Manual of Nearctic Diptera Volume 2

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SYRPHIDAE

52

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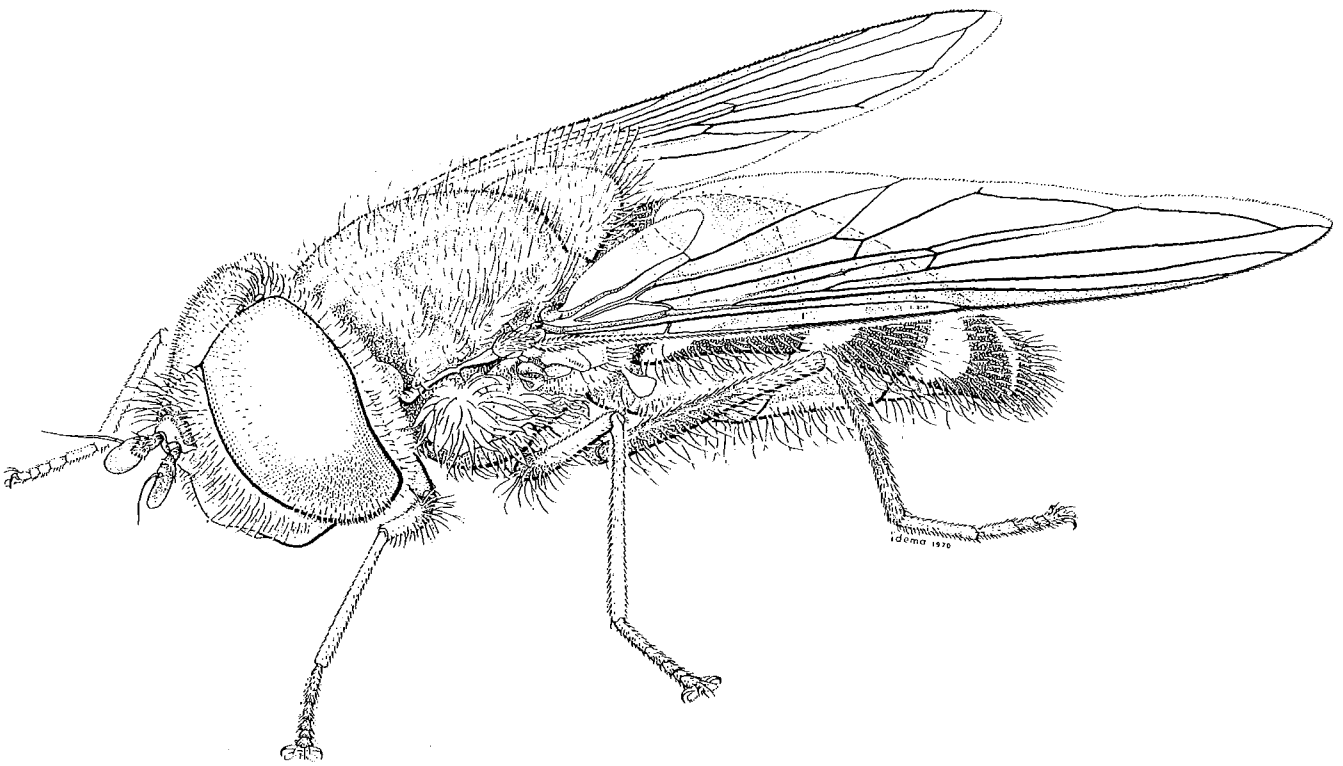
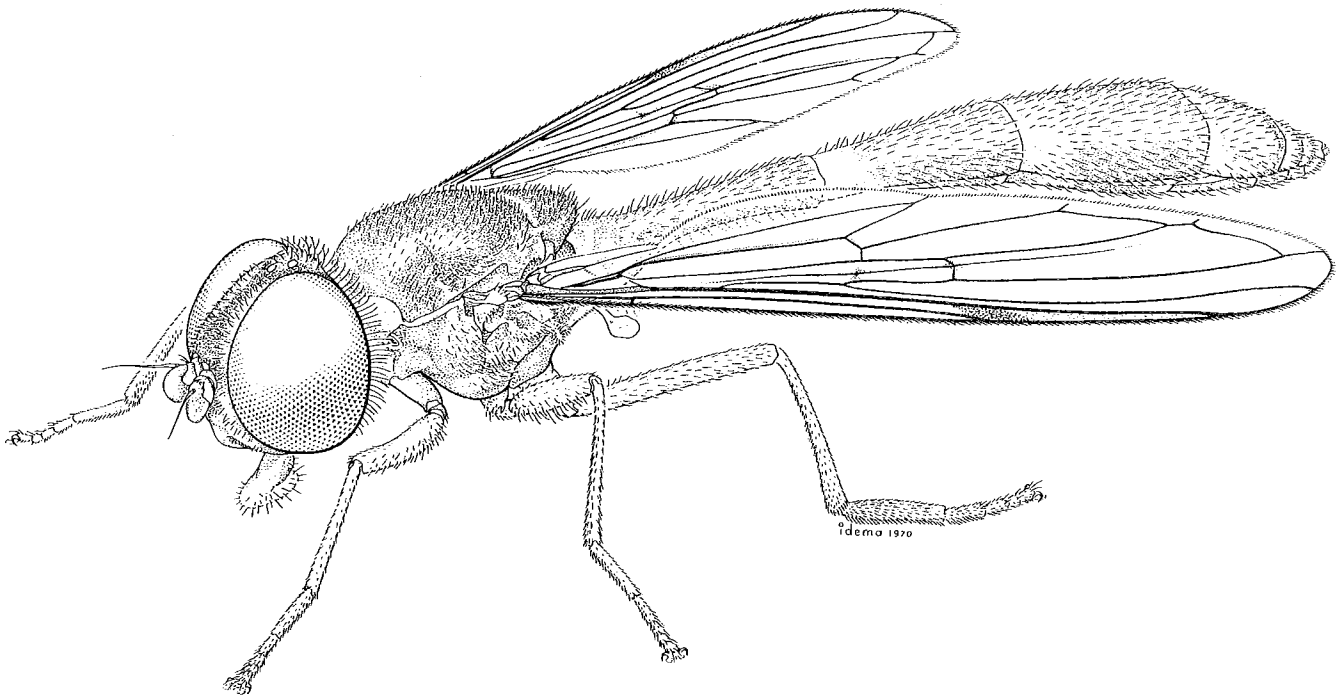


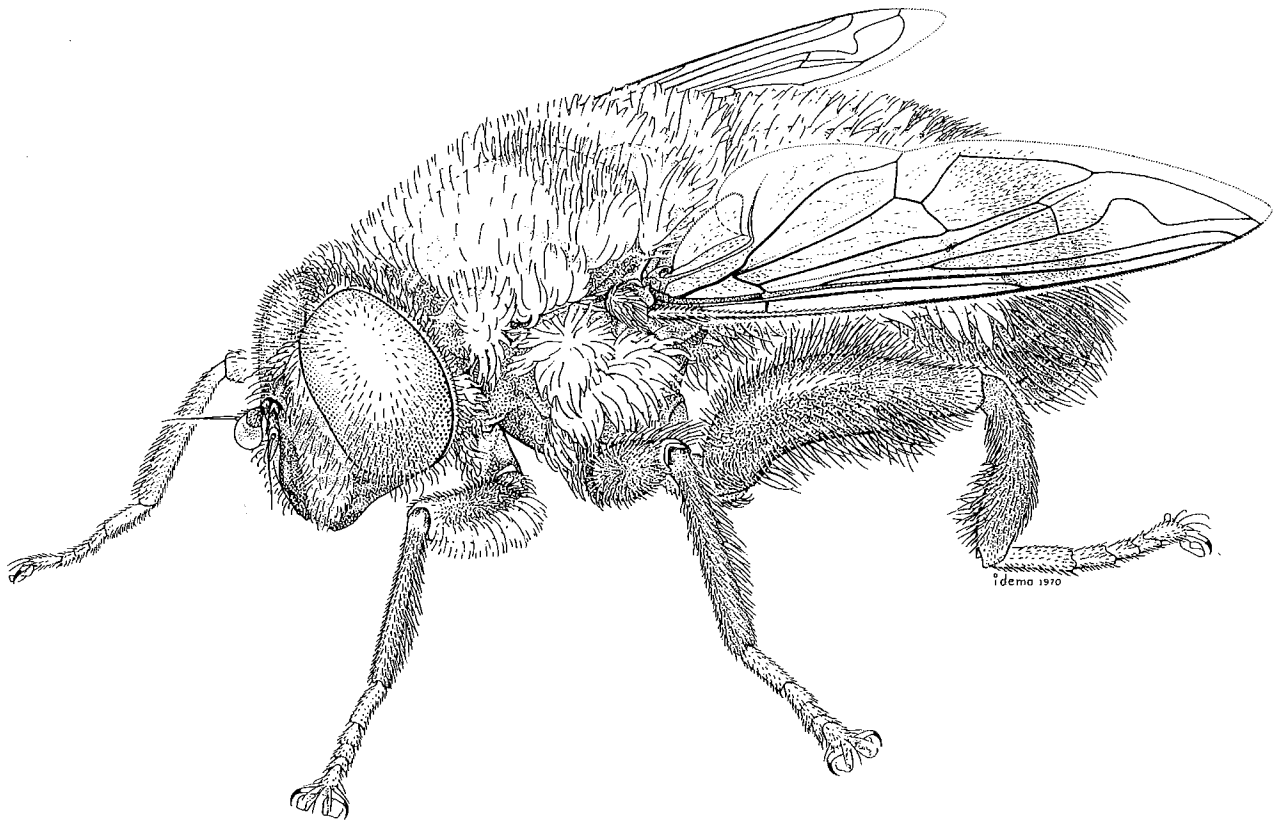
Fig. 52.1. Adult male of *Syrphus torvus* Osten Sacken.

Small to large, very slender to robust flies (Figs. 1–3), 4–25 mm long. Body usually black, very often with yellow or orange markings on head and thorax and particularly on abdomen, more rarely predominantly brown, yellow, metallic green, or blue, or with various combinations of these or other colors. Integument usually smooth but sometimes partly or totally punctate, sculptured, or rugose, usually nearly covered with dense short hairs, rarely with long hairs or nearly bare; some hairs sometimes flattened or scale-like and forming dense tomentum, or on thorax strong and bristle-like; both haired and bare portions shining, slightly to densely pruinose, or with very short dense pile. Many species excellent mimics of aculeate Hymenoptera.

Adult. Head: usually holoptic in male though sometimes very narrowly to broadly dichoptic, moderately to broadly dichoptic in female, without bristles. Some or all facets of upper part of eye sometimes enlarged in male; eye usually unicolorous, rarely with dark spots or bands, or with irregular markings, bare or with very short and sparse to long and dense hairs; these hairs rarely scale-like; three ocelli present. Facial profile varied, sometimes sexually dimorphic (Figs. 4–33); see Thompson (1972) for discussion. Mouthparts variable in length, usually correlated with length of subcranial cavity; taxonomic significance of variation unknown. Antenna sometimes borne on a short or long frontal prominence (Figs. 12, 13); scape and pedicel subcylindrical but varying greatly in length, with hairs or setae; first flagellomere varying greatly in shape, and often with a distinct sensory pit on lower part of inner surface; arista usually with two aristomeres but sometimes with three, usually dorsal but sometimes subapical or apical, usually longer than first flagellomere but very short in some Microdontinae and in some groups with apical arista, usually bare or with short pile, sometimes short to long plumose, rarely appearing strap-like because of very dense pilosity; antennal sockets confluent or separated. Lower facial margin usually with distinct median notch (Fig. 35), more rarely evenly rounded (Fig. 34). Frontogenal suture usually elongate, extending from anteroventral angle of eye for one-third or sometimes up to two-thirds distance to antennal base (Fig. 35), rarely reduced to an elongate anterior tentorial pit at anteroventral margin of eye (Fig. 34); face usually haired only laterad of frontogenal suture, sometimes entirely haired or with only median stripe bare.



2 Baccha elongata ♀



3 Mallota posticata ♂

Figs. 52.2–3. Adults: (2) female of *Baccha elongata* (Fabricius); (3) male of *Mallota posticata* (Fabricius).

Thorax: nearly uniform in structure but sometimes with modifications. Scutum sometimes flattened on posterior half; scutellum sometimes with apical rim, sometimes with rounded apical notch and a pair of short slender preapical processes (Microdontinae), sometimes produced as a conical triangle (*Lepidomyia* Loew), or with a discal depression or with lateral or median tubercles or both (some Volucellini); notopleuron sometimes strongly enlarged (*Ornidia* Lepeletier & Serville) or projecting posteriorly over wing base (*Nausigaster* Williston) (Fig. 74). Anepisternum sometimes uniformly convex, not divided into a flat anterior and a concave posterior portion (Fig. 74). Precoxal bridge absent; postcoxal bridge sometimes partly or completely developed (Figs. 79–81); metasternum variable in development, each half ranging from a slender anterior and submedian sclerotized strip through various intermediate forms to a large unexcavated sclerite (Figs. 70–73, 75, 76).

Distribution of thoracic hairs (and bristles, if present) varied, taxonomically important (Vockeroth 1969, Thompson 1972). Distinct bristles or spines sometimes present on anepisternum, notopleuron, postalar callus, prescutellar area of scutum, and scutellar margin; thorax otherwise with only fine hairs. Prothorax with postpronotum and other sclerites haired or bare. Scutum sometimes with transverse row of long erect hairs near anterior margin; scutellum bare below or with posteroventrally or ventrally directed hairs in one or more rows near posterior margin of ventral surface (ventral scutellar fringe) (Fig. 63). Anepisternum always with convex posterior portion haired, and with flattened anterior portion (if distinct) bare or with erect hairs (Fig. 65); katepisternum usually with distinct posterodorsal or ventral hair patches that are sometimes narrowly or broadly joined, rarely with one or both patches absent, sometimes with hairs also present anterodorsally or along anteroventral margin (Figs. 66–69). Anepimeron with anterior section always haired at least on upper half, with dorsal triangular section below wing base usually bare but sometimes densely haired (Fig. 64), and with posteroventral section usually bare but sometimes partly or entirely haired; katepimeron haired in all Syrphinae but haired or bare in other subfamilies; meron usually bare but sometimes with hairs situated in front of and below spiracle; laterotergite with only short dense pubescence, with long erect hairs only in some Old World Syrphinae. Metepisternum and metepimeron usually bare, but either sclerite sometimes with a few hairs; postcoxal bridge, if present, bare; metasternum haired or bare.

