionibus aucta; DD. Scopoli, Geoffroy, de Geer, Fabricii, Schrank, &c. speciebus vel in systemate non enumeratis, vel nuperrime detectis, vel speciebus Galliae Australis locupletata, generum specierumque rariorum iconibus ornata. Lugduni [=Lyon]. [iii] + 657 pp., 4 pls.
- Vockeroth, J. R. 1971. The identity of some Holarctic and Old World species of *Sphaerophoria* (Diptera: Syrphidae). Can. Entomol. 103: 1627–1634.
- Walker, F. 1849. List of the specimens of dipterous insects in the collection of the British Museum. Vol. 3. London. Pp. 485–687.
- . 1851. Diptera. Vol. 1. [Vol. 1], 314 pp., pls. 1–10. In (Walker, F., H. T. Stainton, and S. J. Wilkinson), Insecta Britannica. London.
- Zetterstedt, J. W. 1838. Dipterologis Scandinaviae. Sect. 3: Diptera, pp. 477–868. In his Insecta Lapponica. Lipsiae [=Leipzig]. vi + 1,140 (pp.).

- . 1842–1860. *Diptera Scandinaviae. Disposita et descripta. Lundae [=Lund]*. Vol. 1, pp. iii–xvi + 1–440 (1842); vol. 2, pp. 441–894 (1843); vol. 3, pp. 895–1280 (1844); vol. 4, pp. 1281–1738 (1845); vol. 5, pp. 1739–2162 (1846); vol. 6, pp. 2163–2580 (1847); vol. 7, pp. 2581–2934 (1848); vol. 8, pp. 2935–3366 (1849); vol. 9, pp. 3367–3710 (1850); vol. 10, pp. 3711–4090 (1851); vol. 11, pp. v–xii + 4091–4546 (1852); vol. 12: Sup. 3, pp. v–xx + 4547–4942 (1855); vol. 13: Sup. 4, pp. v–xvi + 4943–6190 (1859); vol 14, pp. 6191–6609 (1860).