Wing (Figs. 40–60) with characteristic venation, with much variation in minor details but always with these main features: C ending at apex of R_{4+5}; an unattached longitudinal vein called the spurious vein present, running most of length of cells br and r_{4+5}, although this vein very faint in some exotic species; apex of M bent strongly forward near wing margin to end in R_{4+5} and forming apical crossvein; cell cu*p* closed near wing margin. Pterostigma usually present, extending to apex of R_1, sometimes shortened or represented only by crossvein sc extending from near apex of Sc to R_1. Branches of R and M sometimes with short stump veins; upper surface of Rs usually with several long fine bristles, rarely bare; veins other than C bare. Wing membrane usually hyaline but sometimes darkened or with discrete dark markings, sometimes entirely covered with microtrichia but often without microtrichia on part or all of one or both surfaces; bare areas usually near base of wing but sometimes apical part of wing, or rarely entire wing, without microtrichia. Wing shape nearly uniform but anal lobe and alula sometimes much reduced or absent, especially in forms with a petiolate abdomen. Calypteres well-developed; lower one sometimes with erect fine to coarse hairs on upper surface (Fig. 62), with or without long marginal fringe. Plumule short to long, rarely absent, with short to long fringe.

Legs (Figs. 82–92) usually slender and simple but sometimes (especially in male) with coxa, trochanter, femur, tibia, or tarsus modified; hind coxa or trochanter sometimes bearing a spur, spines, or a tubercle; femur sometimes swollen or distorted, often bearing anteroventral or posteroventral preapical spines or a preapical flange or spur; tibia sometimes arcuate, bearing an apical spur or otherwise modified; tarsus sometimes broadened and depressed or first tarsomere (especially on hindleg) sometimes strongly swollen; tarsal claws always curved and tapering to an acute apex except in male of Ethiopian species of *Ischiodon* Sack (Syrphinae).

Abdomen: extremely varied in shape; usually suboval, sometimes short and broad, more frequently elongate and petiolate (slender basally, broadened apically), rarely broadened basally and slender toward apex (Figs. 93–101). Margins of tergites usually curved uniformly downward laterally (Figs. 95, 96); in many Syrphinae tergites 2–5 or 3–5 with a submarginal longitudinal impression producing a marginated abdomen (Figs. 94, 97–100); in *Chrysotoxum* Meigen posterolateral angles of tergites often produced to give a serrated margin (Fig. 94). Abdominal spiracle 1 in Microdontinae, Merodontini, and Pipizini situated in membrane between tergite 1 and sternite 1, in other groups in a sclerotized area that is apparently an anteroventral extension of tergite 1; spiracles 2–7 of both sexes situated in membrane between corresponding tergites and sternites.

Male with tergite 5 visible in Syrphinae (Figs. 94–100), but in other subfamilies this tergite not visible externally (Fig. 101). Sternites 1–5 usually well-developed, sometimes very slender, rarely with tubercles, keels, or other modifications; sternite 1 unsclerotized only in some species of *Sphegina* Meigen (Fig. 80). Terminalia (Figs. 102, 103) rotated through 360°; segments 5 (or 6) to 8 rotated through 180°; segment 9 rotated through an additional 180°, so that sternite 8 lies immediately behind tergite 9 (epandrium); terminalia at same time flexed forward so that segment 9 normally lies in an asymmetric position below tergite 4 or 5 and surstyli and aedeagus are directed forward (Fig. 102). Sternite 8 usually smoothly rounded externally, rarely with processes. Tergite 9 (epandrium) usually a hollow curved shell, open ventrally; a pair of usually weak and compressed but sometimes highly modified cerci set in a posterodorsal notch that is rarely (in most *Sphaerophoria* Lepeletier & Serville and in some *Ocyptamus* Macquart) closed posteriorly, so that cerci are thereby surrounded by tergite 9. Pair of articulated

surstyli of varied shape at posterolateral angles of tergite 9; base of each surstylus with an internal apodeme projecting anteriorly below tergite 9; these apodemes fused medially, articulated anteriorly with anterodorsal angle of sternite 9 (hypandrium), and apparently representing sternite 10; sternite 10 in *Toxomerus* Macquart (Fig. 102), some *Copestylum* Macquart, and some genera of Pipizini bearing a haired weakly to strongly sclerotized external process projecting posteriorly between surstyli. Terminalia of two markedly distinct types: in Microdontinae (Fig. 105) sternite 9 having infolded posterodorsal surface, and lacking articulated apical lobes; aedeagus elongate, swollen basally, unsegmented, tubular, without lateral or dorsal processes although often divided apically into two parallel tubes; aedeagal apodeme double or absent; ejaculatory apodeme small; sperm duct strongly sclerotized distally, with a swollen and spherical basal portion partly enclosed by base of aedeagus, and with an elongate apical portion completely enclosed by aedeagus; terminalia of most species of Microdontinae almost identical. In Syrphinae and Eristalinae (Fig. 104) sternite 9 lacking infolded posterodorsal surface and having an articulated or fused process at each posteroapical angle called the paramere or superior lobe; aedeagus rarely elongate, never in the form of a simple elongate tube, strongly protruding or almost entirely enclosed within sternite 9, one- or two-segmented and often with distal segment forming an inflated semimembranous sac, usually with lateral or dorsal processes, and frequently with very complex sclerotization; aedeagal apodeme always present and single; sperm duct slender and membranous, but having at its proximal end a sclerotized ejaculatory apodeme that varies from very small to extremely large; terminalia of Syrphinae and Eristalinae extremely varied, offering excellent taxonomic characters at specific to tribal levels at least.

Female with at least tergites and sternites 1–5 exposed; sternite 5 sometimes partly withdrawn under sternite 4. Tergites and sternites 6–8 usually telescoped within preceding sclerites and weakly sclerotized; sometimes sternite 6, 7, or even 8 exposed and moderately to strongly sclerotized. Ovipositor (Fig. 106) usually slightly depressed to subcylindrical, rarely somewhat aciculate, generally ignored by taxonomists but with distinct specific differences in at least some species of *Toxomerus, Ocyptamus,* and *Orthonevra* Macquart. Three spermathecae present, small, apparently of little taxonomic significance, but so far not well-investigated.

Egg. Nearly uniform in shape, elongate-ovoid, without apical or lateral processes. Surface sculpturing varied, providing important taxonomic characters in some groups. Paper by Chandler (1968) important, describing and illustrating eggs of many British Syrphinae and Pipizini.

Larva. Extremely varied in habitus (Figs. 107, 109, 111, 113, 115), structure, habitat, and feeding habits. Form sometimes maggot-like or slightly to strongly flattened; segments sometimes bearing dorsal or lateral single or branched processes, especially toward posterior end; integument smooth, variously ornamented, or spinose. In some Milesiini prothorax and mesothorax bearing strong sclerotized hooks. In the Microdontinae (Fig. 107) form slug-like, without obvious segmentation, with a marginal fringe of fine processes, and usually with a dorsal vestiture of fine erect spicules arranged in clusters or in a hexagonal pattern. In all genera a single circular series of sensillae borne on thoracic segments 1–3 and on abdominal segments 1–8, at most 12 on each segment, but often fused or reduced in number; each sensilla normally raised on a papilla and surrounded by one or several setae. Prolegs present on mesothorax and abdominal segments 1–6 of most Eristalinae (Fig. 111), but much reduced or absent in some Eristalinae and all Syrphinae (Fig. 113) and Microdontinae; several rows of crochets usually present on each proleg in Eristalinae, but crochets sometimes reduced or absent. Eversible tracheated anal papillae probably present in all larvae; differences in branching evident, probably offering significant taxonomic characters.

First instar larva metapneustic; prothoracic spiracles (Fig. 110) usually appearing in second instar, in Eristalini only in third instar, and in plant-piercing *Chrysogaster* Meigen and in Microdontinae not appearing at all. Third instar of all known larvae except that of *Toxomerus politus* (Say) with posterior spiracles borne on a common process; this process short and nonretractile in Microdontinae (Fig. 108), Syrphinae (Fig. 114), and many Eristalinae (Figs. 112, 116), moderately to very long and telescopic in some Eristalinae (Fig. 111), and modified into an aciculate process for piercing aquatic plants for air supply in some species of *Chrysogaster.* Three straight to convoluted slit-like apertures usually present in each spiracle, but numerous radial slits (some *Volucella* Geoffroy, *Temnostoma* Lepeletier & Serville) or many pore-like openings (Microdontinae, Fig. 108) sometimes present instead. Four pairs of branched hairs on margin of fused spiracular plates usually present, but these often unbranched or absent in Pipizini, Syrphinae, and Microdontinae.

Mouthparts varied in structure, particularly important taxonomically and phylogenetically. Most detailed accounts those of Hartley (1963, morphology) and Roberts (1970, morphology and function). Four types evident: saprophagous (most Eristalinae), phytophagous (*Cheilosia* Meigen, Merodontini), predacious (Syrphinae, Pipizini), and scavenging (*Volucella,* Microdontinae). Saprophagous types having a complex comb-like mandibular lobe supported by a very slender reduced mandibular sclerite and having a highly musculated and contractile chamber (cibarium) within main part of cephalopharyngeal skeleton; fringed longitudinal ridges on floor of cibarium together with mandibular comb providing an effective filter-feeding apparatus for larvae living in aquatic or semiaquatic medium. Phytophagous types having much stronger mandibles and sometimes, at least, reduced ventral cibarial ridges, as well as sometimes a grinding pharyngeal apparatus for reducing particle size of plant tissue; larvae of Merodontini and perhaps at least those *Cheilosia* spp. living in decaying fungi, probably feeding on bacteria or fungal spores rather than on tissues of apparent host plant. Predacious types having four piercing stylets formed from labrum, mandibles, and fused labial lobes; cibarium strongly musculated, but because of concentrated diet no ventral filtering ridges present. Scavenging types (e.g.

Volucella inhabiting nests of Hymenoptera) having structures similar to those of saprophagous Eristalinae but with cibarial pump and filtering ridges reduced; structures of Microdontinae differing from those of other scavengers, showing some similarities (thin flat mandibles with ventral serration, sclerotized and pointed labium, absence of cibarial ridges) to predacious type; this similarity, although almost certainly due to convergence, not surprising because although some of these larvae feeding on solid pellets ejected from pharyngeal pockets of ants, others almost certainly predacious on immature stages of their hosts.

Pupa. Pupation occurring within contracted and eventually hardened larval skin. Newly formed pupal spiracles in Microdontinae and most Eristalinae varying greatly in length, shape, and nature of pores and protruding through dorsum of abdominal segment 1, sometimes apparent beneath surface but very rarely breaking through in Syrphinae. Eclosion of adult occurring by forcing open two opercula; one formed from dorsal part of thoracic segments; other formed by dorsal part of first abdominal segment.

Biology and behavior. The adults are among the most abundant and conspicuous of Diptera. Most if not all species are able to hover motionless in flight or to move in various directions. How this habit is associated with mating and with other activities such as feeding or dispersal is not clear. Most species are diurnal and very active, and certain European species move in large numbers over very long distances. All Syrphinae and Eristalinae probably visit flowers and feed on pollen and nectar. They are therefore significant pollinators of many plants, but their role as such has been little studied. This exposed feeding situation may be mainly responsible for mimicry of aculeate Hymenoptera, and mimicry is more frequent and better developed in the Syrphidae than in any other family of Diptera. The Microdontinae are not known to visit flowers; they are rather weak fliers and do not seem to move far from the larval habitat. Nevertheless, many species of Microdontinae apparently mimic Hymenoptera.

The larvae have a wide variety of habitats and food. Larvae of Microdontinae are known to live only in ant nests. Larvae of Syrphinae are predacious primarily on Aphidoidea and other Homoptera, but some species are known to feed on immature Thysanoptera, Coleoptera, or Lepidoptera. Larvae of Pipizini feed on Aphidoidea. Both these groups are probably important in controlling homopterous pests of cultivated plants, but little definite evidence of this role is available, and introductions of exotic predacious species as biological control agents in various parts of the world have not achieved any noticeable success. The feeding habits of Eristalinae are particularly varied. *Cheilosia* larvae feed in fungi or vascular plants; *Volucella* larvae are scavengers in nests of colonial Hymenoptera; *Copestylum* larvae live in decaying plant material, especially Cactaceae; Merodontini larvae live in monocotyledonous bulbs and sometimes in other plants and, although they are probably secondary invaders, are considered of considerable economic importance; larvae of *Tropidia* Meigen, *Syritta* Lepeletier & Serville, and *Rhingia* Scopoli live in dung or similar decaying organic material; Eristalini and Sericomyiini larvae live in water with a high organic content; larvae of *Neoascia* Williston, *Chrysogaster,* and *Orthonevra* are aquatic, with apparently some specific preference for relatively clean or polluted water; several other tribes of Eristalinae have larvae associated with tree holes, ulcerated tree wounds, or rotting wood. Larvae of a few Eristalini and *Syritta* have been known to cause intestinal myiasis in man, but this occurrence is apparently rare.

Classification and distribution. The classification of the Syrphidae has recently undergone extensive rearrangement. We recognize three subfamilies. The generic classification of the Nearctic Microdontinae (couplets 51 and 52) is that of Thompson (1969). The arrangement of the Syrphinae (couplets 2–38) is based largely on the work of Vockeroth (1969); keys to most of the Nearctic species are in preparation by Vockeroth. The classification of the Eristalinae is based primarily on the work of Thompson (1972, 1975). As treated here, the Eristalinae includes Milesiinae plus Pipizini minus Microdontini of Wirth *et al.* (1965), and the Milesiinae of Thompson (1972). A revised catalog of the Nearctic Syrphidae is in preparation by Thompson. The only tribe whose subfamily placement is still uncertain is the Pipizini (couplets 54, 55). The larvae of the Pipizini are apparently all predacious, as are those of the Syrphinae, but the characters of the adults suggest that the group should be referred to the Eristalinae. A thorough study of the larval mouthparts might indicate whether they show synapomorphy with those of the Syrphinae or whether the predatory habit has developed independently in the Pipizini.

The family is nearly world wide in distribution. In the New World, species occur from the northern limits of land south to Tierra del Fuego and the Falkland Islands. In general, native species are absent only from Antarctica and remote oceanic islands, e.g. Hawaii and many subantarctic islands. However, many species have been transported by human agency so that Hawaii now has 16 resident species and Easter Island two.

Of the 14 tribes of Syrphinae and Eristalinae recognized by us, 13 are widespread, occurring in most major zoogeographical regions. However, the Toxomerini, with the single genus *Toxomerus,* is a New World group, with over 100 Neotropical species and with 17 species occurring north of Mexico.

The distribution of most genera, unlike that of most tribes, is markedly restricted. There are a few exceptions. *Microdon* Meigen, as currently recognized, is nearly world wide in distribution and very diverse in appearance; it may eventually be divided into several genera. All species of Cerioidini (couplets 42–44) mimic wasps; as a result, the genera recognized here, some of which are nearly world wide, may be artificial groups based on similarities resulting from mimetically induced convergence.

Most genera are markedly restricted to the Holarctic, the Neotropical, or the Palaeotropical region. Rarely is a genus well developed in two of these regions and even more rarely is a genus represented more than intrusively in all three regions.

About 180 genera of Syrphidae are recognized and about 6000 species have been described. Approximately 870 species in 88 genera are Nearctic (*Palumbia* Rondani is doubtfully Nearctic). Forty-nine of these genera are predominantly Holarctic in distribution. In a few cases these genera have a subgenus (as now defined) with its greatest development elsewhere. *Chalcosyrphus* (*Neplas* Porter) is almost entirely Neotropical and *Paragus* (*Pandasyopthalmus* Stuckenberg) is predominantly Palaeotropical. Few of these 49 Holarctic genera have very many species. *Cheilosia,* with 77 Nearctic species and even more Palaearctic species, is the largest. *Platycheirus* Lepeletier & Serville, as here delimited, is almost as large; it also has many Palaearctic species, as well as a number in the Andes and in New Zealand. Together, these 49 genera contain about 75% of the Nearctic species.

Only eight genera are restricted to the Nearctic region. *Hiatomyia* Shannon has 22 species (possibly some poorly known eastern Palaearctic species should be placed here). *Hadromyia* Williston has six species; the other six genera each have only one or two.

The most distinctive group of genera, in terms of probable place of origin (or perhaps of speciation after migration from their place of origin), are the 10 genera that are otherwise exclusively Neotropical. They have a total of 99 species north of Mexico but have together 1067 species south of the United States, with many more not yet described. Most of these 99 species do not occur north of the southern United States and only 11 are known from Canada. The largest of these genera, in the Nearctic, are *Copestylum, Toxomerus, Ocyptamus,* and *Palpada* Macquart.

Ten genera, apart from *Microdon* and the four genera of Cerioidini referred to above, have anomalous distributions, with usually only a few species in each of several zoogeographical regions. *Orthonevra* has 16 Nearctic species and probably as many Palaearctic species, but it has also seven or more Neotropical species and possibly several in the Afrotropical region. *Allograpta* Osten Sacken is primarily circumtropical (Vockeroth 1969); the five Nearctic species occur in the Neotropical region as well and are almost certainly Neotropical in origin. The other genera in this category, e.g. *Psilota* Meigen, *Rhingia,* and *Tropidia,* pose interesting geographical problems and are well worth further study.

Three genera, *Meliscaeva* Frey, *Milesia* Latreille, and *Melanostoma* Schiner, are predominantly Palaeotropical in distribution. The first two are almost entirely Oriental, and the third has many Oriental and Afrotropical species. The Nearctic species of *Milesia* are undoubtedly endemic. The single species of *Meliscaeva* and of *Melanostoma* are Holarctic but were probably not introduced by man.

The six Nearctic species of the genera *Eumerus* Meigen, *Merodon* Meigen, *Syritta,* and *Eristalinus* Rondani have undoubtedly been introduced by man from Europe.

The literature on taxonomy and biology of both the adult and larva is extensive. The adult description given here is based on the studies of the present authors. The information on the larvae is derived mainly from the work of Heiss (1938), Dixon (1960), Hartley (1961, 1963), Dušek and Láska (1967), and Roberts (1970). Wirth *et al.* (1965) give references to many of the important papers on the family. Other important references are Bhatia (1939, aphidophagous larvae), Hippa (1968, genera of Palaearctic Syrphini), Hippa (1978, genera of the *Xylota* Meigen group), Boyes *et al.* (1971, cytotaxonomy of the Syrphinae), Boyes *et al.* (1980, cytotaxonomy of the Eristalinae and Microdontinae), Goeldlin de Tiefenau (1974, taxonomy and biology of Syrphinae of Switzerland), Shatalkin (1975, suprageneric classification), and Maier and Waldbauer (1979, mate-seeking strategies).

Fossil Syrphidae, apparently referable to two tribes of Syrphinae and six of Eristalinae, are known from the Eocene, Oligocene, and Miocene. Hull gave an excellent review of the 72 named species in 1945, and later Hull (1949*a*) gave a tabular summary and named several new genera. Thirty-two species are known from Baltic amber (31 Eristalinae, one possible Syrphinae); the others are from sedimentary deposits from western North America and Europe. Forty-five species are assigned to recent genera; the others belong to extinct genera, which do not differ markedly from living Syrphidae. Because of many changes in classification and the use of many additional taxonomic characters since Hull's study, the available material should be critically reexamined.

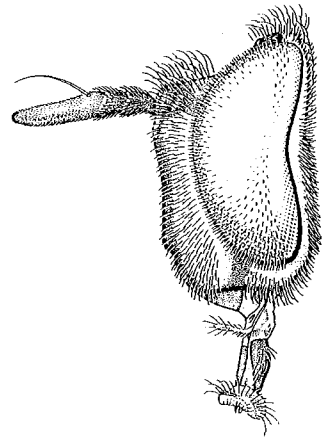
Key to genera

1. Postpronotum bare (Fig. 65). Head posteriorly strongly concave and closely appressed to thorax so that postpronota are partly or entirely hidden. Male abdomen with tergite 5 visible in dorsal view and varying in form from a subquadrate or subtriangular to a short transverse sclerite (Figs. 94–100) ..... SYRPHINAE....2

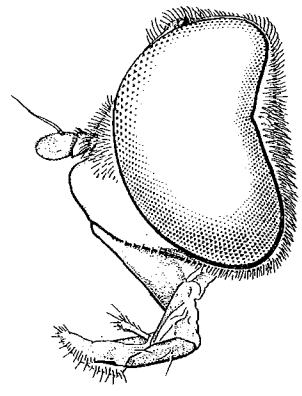
   Postpronotum with at least a few suberect or appressed hairs (Fig. 64). Head posteriorly less strongly concave so that postpronota are clearly exposed. Male abdomen with tergite 5 not visible in dorsal view (Fig. 101) ..... MICRODONTINAE, ERISTALINAE....39

2. Antenna elongate, sometimes longer than head; first flagellomere at least three times as long as wide; scape and pedicel often longer than wide (Fig. 4). Abdomen strongly convex dorsally, strongly marginated, usually with posterolateral angles of tergites projecting (Fig. 94) ..... ***Chrysotoxum*** Meigen

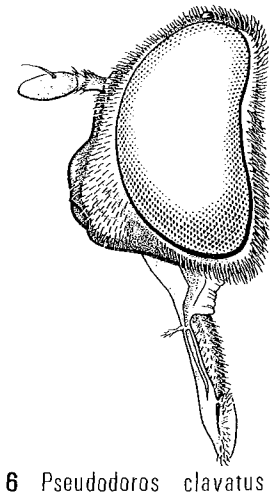
   about 7 spp.; widespread; Curran 1924, Shannon 1926*c*



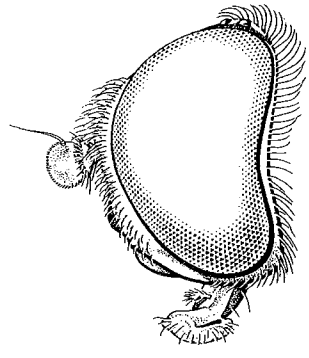
4 Chrysotoxum derivatum ♂



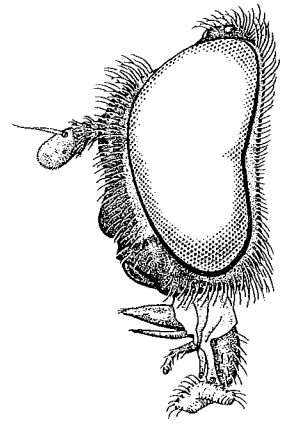
5 Toxomerus geminatus ♂



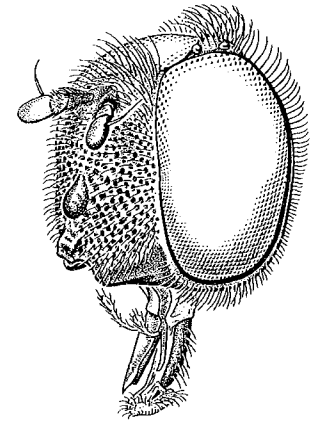
6 Pseudodoros clavatus ♀



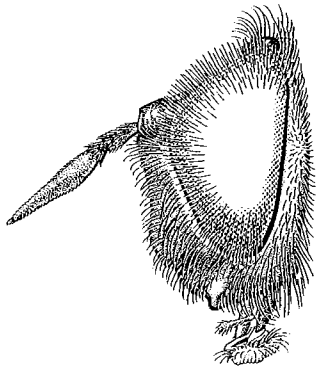
7 Baccha elongata ♂



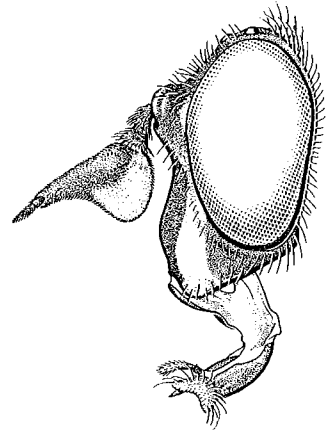
8 Melanostoma mellinum ♂



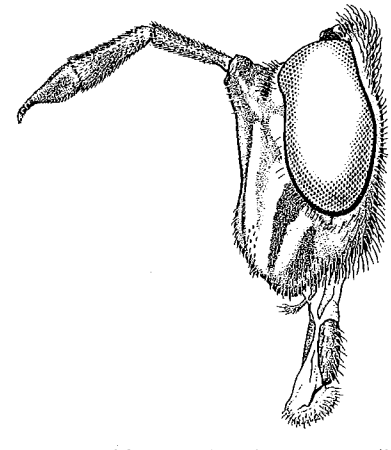
9 Platycheirus stegnus ♂



10 Callicera erratica ♂



11 Pelecocera pergandei ♀



12 Polybiomyia townsendi ♂

Figs. 52.4–12. Heads: (4) *Chrysotoxum derivatum* Walker; (5) *Toxomerus geminatus* (Say); (6) *Pseudodoros clavatus* (Fabricius); (7) *Baccha elongata* (Fabricius); (8) *Melanostoma mellinum* (Linnaeus); (9) *Platycheirus stegnus* (Say); (10) *Callicera erratica* (Walker); (11) *Pelecocera pergandei* (Williston); (12) *Polybiomyia townsendi* (Snow) (*continued*).

Antenna short, shorter than head; first flagellomere at most twice as long as wide; scape and pedicel not longer than wide (Figs. 5–9). Abdomen variable but without posterolateral angles of tergites projecting (Figs. 95–100) 3

3. Lower lobe of calypter with many long coarse yellow hairs above, especially on posteromedial portion (Fig. 62) ..... ***Syrphus*** Fabricius
11 species; widespread; Vockeroth 1983

Lower lobe of calypter with only microscopic pile above or, rarely, with a few very fine pale scattered erect hairs 4

4. Posterior margin of eye with distinct triangular emargination that is at or above level of insertion of antennae (Fig. 5). Facial tubercle well-developed, beginning immediately below insertion of antennae and sometimes laterally compressed. Metasternum bare. Abdomen at least weakly marginated. Male with sclerotized, haired, very short to long triangular process arising from sternite 10 and projecting posteriorly between bases of surstyli (Fig. 102) ..... ***Toxomerus*** Macquart
17 spp.; widespread; Hull 1943

Posterior margin of eye with emargination usually indistinct or shallow and rounded, but if distinct and subtriangular, situated below level of insertion of antennae (Figs. 6–8). Facial tubercle variable, sometimes indistinct or absent, not compressed. Metasternum bare or haired. Abdomen marginated or unmarginated. Male without sclerotized process projecting between bases of surstyli, with at most a weak bare semimembranous process in this position .. 5

5. Hind femur with distinct anteroventral and posteroventral spines on apical half. R_{4+5} slightly to strongly dipped into cell r_{4+5} (Fig. 45). Abdomen strongly petiolate (Fig. 95) ..... ***Salpingogaster*** Schiner 6

Hind femur without spines. R_{4+5} usually straight or nearly so (as in Fig. 41). If R_{4+5} distinctly dipped into cell r_{4+5} (Figs. 40, 42–44), then abdomen not petiolate 7

6. R_{4+5} deeply dipped (Fig. 45). Tergite 1 produced laterally into a strong spur (Fig. 95). Upper occipital setae reduced to a single row ..... ***Salpingogaster*** (***Salpingogaster*** Schiner)
2 spp.; Texas and Florida; Curran 1932, 1941

R_{4+5} shallowly dipped. Tergite 1 not produced into a spur. Upper occipital setae in three or four rows ..... ***Salpingogaster*** (***Eosalpingogaster*** Hull)
1 sp., *nepenthe* (Hull); Florida

7. Anterior anepisternum with short to moderately long erect hairs, at least posterodorsally (Fig. 65) 8

Anterior anepisternum without hairs, with only microscopic pubescence 10

8. Hind coxa with tuft of hairs at posteromedial apical angle (Fig. 77). Eye bare or haired. Abdomen oval ..... ***Parasyrphus*** Matsumura
10 spp.; widespread, including Arctic; Fluke 1935 (as part of *Epistrophe*)

Hind coxa without hairs at posteromedial apical angle. Eye bare. Abdomen oval, parallel-sided, or petiolate 9

9. Extreme posterior margin of wing with a series of minute closely spaced rounded black dots (Fig. 61). Metepisternum bare. Abdomen suboval to parallel-sided ..... ***Meliscaeva*** Frey
1 sp., *cinctella* (Zetterstedt); widespread

Extreme posterior margin of wing without these dots. Metepisternum often with several fine hairs. Abdomen very variable, oval to strongly petiolate (as in Fig. 2) ..... ***Ocyptamus*** Macquart
13 spp.; widespread; Hull 1949*b* (as part of *Baccha*)

10. Abdomen strongly petiolate (Fig. 2) 11

Abdomen parallel-sided to oval, never distinctly petiolate (Figs. 96–100) 14

11. Face produced rather strongly forward on lower half (Fig. 6) 12

Face not at all produced forward, either straight or with a very weak tubercle (Fig. 7) .. 13

12. Antennal sockets separated by about twice length of scape. Pleura mostly yellow; scutellum yellow ..... ***Allograpta*** Osten Sacken, in part
5 spp.; widespread; Curran 1932, Fluke 1942

Antennal sockets separated by less than length of scape. Pleura black; scutellum yellow, with broad transverse black band ..... ***Pseudodoros*** Becker
1 sp., *clavatus* (Fabricius); central U.S.A. southward

13. Face straight, without tubercle. Metepisternum with a row of fine subappressed hairs ..... ***Leucopodella*** Hull
1 sp., *marmorata* (Bigot); southern Arizona

Face with low but distinct tubercle just above lower margin (Fig. 7). Metepisternum bare ..... ***Baccha*** Fabricius
1 sp., *elongata* (Fabricius); widespread

14. Face and scutellum entirely black in background color. Abdomen unmarginated (as in Fig. 96). Metasternum bare. Eye bare 15

Face or scutellum or both at least partly yellow or yellow brown in background color, both never entirely black. Abdomen, metasternum, and eye variable 17

15. Metepisternum with several fine subappressed hairs; upper and lower katepisternal hair patches broadly separated posteriorly, joined anteriorly (Fig. 66). Hind coxa with tuft of hairs at posteromedial apical angle (as in Fig. 77) ..... ***Xanthandrus*** Verrall
1 sp., *mexicanus* Curran; southern Texas

Metepisternum bare; katepisternal hair patches broadly separated throughout (as in Fig. 68). Hind coxa without hairs at posteromedial apical angle 16

16. Metasternum normal, with median portion broadly joined to lateral arms (Fig. 71). Face variable, almost straight with weak tubercle or moderately or strongly produced forward below, sometimes with pruinescence forming a punctate or rippled pattern (Fig. 9). Legs of male sometimes slender and unornamented, sometimes with fore tibia and tarsus broadened, or sometimes with femora or tibiae with bristles, hair tufts, or modified hairs ..... ***Platycheirus*** Lepeletier & Serville
64 spp.; widespread, including Arctic; Curran 1927, 1930*b* (as *Platycheirus*, as part of *Melanostoma* and as *Pyrophaena* Schiner)

Metasternum greatly reduced, with deep posterior incision on each side so that median portion is narrowly joined to lateral arms (Fig. 70). Face not produced below, with small tubercle; facial pruinescence never punctate nor rippled (Fig. 8). Legs of male slender, without bristles, hair tufts, or modified hairs ..... ***Melanostoma*** Shiner
1 sp., *mellinum* (Linnaeus)

17. Metapleuron with a tuft of fine hairs below spiracle; metasternum haired. R_{4+5} distinctly dipped into cell r_{4+5} (Fig. 40). Large species, with broad strongly marginated abdomen ..... ***Didea*** Macquart
2 spp.; widespread; Vockeroth 1983

Metapleuron bare below spiracle; metasternum haired or bare. R_{4+5} straight or dipped. Size and shape variable 18

18. Scutum with a sharply defined clear yellow or whitish yellow lateral or sublateral stripe extending at least from postpronotum to transverse suture 19

Scutum with at most a poorly defined dull yellow pruinose lateral stripe 24

19. Abdomen with at least a weak margin on tergites 4 and 5, often with a strong margin on tergites 3–5 (Fig. 98) 20

Abdomen unmarginated (as in Fig. 96) 22

20. Upper part of katepisternum with sharply defined bright yellow spot 21

Katepisternum entirely dark or with at most a diffuse pruinose yellow area above ..... ***Epistrophe*** (***Epistrophella*** Dušek & Láska), in part
1 sp., *emarginata* (Say); widespread

21. Abdomen strongly convex in cross section. Anepisternum black; scutellum unicolorous brown ..... ***Doros*** Meigen
1 sp., *aequalis* Loew; widespread

Abdomen nearly flat. Anepisternum yellow posteriorly; scutellum bright yellow posteriorly ..... ***Xanthogramma*** Schiner
1 sp., *flavipes* (Loew); eastern

22. Ventral scutellar fringe complete, well-developed, moderately dense (Fig. 63). Male terminalia small, inconspicuous; tergite 9 at most one-third as wide as abdomen 23

Ventral scutellar fringe absent or nearly so on at least median third, present but sparse laterally. Male terminalia extremely large, globose; tergite 9 as wide as abdomen ..... ***Sphaerophoria*** Lepeletier & Serville
13 spp.; widespread; Knutson 1973

23. Metasternum bare ..... ***Melangyna*** (***Meligramma*** Frey), in part
3 spp.; widespread; Vockeroth 1980

Metasternum haired (as in Fig. 76) ..... ***Allograpta*** Osten Sacken, in part
see couplet 12

24. Wing with narrow but distinct brown band extending from anterior margin across crossvein r-m. Tergite 2 and base of tergite 3 yellow or gray; tergites otherwise black ..... ***Leucozona*** (***Leucozona*** Schiner)
1 sp., *lucorum* (Linnaeus); widespread

Wing unmarked except for stigmal darkening. Tergites not colored as above 25

25. Metasternum bare 26

Metasternum with at least a few hairs (as in Fig. 76) 37

26. Eye distinctly haired 27

Eye bare or very nearly so (a few species of *Melangyna sens. str.* having very short and sparse eye hairs keying out in either alternative) 32

27. Tergite 1 well-developed, especially on disc where it is frequently half as long as tergite 2, and always extending well beyond scutellum, sublaterally about three-quarters as long as tergite 2 (Fig. 97); tergites minutely punctate. Length 7.5 mm or less ..... ***Paragus*** Latreille 28

Tergite 1 greatly reduced, frequently almost linear on disc and practically covered by scutellum, sublaterally at most half as long as tergite 2 (Figs. 96, 98–100); tergites not punctate. Length 6.7 mm or more 29

28. Eye with hairs arranged in three more or less vertical bands of contrasting color. Scutellum black, with apex narrowly yellow or reddish ..... ***Paragus*** (***Paragus*** Latreille)
several species, almost all undescribed; widespread

Eye with hairs of nearly uniform color, not forming bands of contrasting color. Scutellum entirely black ..... ***Paragus*** (***Pandasyopthalmus*** Stuckenberg)
1 sp., *haemorrhous* Meigen; widespread

29. Wing membrane with at least apical third densely and uniformly trichose, without bare areas along veins. Male eye without well-defined area of enlarged facets above 30

Wing membrane with very sparse and scattered microtrichia and with extensive bare areas on apical third (Fig. 41). Male eye with well-defined area of enlarged facets above ..... ***Scaeva*** Fabricius
1 sp., *pyrastri* (Linnaeus); western

30. Tergite 2 with large subquadrate gray or yellow spots that are much larger than pale markings on tergites 3 and 4 ..... ***Leucozona*** (***Ischyrosyrphus*** Bigot)
2 spp.; widespread; Fluke 1935

Tergite 2 with oval or transverse yellow spots that are smaller than pale markings on tergites 3 and 4 (Figs. 96, 98–100) or tergite 2 entirely black .....

31. Abdomen unmarginated, slender and parallel-sided or narrowly oval (Fig. 96) ..... ***Melangyna*** (***Melangyna*** Verrall), in part
7 spp.; widespread; Fluke 1935 (as part of *Epistrophe*)

Abdomen weakly but distinctly marginated (as in Fig. 98), oval .... ***Dasysyrphus*** Enderlein
7 spp.; widespread; Fluke 1933 (as *amalopis* group of *Metasyrphus*)

32. R_{4+5} at least moderately dipped into cell r_{4+5} (Figs. 42, 43) 33

R_{4+5} straight or nearly so (as in Fig. 41) 34

33. R_{4+5} moderately dipped (Fig. 42). Face with black median stripe ..... ***Eupeodes*** (***Lapposyrphus*** Dušek & Láska)
2 spp.; widespread; Fluke 1952

R_{4+5} very strongly dipped (Fig. 43). Face entirely yellow ..... ***Dideomima*** Vockeroth
1 sp., *coquilletti* (Williston); southern Arizona

34. Abdomen with at least a faint trace of margin on tergite 3, 4, or 5 (Fig. 99). Face with at most an obscure dark stripe medially. Broader species, with oval or suboval abdomen 35

Abdomen entirely unmarginated (Fig. 96). Face often with clearly defined dark median stripe. More slender species, with nearly parallel-sided abdomen 36

35. Upper and lower katepisternal hair patches narrowly joined posteriorly (Fig. 67). Tergite 4 with entire yellow band (Fig. 99) ..... ***Epistrophe*** (***Epistrophe*** Walker), in part
5 spp.; widespread; Vockeroth 1983

Upper and lower katepisternal hair patches broadly separated (Fig. 68). Tergite 4 with yellow band divided medially (Fig. 98) ..... ***Epistrophe*** (***Epistrophella*** Dušek & Láska), in part
see couplet 20

36. Hind coxa with tuft of hairs at posteromedial apical angle (as in Fig. 77). Pale abdominal markings transverse; spots of tergites 2–4 always separated (Fig. 96). Face usually with black median stripe, rarely entirely yellow ..... ***Melangyna*** (***Melangyna*** Verrall), in part
see couplet 31

Hind coxa without tuft of hairs at posteromedial apieal angle. Pale abdominal markings oblique; spots sometimes confluent. Face entirely yellow ..... ***Melangyna*** (***Meligramma*** Frey), in part
see couplet 23

37. R_{4+5} straight or nearly so (as in Fig. 41). Eye usually bare, rarely with distinct but very sparse hairs 38

R_{4+5} slightly but distinctly dipped into cell r_{4+5} (Fig. 44). Eye densely haired ..... ***Eriozona*** (***Megasyrphus*** Dušek & Láska)
1 sp., *erraticus* (Linnaeus); widespread

38. Abdomen with strong distinct margin extending clearly from middle of tergite 2 to end of tergite 5 (Fig. 100). Upper and lower katepisternal hair patches very nearly confluent anteriorly, distinctly separated posteriorly (Fig. 69) ..... ***Eupeodes*** (***Eupeodes*** Osten Sacken)
15 spp.; widespread, including Arctic; Fluke 1952 (as *Metasyrphus*)

Abdomen with very weak indistinct margin that begins on tergite 3 or 4 (Fig. 99). Upper and lower katepisternal hair patches broadly separated anteriorly, narrowly joined posteriorly (Fig. 67) ..... ***Epistrophe*** (***Epistrophe*** Walker), in part
see couplet 35

39. Antenna with terminal stylus (Figs. 10–13) 40

Antenna with dorsal arista (Figs. 14–39) 45

40. Eye and face haired (Fig. 10). Crossvein r-m before middle of cell dm (as in Fig. 52). Ventral scutellar fringe present (as in Fig. 63) ..... ***Callicera*** Panzer
4 spp.; eastern and southwestern; Curran 1935

Eye bare and face usually bare. If face haired, then crossvein r-m beyond middle of cell dm (as in Fig. 46). Ventral scutellar fringe absent 41

41. Crossvein r-m before middle of cell dm (as in Fig. 52). Antenna short; scape about as long as wide; first flagellomere large and longer than scape and pedicel combined (Fig. 11). Length 7 mm or less ..... ***Pelecocera*** Meigen
1 sp., *pergandei* (Williston); eastern

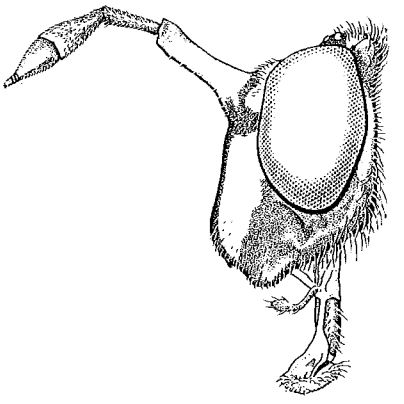
Crossvein r-m beyond middle of cell dm (Fig. 46). Antenna long; scape three to four times as long as wide; first flagellomere shorter than scape and pedicel combined (Figs. 12, 13). Length 8 mm or more 42

42. Frontal prominence absent or much shorter than scape (Fig. 12).....43

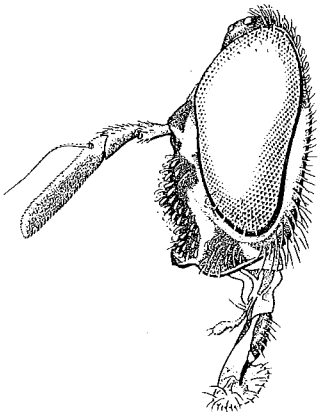
Frontal prominence at least as long as scape (Fig. 13) 44

43. Postcoxal bridge complete (Fig. 81) ..... ***Polybiomyia*** Shannon
9 spp.; southwestern; Shannon 1925

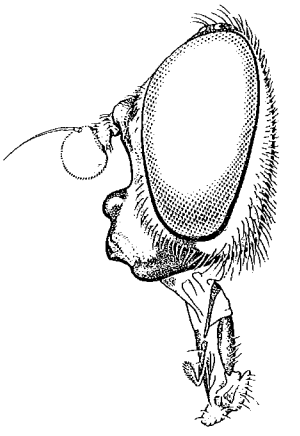
Postcoxal bridge incomplete, with a membranous area present above bases of hind coxae .. ***Sphiximorpha*** Rondani
8 spp.; widespread; Curran 1941 (as part of *Cerioides* Rondani)



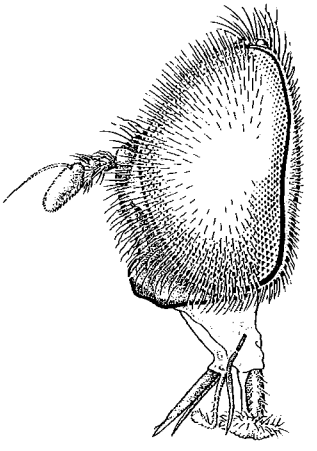
13 Ceriana abbreviata ♂



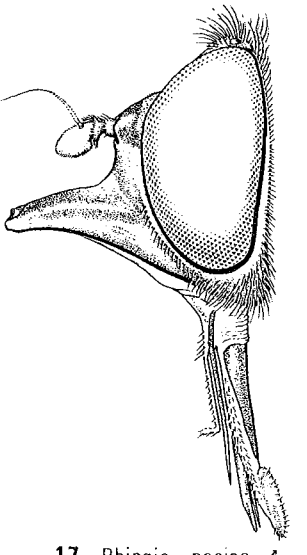
14 Lepidomyia micheneri ♂



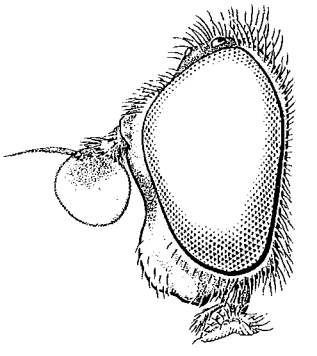
15 Myolepta varipes ♂



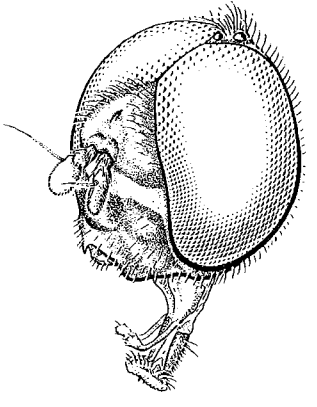
16 Psilota thatuna ♂



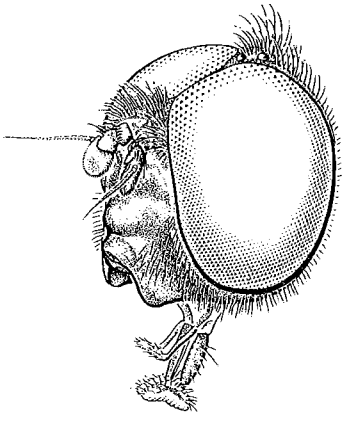
17 Rhingia nasica ♂



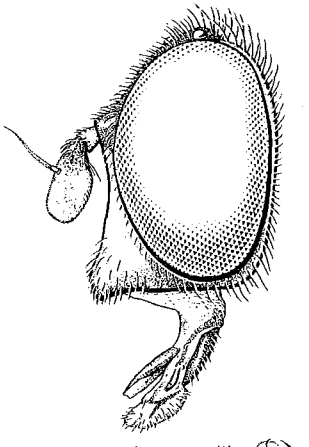
18 Chamaesyrphus willistonii ♂



19 Chrysogaster antitheus ♂

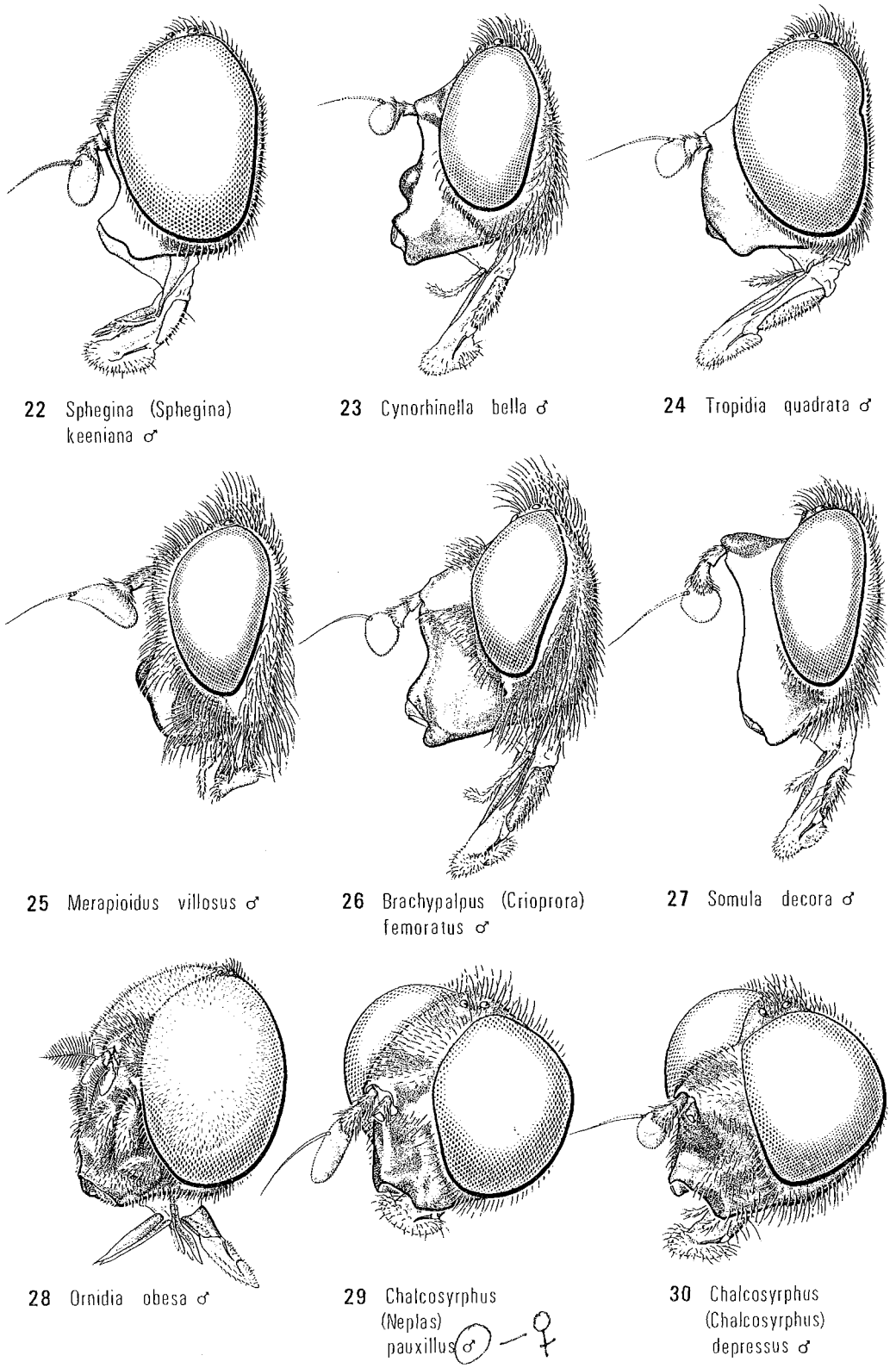


20 Cheilosia sialia ♂

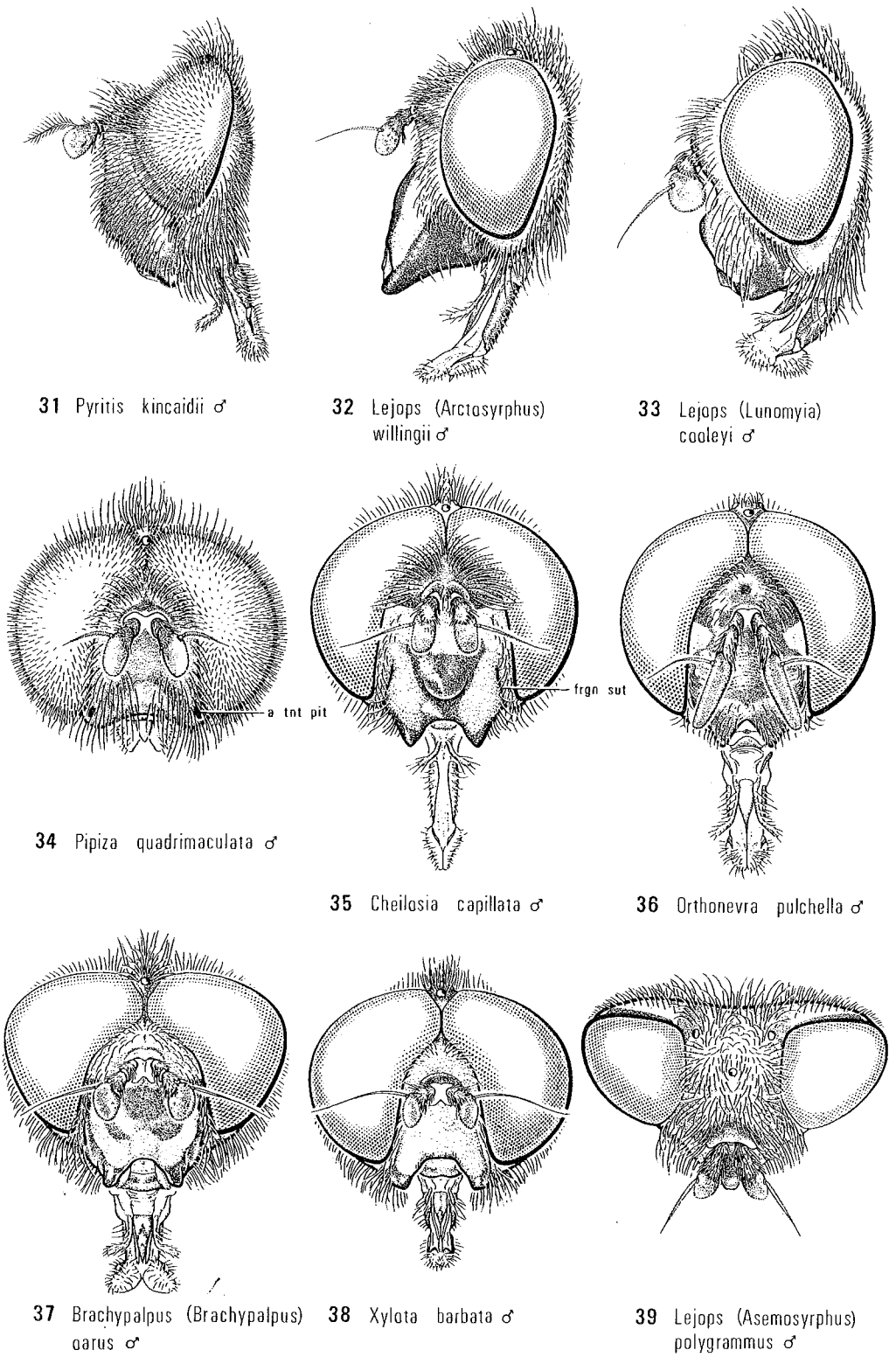


21 Neoascia metallica ♂ ♀

Figs. 52.13–21. Heads (*continued*): (13) *Ceriana abbreviata* (Loew); (14) *Lepidomyia micheneri* (Fluke); (15) *Myolepta varipes* Loew; (16) *Psilota thatuna* Shannon; (17) *Rhingia nasica* Say; (18) *Chamaesyrphus willistonii* (Snow); (19) *Chrysogaster antitheus* Walker; (20) *Cheilosia sialia* Shannon; (21) *Neoascia metallica* (Williston) (*continued*).



Figs. 52.22–30. Heads (*continued*): lateral views of (22) *Sphegina* (*Sphegina*) *keeniana* Williston, (23) *Cynorhinella bella* (Williston), (24) *Tropidia quadrata* (Say), (25) *Merapioidus villosus* Bigot, (26) *Brachypalpus* (*Crioprora*) *femoratus* (Williston), and (27) *Somula decora* Macquart; anterolateral views of (28) *Ornidia obesa* (Fabricius), (29) *Chalcosyrphus* (*Neplas*) *pauxillus* (Williston), and (30) *Chalcosyrphus* (*Chalcosyrphus*) *depressus* (Shannon) (*continued*).



31 Pyritis kincaidii ♂

32 Lejops (Arctosyrphus) willingii ♂

33 Lejops (Lunomyia) cooleyi ♂

34 Pipiza quadrimaculata ♂

35 Cheilosia capillata ♂

36 Orthonevra pulchella ♂

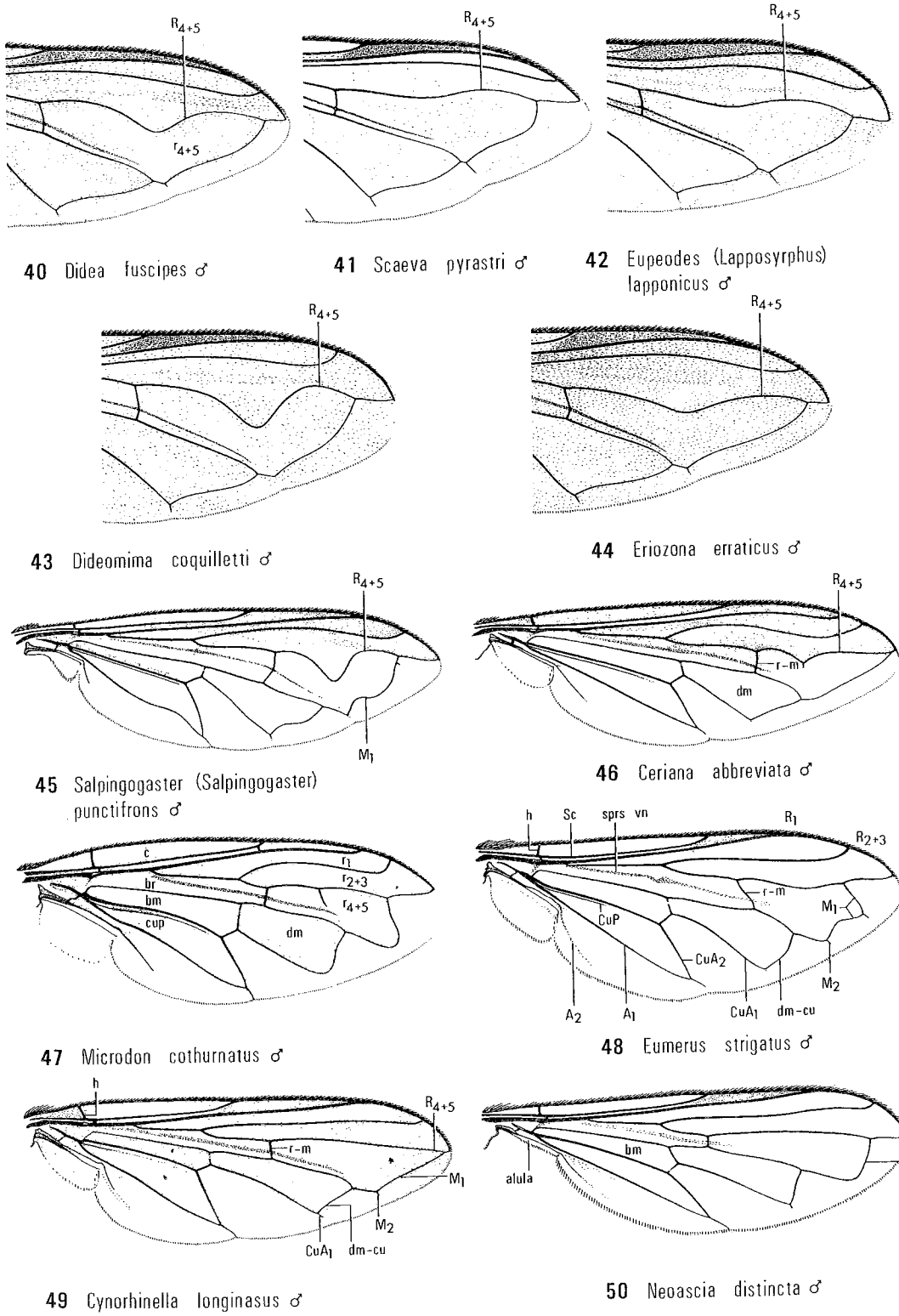
37 Brachypalpus (Brachypalpus) oarus ♂

38 Xylota barbata ♂

39 Lejops (Asemosyrphus) polygrammus ♂

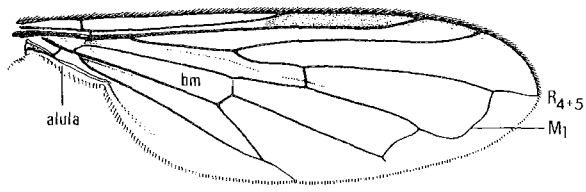
Figs. 52.31–39. Heads (*concluded*): lateral views of (31) *Pyritis kincaidii* (Coquillett), (32) *Lejops* (*Arctosyrphus*) *willingii* (Smith), and (33) *Lejops* (*Lunomyia*) *cooleyi* (Seamans); anterior views of (34) *Pipiza quadrimaculata* (Panzer), (35) *Cheilosia capillata* Loew, (36) *Orthonevra pulchella* (Williston), (37) *Brachypalpus* (*Brachypalpus*) *oarus* (Walker), and (38) *Xylota barbata* Loew; (39) dorsal view of *Lejops* (*Asemosyrphus*) *polygrammus* (Loew).

Abbreviations: a tnt pit, anterior tentorial pit; frgn sut, frontogenal suture.

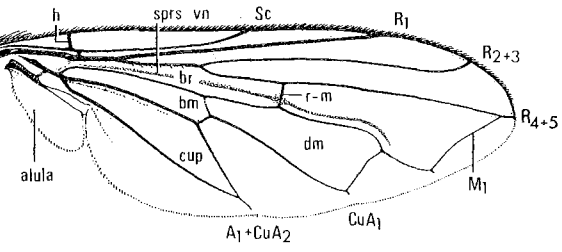


Figs. 52.40–50. Wings: outer half of wing, showing microtrichia, of (40) *Didea fuscipes* Loew, (41) *Scaeva pyrastri* (Linnaeus), (42) *Eupeodes* (*Lapposyrphus*) *lapponicus* (Zetterstedt), (43) *Dideomima coquilletti* (Williston), and (44) *Eriozona erraticus* (Linnaeus); complete wing of (45) *Salpingogaster* (*Salpingogaster*) *punctifrons* Curran, (46) *Ceriana abbreviata* (Loew), (47) *Microdon cothurnatus* Bigot, (48) *Eumerus strigatus* (Fallén), (49) *Cynorhinella longinasus* Shannon, and (50) *Neoascia distincta* Williston (*continued*).

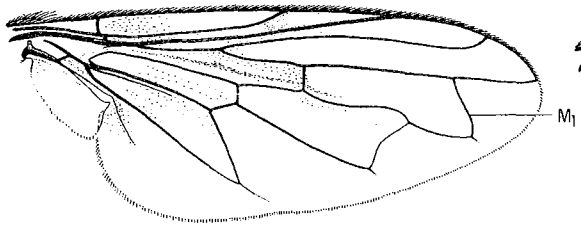
Abbreviations: sprs vn, spurious vein.



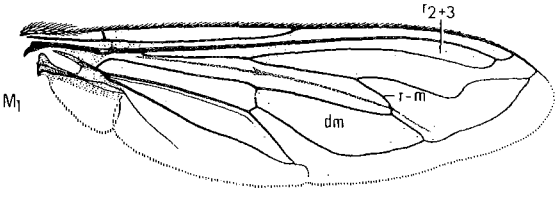
51 Sphegina (Sphegina) keeniana ♂



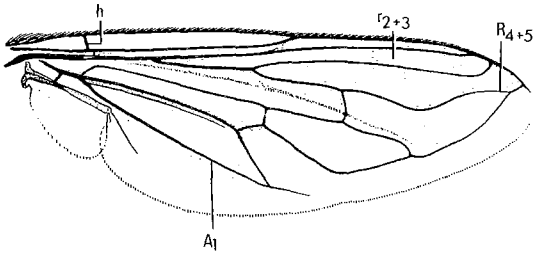
52 Brachyopa (Brachyopa) notata ♂



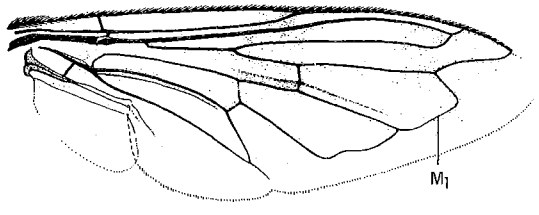
53 Orthonevra pulchella ♂



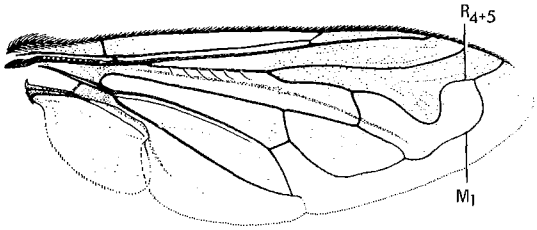
54 Milesia virginiensis ♂



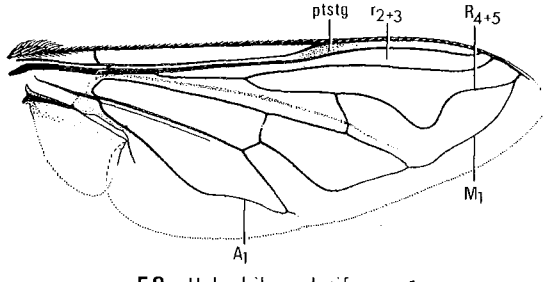
55 Teuchocnemis lituratus ♂



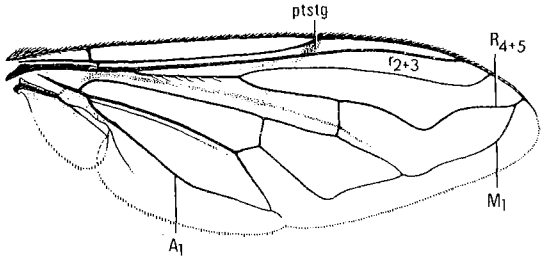
56 Volucella bombylans ♂



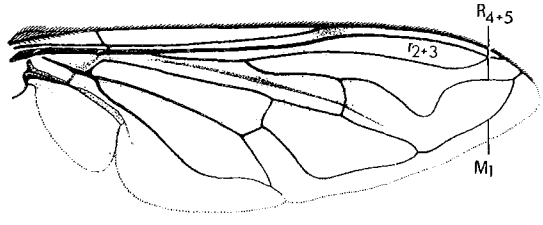
57 Merodon equestris ♂



58 Helophilus latifrons ♂



59 Parhelophilus laetus ♂



60 Eristalis (Eristalis) tenax ♂

Figs. 52.51–60. Wings (*concluded*): (51) *Sphegina* (*Sphegina*) *keeniana* Williston; (52) *Brachyopa* (*Brachyopa*) *notata* Osten Sacken; (53) *Orthonevra pulchella* (Williston); (54) *Milesia virginiensis* (Drury); (55) *Teuchocnemis lituratus* (Loew); (56) *Volucella bombylans* (Linnaeus); (57) *Merodon equestris* (Fabricius); (58) *Helophilus latifrons* Loew; (59) *Parhelophilus laetus* (Loew); (60) *Eristalis* (*Eristalis*) *tenax* (Linnaeus).

Abbreviations: ptstg, pterostigma; sprs vn, spurious vein.

44. R_{4+5} with a spur into cell r_{4+5} (Fig. 46). Abdomen not petiolate ..... ***Ceriana*** Rafinesque
5 spp.; widespread; Shannon 1925 (as *Tenthredomyia* Shannon)

R_{4+5} without spur. Abdomen petiolate ..... ***Monoceromyia*** Shannon
1 sp., *floridensis* (Shannon); Florida

45. R_{4+5} straight or nearly so, not strongly dipped into cell r_{4+5} (Figs. 47–56) 46
R_{4+5} moderately to strongly dipped into cell r_{4+5} (Figs. 57–60)[1] 103

46. Arista bare or pubescent; if arista pubescent, then hairs never more than twice as long as basal diameter of arista (Figs. 14–27, 29–30, 34–38) 47

Arista plumose, with hairs at least three times as long as basal diameter of arista (Figs. 28, 31) 96

47. Fore and mid femora with short strong anteroventral and posteroventral spines near apex (Fig. 82) 48

Fore and mid femora without distinct spines 49

48. Antenna long; first flagellomere more than twice as long as wide; scape and pedicel elongate. Face tuberculate in both sexes (Fig. 14) ..... ***Lepidomyia*** Loew
1 sp., *micheneri* (Fluke); southern Texas

Antenna short; first flagellomere less than twice as long as wide; scape and pedicel short. Face tuberculate in male (Fig. 15), concave in female ..... ***Myolepta*** Newman
7 spp.; widespread; Fluke and Weems 1956

49. Eye haired or bare. If eye bare, crossvein r-m usually perpendicular, usually before middle of cell dm, never strongly oblique nor extending to outer third or more of cell dm (Figs. 49–53); if crossvein located above middle fifth of cell dm, then thorax with distinct bristles. Metasternum never strongly developed (Fig. 75) 50

Eye bare. Crossvein r-m always oblique, usually beyond middle of cell dm, frequently strongly oblique and extending to outer third of cell dm (Fig. 54); if crossvein located above middle fifth of cell dm (Fig. 55), then thorax without bristles. Metasternum often strongly developed (Fig. 76) 73

50. Antenna elongate, with scape and usually also first flagellomere more than 2.5 times as long as wide. Anterior anepisternum haired; postcoxal bridge narrow but complete (Fig. 79). R_{4+5} often with a spur into cell r_{4+5} (Fig. 47) 51

Antenna usually short; scape usually at most twice as long as wide; first flagellomere usually rounded or oval. If scape more than twice as long as wide, postmetacoxal bridge absent. Anterior anepisternum haired or bare; postcoxal bridge usually absent or incomplete, but if present broad (Fig. 80). R_{4+5} never with a spur into cell r_{4+5} 53

51. Katepisternum and posterior anepisternum bare; metasternum bare, reduced to a short transverse anterior sclerite with a narrow median posterior extension (Fig. 72). R_{4+5} without a spur. Abdomen petiolate ..... ***Mixogaster*** Macquart
3 spp.; southern; Hull 1954

Katepisternum and posterior anepisternum with many hairs; metasternum haired, usually well-developed (Fig. 73). R_{4+5} with a spur into cell r_{4+5} (Fig. 47). Abdomen variable in shape 52

52. Katepimeron haired. Abdomen petiolate ..... ***Rhopalosyrphus*** Giglio-Tos
1 sp., *carolae* Capelle; southwestern

Katepimeron bare. Abdomen parallel-sided or oval but not petiolate ..... ***Microdon*** Meigen
29 spp.; widespread; Thompson 1981

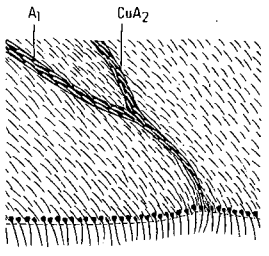
53. Facial margin evenly rounded, not notched anteromedially (Fig. 34); frontogenal suture reduced to a pit; eye and face densely haired. Ventral scutellar fringe present (as in Fig. 63) 54

Facial margin notched anteromedially (Fig. 35); frontogenal suture elongate, not forming a small round pit; eye and face haired or bare. Ventral scutellar fringe present or absent 56

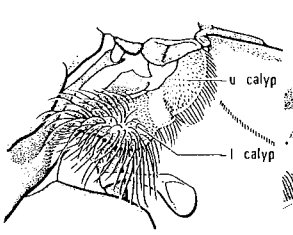
54. Anterior anepisternum with long erect hairs (as in Fig. 65) ..... ***Trichopsomyia*** Williston
8 spp.; widespread; Curran 1921 (as *Pipizella* Rondani)

Anterior anepisternum bare 55

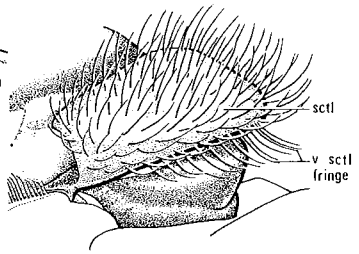
[1] The genera *Sericomyia* and *Arctophila* show considerable variation in the course of R_{4+5}; specimens key either way but eventually run to couplet 106, where the two genera are distinguished.



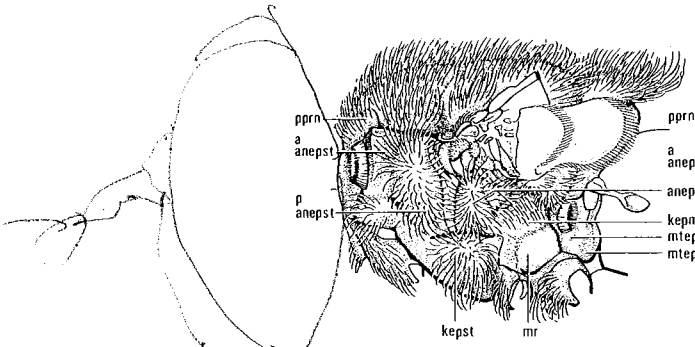
61 Meliscaeva cinctella ♂



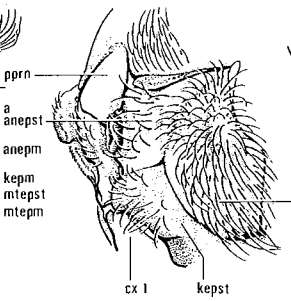
62 Syrphus ribesii ♂



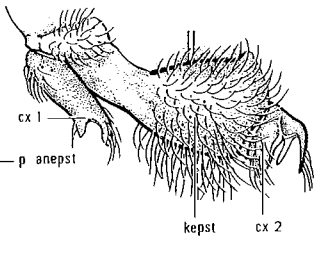
63 Allograpta obliqua ♂



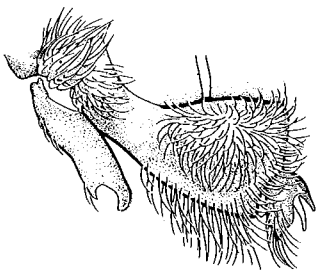
64 Eristalinus aeneus ♂



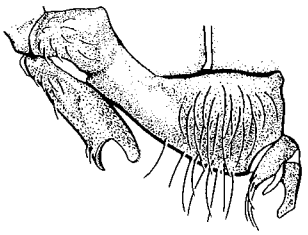
65 Meliscaeva cinctella ♂



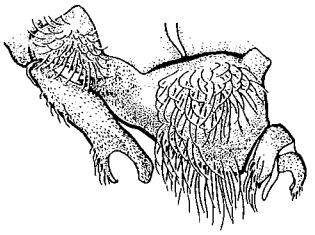
66 Xanthandrus mexicanus ♂



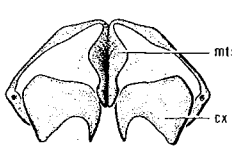
67 Epistrophe (Epistrophe) grossulariae ♂



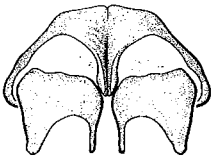
68 Epistrophe (Epistrophella) emarginata ♂



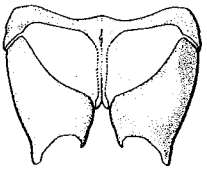
69 Eupeodes (Eupeodes) americanus ♂



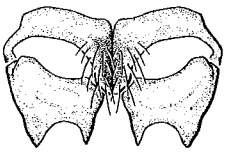
70 Melanostoma mellinum ♂



71 Platycheirus quadratus ♂



72 Mixogaster delongi ♂



73 Microdon piperi ♂

Figs. 52.61–73. Details of wing and thorax: (61) *Meliscaeva cinctella* (Zetterstedt), posterior margin of wing; (62) *Syrphus ribesii* (Linnaeus), upper surface of lower calypter; (63) *Allograpta obliqua* (Say), posterolateral view of scutellum; (64) *Eristalinus aeneus* (Scopoli), lateral view of thorax; (65) *Meliscaeva cinctella*, lateral view of anterior part of thorax; katepisternum of (66) *Xanthandrus mexicanus* Curran, (67) *Epistrophe* (*Epistrophe*) *grossulariae* (Meigen), (68) *Epistrophe* (*Epistrophella*) *emarginata* (Say), and (69) *Eupeodes* (*Eupeodes*) *americanus* (Wiedemann); ventral views of metasternum of (70) *Melanostoma mellinum* (Linnaeus), (71) *Platycheirus quadratus* (Say), (72) *Mixogaster delongi* Johnson, and (73) *Microdon piperi* Knab.

Abbreviations: a anepst, anterior anepisternum; anepm, anepimeron; cx, coxa; kepm, katepimeron; kepst, katepisternum; l calyp, lower calypter; mr, meron; mtepm, metepimeron; mtepst, metepisternum; mtst, metasternum; p anepst, posterior anepisternum; pprn, postpronotum; sctl, scutellum; u calyp, upper calypter; v sctl fringe, ventral scutellar fringe.

55. Katepimeron bare. Male with distinct conically produced frontal prominence. Hind trochanter of male simple ..... ***Pipiza*** Fallén
16 spp.; widespread; Curran 1921

Katepimeron haired at least anteriorly. Male with frontal prominence very short. Hind trochanter of male often with ventral spur ..... ***Heringia*** Rondani
30 spp.; widespread; Curran 1921 (including *Chemodon* Egger)

56. M_1 strongly biangulate, with an external spur; apical portion of M_1 forming on its outer side an acute angle with R_{4+5} (Fig. 48). Hind femur greatly enlarged, with anteroventral and posteroventral row of spines near apex. Eye haired ..... ***Eumerus*** Meigen
3 spp.; widespread; Latta and Cole 1933

M_1 not strongly biangulate; apical portion usually forming a right or obtuse angle with R_{4+5} (Figs. 49–52); if apical portion of M_1 curved toward wing base (Fig. 53), then eye bare. Hind femur at most slightly enlarged 57

57. Anepisternum uniformly raised, not differentiated into a flattened anterior and a convex posterior portion; scutum with a lateral triangular extension above wing base (called the notopleural wing shield) (Fig. 74). Body densely punctate ..... ***Nausigaster*** Williston
8 spp.; southwestern; Curran 1941

Anepisternum clearly differentiated into a flat anterior portion and a convex posterior portion (as in Fig. 65); notopleural wing shield absent. Body not punctate 58

58. Eye haired 59

Eye bare 61

59. Face without a tubercle but with lower margin projecting (Fig. 16). Anterior anepisternum haired (as in Fig. 65); scutellum with distinct marginal rim ..... ***Psilota*** Meigen
3 spp.; western and southern U.S.A.

Face tuberculate, without projecting lower margin (Figs. 20, 35). Anterior anepisternum bare; scutellum without marginal rim, evenly convex apically 60

60. Crossvein r-m at or beyond middle of cell dm (as in Fig. 55). Antennal sockets confluent; face yellow with black median stripe. Legs yellow ..... ***Ferdinandea*** Rondani
5 spp.; widespread; Hull 1942*a*

Crossvein r-m before middle of cell dm (as in Fig. 52). Antennal sockets separated; face black. Legs usually mostly black ..... ***Cheilosia*** Meigen, in part
77 spp.; widespread; Hull and Fluke 1950 (in part, as *Cheilosia* and *Chilomyia* Shannon), Fluke and Hull 1946 (in part, as *Cartosyrphus* Bigot)

61. Ventral scutellar fringe present (as in Fig. 63) 62

Ventral scutellar fringe absent or nearly so 67

62. Face produced into a long porrect snout without tubercle (Fig. 17). C and R_{4+5} ending well beyond apex of wing ..... ***Rhingia*** Scopoli
1 sp., *nasica* Say; widespread

Face usually not at all produced, but if moderately produced, directed downward as well as forward and bearing a tubercle (Fig. 23). C and R_{4+5} ending at or before apex of wing (Fig. 49) 63

63. Last section of R_{4+5} longer than crossvein h and usually longer than crossvein r-m 64

Last section of R_{4+5} shorter than crossvein h and at most half as long as crossvein r-m (Fig. 49) 66

64. Face yellow laterally, slightly concave above and convex below, usually haired ventromedially (Fig. 18). Arista bare or very nearly so; hairs shorter than basal diameter of arista. Male broadly dichoptic ..... ***Chamaesyrphus*** Mik
3 spp.; southwestern; Curran 1923

Face entirely black or partly yellow, bare medially, either with a distinct tubercle clearly separated from oral margin (Figs. 19–20) or straight with lower margin projecting. If face partly yellow, aristal hairs distinctly longer than basal diameter of arista. Male holoptic 65

65. Face haired, with only a median stripe bare; hairs extending from just below level of antenna to subcranial margin; face of male tuberculate, sometimes weakly rugose laterally (Fig. 19); face of female straight with lower margin projecting; face and frons of female sometimes rugose. Scutellum without bristles ..... ***Chrysogaster*** Meigen, in part
10 spp.; widespread; Fluke 1949

Face usually haired only between frontogenal suture and eye (Fig. 35); if hairs are present medial to frontogenal suture, they begin well below level of antenna and end well above subcranial margin (Fig. 20); face of both sexes with strong tubercle, smooth; frons smooth. Margin of scutellum sometimes with strong bristles ..... ***Cheilosia*** Meigen, in part
see couplet 60

66. Last section of R_{4+5} less than half as long as crossvein h (Fig. 49). Hind femur with at least a weak spinose anteroventral preapical ridge (Fig. 87). Metasternum haired or bare. Eyes of male separated by, at most, width of anterior ocellus .. ***Cynorhinella*** Curran, in part
2 spp.; widespread; Shannon 1924

Last section of R_{4+5} subequal to crossvein h. Hind femur without an anteroventral preapical ridge. Metasternum bare. Eyes of male separated by about width of ocellar triangle ... . ***Lejota*** Rondani, in part
2 spp.; widespread; Fluke and Weems 1956

67. Abdomen petiolate. Alula narrower than width of cell bm (Figs. 50, 51). Postcoxal bridge entire (Fig. 80) or nearly so. Face concave or nearly straight, never tuberculate (Figs. 21, 22). Male broadly dichoptic 68

Abdomen parallel-sided or oval. Alula at least as wide as cell bm (Figs. 52, 53). Postcoxal bridge absent. Face variable, often tuberculate. Male holoptic or dichoptic 70

68. M_1 either perpendicular and forming a right angle with R_{4+5} or with its apical portion curved slightly toward wing base (Fig. 50). Face oblique, nearly straight (Fig. 21). Katepisternum usually haired ..... ***Neoascia*** Williston
10 spp.; widespread; Curran 1925*a*

M_1 oblique, forming an acute angle with R_{4+5} (Fig. 51). Face convex (Fig. 22). Katepisternum bare ..... ***Sphegina*** Meigen.... 69
25 spp.; widespread; Malloch 1922, Hull 1935, Coovert and Thompson 1977

69. Sternite 1 distinct, strongly sclerotized, subquadrate, haired .... ***Sphegina*** (***Sphegina*** Meigen)

Sternite 1 absent (Fig. 80) or present; if present, then much weaker than sternite 2, very slender, and bare ..... ***Sphegina*** (***Asiosphegina*** Stackelberg)

70. Face and scutellum pale, orange to yellow; legs and abdomen extensively pale. Last section of R_{4+5} short, subequal to crossvein h (Fig. 52) .... ***Brachyopa*** (***Brachyopa*** Meigen), in part
13 spp.; widespread; Curran 1922

Face and scutellum black, usually with a metallic luster; legs and abdomen mostly black or dark metallic. Last section of R_{4+5} variable in length 71

71. Last section of R_{4+5} less than half as long as crossvein r-m. Male dichoptic. Face and frons of female smooth ..... ***Lejota*** Rondani, in part
see couplet 66

Last section of R_{4+5} subequal to or longer than crossvein r-m (Fig. 53). Male holoptic. Face of both sexes and frons of female sometimes rugose (Fig. 36)..... 72

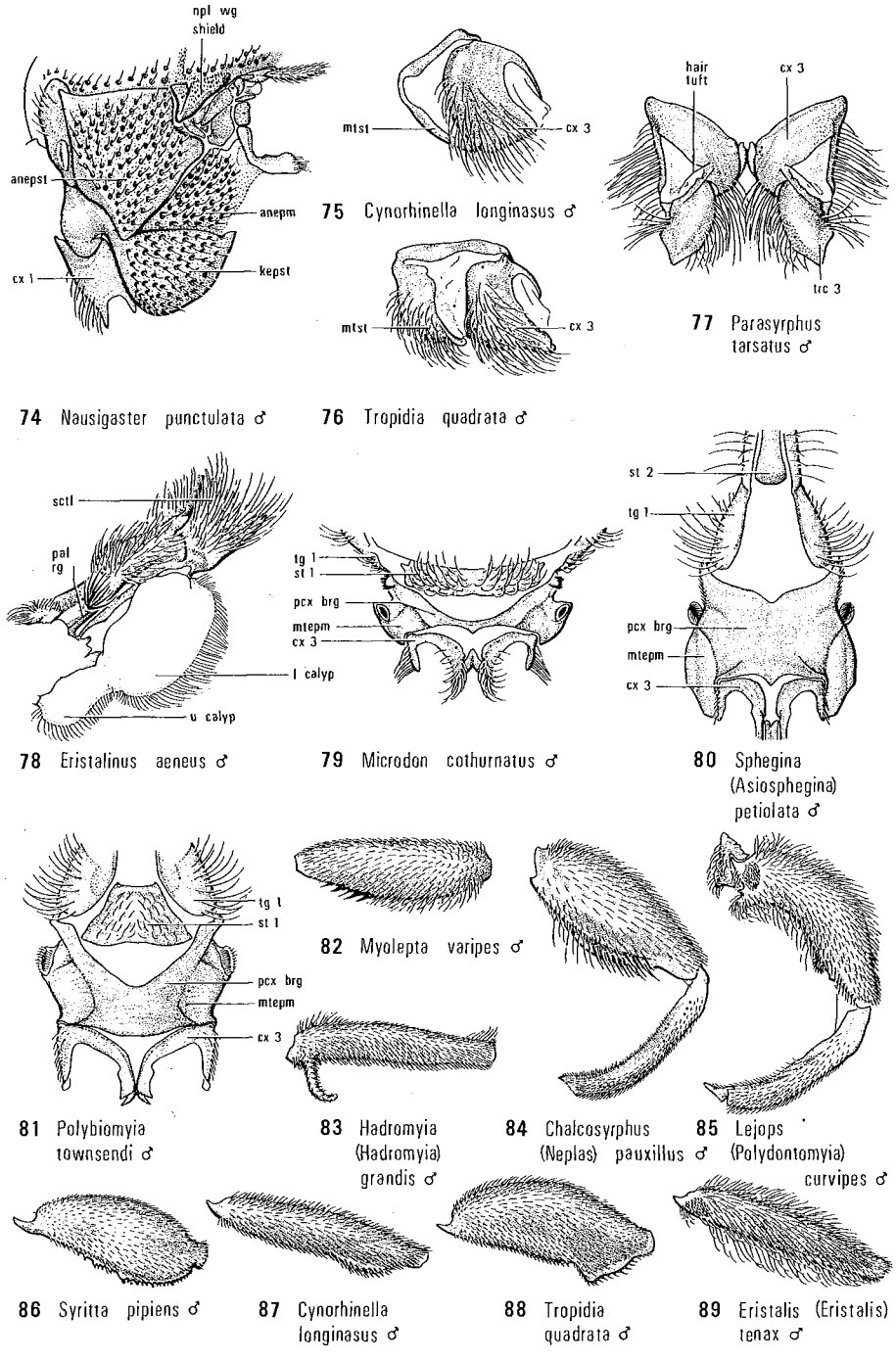
72. Sternite 1 shining, metallic. M_1 curved toward wing base (Fig. 53). First flagellomere usually at least twice as long as wide. Metasternum usually with a few short hairs .... ***Orthonevra*** Macquart
16 spp.; widespread; Shannon 1916, Sedman 1964 and 1966

Sternite 1 entirely pruinose. M_1 usually outwardly oblique, rarely curved very slightly toward wing base. First flagellomere at most 1.4 times as long as wide. Metasternum bare.... ..... ***Chrysogaster*** Meigen, in part
see couplet 65

73. Cell r_{2+3} closed before wing margin (Fig. 54) ..... ***Milesia*** Latreille
3 spp.; southern; Hull 1924

Cell r_{2+3} open to wing margin (Fig. 55) 74

74. Hind femur slender, with a slender unspined preapical anteroventral tooth-like process. Anterior anepisternum haired (as in Fig. 65). Large robust flies, mimicking wasps or hornets ... . ***Spilomyia*** Meigen
11 spp.; widespread; Curran 1951



Figs. 52.74–89. Details of thorax, abdomen, and legs: (74) *Nausigaster punctulata* Williston, dorsolateral view of anterior half of thorax; lateral views of metasternum and hind coxa of (75) *Cynorhinella longinasus* Shannon and (76) *Tropidia quadrata* (Say); (77) *Parasyrphus tarsatus* (Zetterstedt), posterior view of hind coxae and trochanters; (78) *Eristalinus aeneus* (Scopoli), postalar ridge; postcoxal bridge and base of abdomen of (79) *Microdon cothurnatus* Bigot, (80) *Sphegina* (*Asiosphegina*) *petiolata* Coquillett, and (81) *Polybiomyia townsendi* (Snow); (82) *Myolepta varipes* Loew, anteroventral view of fore femur; (83) *Hadromyia* (*Hadromyia*) *grandis* Williston, anterior view of mid femur; anterior views of hind femur and tibia of (84) *Chalcosyrphus* (*Neplas*) *pauxillus* (Williston) and (85) *Lejops* (*Polydontomyia*) *curvipes* (Wiedemann); anterior views of hind femur of (86) *Syritta pipiens* (Linnaeus), (87) *Cynorhinella longinasus*, (88) *Tropidia quadrata*, and (89) *Eristalis* (*Eristalis*) *tenax* (Linnaeus).

Abbreviations: anepm, anepimeron; anepst, anepisternum; cx, coxa; kepst, katepisternum; l calyp, lower calypter; mtepm, metepimeron; mtst, metasternum; npl wg shield, notopleural wing shield; pal rg, postalar ridge; pcx brg, postcoxal bridge; sctl, scutellum; st, sternite; tg, tergite; trc, trochanter; u calyp, upper calypter.

Hind femur not as above. If hind femur with a preapical anteroventral process, then femur swollen (Figs. 86–88) and anterior anepisternum bare. General appearance variable 75

75. Katepisternum continuously haired along posterior margin; anterior anepisternum haired or bare. Gena and lower part of face haired. Body with bright yellow pruinose markings; flies mimicking wasps .....***Temnostoma*** Lepeletier & Serville
10 spp.; widespread; Curran 1939*b*, Shannon 1939

Katepisternum with separate dorsal and ventral hair patches; anterior anepisternum bare. Gena and lower part of face usually bare. If face haired, body entirely black. Body variable in appearance 76

76. Metasternum haired; hairs as long as or longer than those of hind coxa (Fig. 76) 77

Metasternum without hairs, with only very short pubescence 86

77. Wing membrane with microtrichia almost absent on basal two-thirds, very sparse and scattered on apical third. Metepisternum with a patch of fine hairs. Hind femur greatly enlarged, with an anteroventral spinose ridge on apical third (Fig. 86) .....
.....***Syritta*** Lepeletier & Serville
1 sp., *pipiens* (Linnaeus); widespread

Wing membrane entirely trichose or with moderate bare areas on approximately the basal third, densely and uniformly trichose on apical third. Metepisternum haired or bare. Hind femur variable 78

78. Hind femur with an apicoventral triangular plate or spinose ridge (Figs. 87, 88) 79

Hind femur without apicoventral process 80

79. Crossvein dm-cu and last section of M meeting at an obtuse angle, not continuous; at least a trace of M_2 and of CuA_1 beyond crossvein dm-cu present (Fig. 49). Metasternum small (Fig. 75). Face produced anteroventrally, extending about half its length below eye, not carinate, with a small tubercle; gena broad (Fig. 23) .....***Cynorhinella*** Curran, in part
see couplet 66

Crossvein dm-cu and apical crossvein nearly continuous, without external spurs (as in Fig. 55). Metasternum very large (Fig. 76). Face not produced below, extending less than one-quarter its length below eye, carinate on at least lower half, without tubercle; gena narrow (Fig. 24) .....***Tropidia*** Meigen
8 spp.; widespread; Shannon 1926*b*

80. Face concave, sometimes subcarinate, not tuberculate; gena narrow (Figs. 29–30). Body with short and sparse hairs, without bright yellow pruinose markings 81

Face produced downward, usually tuberculate; gena broad (Fig. 25). Body either with long hairs or with bright yellow pruinose markings 84

81. Face yellow in background color. Apical section of A_1 long, straight, not reaching wing margin (Fig. 55). Ventral scutellar fringe absent. Hind tibia of male with strong ventral spur (Fig. 90) .....***Teuchocnemis*** Osten Sacken, in part
2 spp.; eastern; Williston 1887

Face mostly black in background color. Apical section of A_1 shorter, curved, reaching wing margin. Ventral scutellar fringe present (as in Fig. 63). Hind tibia of male without spur .....***Chalcosyrphus*** Curran 82

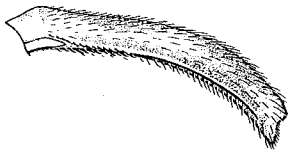
82. Face subcarinate (Fig. 29). Hind femur greatly swollen and with ventromedial carina; hind tibia strongly arcuate (Fig. 84). Laterotergite carinate .....***Chalcosyrphus*** (***Neplas*** Porter)
1 sp., *pauxillus* (Williston); southern Arizona

Face rounded medially, not subcarinate (Fig. 30). Hind femur less strongly swollen and without ventromedial carina; hind tibia not strongly arcuate. Laterotergite rounded, not carinate 83

83. Face haired below almost to midline (Fig. 30). Crossvein r-m situated before middle of cell dm. Scutum flattened in front of scutellum. Male narrowly dichoptic. Hind trochanter of male with ventral tubercle .....***Chalcosyrphus*** (***Chalcosyrphus*** Curran)
1 sp., *depressus* (Shannon); western

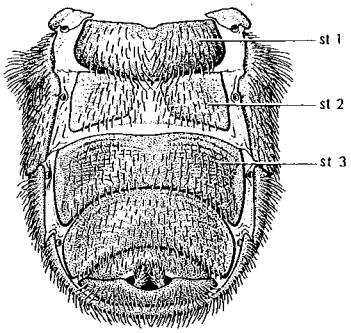
Face haired only laterally. Crossvein r-m situated at or beyond middle of cell dm. Scutum not flattened posteriorly. Male holoptic. Hind trochanter of male without tubercle .....
.....***Chalcosyrphus*** (***Xylotomima*** Shannon)
25 spp.; widespread; Shannon 1926*b* (as *Xylotomima* and *Xylotodes* Shannon), Curran 1941 (as part of *Heliophilus* Meigen)

90 Teuchocnemis lituratus ♂

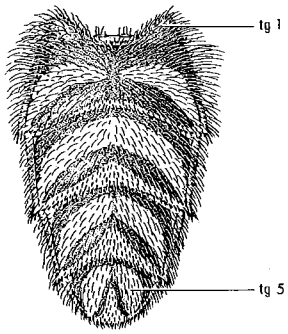


91 Lejops (Anasimyia) bilinearis ♂

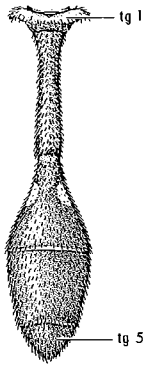
92 Parhelophilus laetus ♂



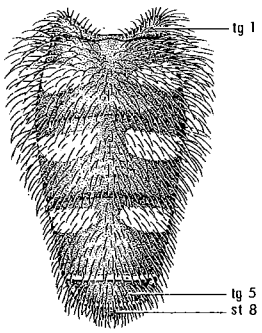
93 Lejops (Polydontomyia) curvipes ♀



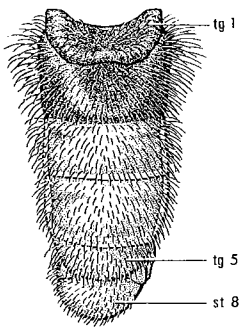
94 Chrysotoxum integre ♂



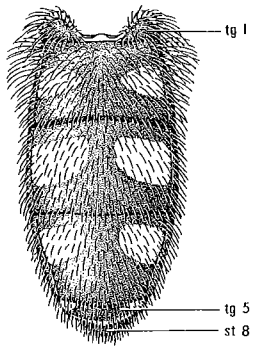
95 Salpingogaster (Salpingogaster) punctifrons ♂



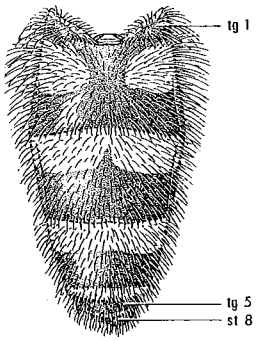
96 Melangyna (Melangyna) lasiophthalma ♂



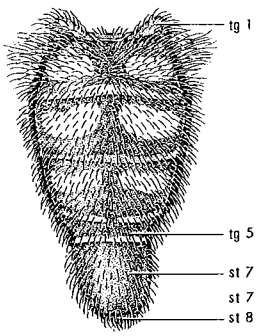
97 Paragus (Pandasyopthalmus) haemorrhous ♂



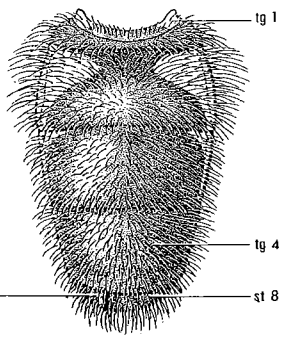
98 Epistrophe (Epistrophella) emarginata ♂



99 Epistrophe (Epistrophe) grossulariae ♂



100 Eupeodes (Eupeodes) volucris ♂



101 Blera badia ♂

Figs. 52.90–101. Legs and abdomens: (90) *Teuchocnemis lituratus* (Loew), anterior view of hind tibia; anteroventral views of hind tibia of (91) *Lejops* (*Anasimyia*) *bilinearis* (Williston) and (92) *Parhelophilus laetus* (Loew); (93) *Lejops* (*Polydontomyia*) *curvipes* (Wiedemann), ventrolateral view of abdomen; dorsal views of abdomen of (94) *Chrysotoxum integre* Williston, (95) *Salpingogaster* (*Salpingogaster*) *punctifrons* Curran, (96) *Melangyna* (*Melangyna*) *lasiophthalma* (Zetterstedt), (97) *Paragus* (*Pandasyopthalmus*) *haemorrhous* Meigen, (98) *Epistrophe* (*Epistrophella*) *emarginata* (Say), (99) *Epistrophe* (*Epistrophe*) *grossulariae* (Meigen), (100) *Eupeodes* (*Eupeodes*) *volucris* Osten Sacken, and (101) *Blera badia* (Walker).

Abbreviations: st, sternite; tg, tergite.

84. Arista inserted at apex of conically produced first flagellomere (Fig. 25) ..... ***Merapioidus*** Bigot
1 sp., *villosus* Bigot; eastern

Arista dorsal 85

85. Thorax and abdomen with distinct yellow pruinose markings. Body with short and sparse hairs; flies mimicking wasps ..... ***Sphecomyia*** Latreille
8 spp.; widespread; Weismann 1965, 1966

Thorax and abdomen without yellow pruinose markings. Body with long hairs; flies mimicking bumblebees ..... ***Criorhina*** Meigen
14 spp.; widespread; Curran 1925*b*

86. Apical section of R_{4+5} at least three-quarters as long as crossvein h (as in Fig. 55) 87

Apical section of R_{4+5} not more than one-third as long as crossvein h (as in Fig. 49) (some species of *Blera* varying in this character, running out in either half of couplet) 93

87. Face mostly or entirely bright to dull yellow, at most obscurely darkened medially 88

Face black in background color, rarely slightly yellowish below 90

88. Abdomen either shining metallic or blackish with shining metallic bands, with brassy yellow hairs but without yellow markings ..... ***Hadromyia*** (***Chrysosomidia*** Curran)
5 spp.; widespread; Shannon 1916

Abdomen either black and at least partly black-haired or black with clear yellow markings on tergites 2–4 89

89. Abdomen entirely black, black-haired except for yellow-haired tergite 4. Middle femur of male with long ventral subbasal spur (Fig. 83). Large robust flies, mimicking bumblebees ..... ***Hadromyia*** (***Hadromyia*** Williston)
1 sp., *grandis* Williston; western

Abdomen black, usually with yellow lateral marks on at least tergites 2–4, always extensively pale-haired (Fig. 101). Middle femur of male simple. Flies not mimicking bumblebees ..... ***Blera*** Billberg, in part
16 spp.; widespread; Curran 1953

90. Crossvein r-m situated slightly before middle of cell dm. Abdomen broadly oval. Ventral scutellar fringe present or absent. Male narrowly dichoptic ..... ***Lejota*** Rondani, in part
see couplet 66

Crossvein r-m situated beyond middle of cell dm. Abdomen elongate. Ventral scutellar fringe present (as in Fig. 63). Male holoptic 91

91. Head triangular in anterior view (Fig. 37); face extensively shining; gena broad, much broader than posterior thoracic spiracle. First flagellomere kidney-shaped, wider than long (Fig. 26). Hind femur greatly enlarged, arcuate, with a small apicoventral tubercle frequently hidden by tibia ..... ***Brachypalpus*** Macquart 92

Head elliptic in anterior view (Fig. 38); face pruinose; gena narrow, narrower than posterior thoracic spiracle. First flagellomere longer than wide. Hind femur not greatly enlarged or arcuate, without ventral tubercle ..... ***Xylota*** Meigen
29 spp.; widespread; Shannon 1926*b*, Curran 1941 (as part of *Heliophilus)*

92. Face straight under antenna, with its lower margin produced strongly forward beyond level of base of antenna (Fig. 26) ..... ***Brachypalpus*** (***Crioprora*** Osten Sacken)
4 spp.; widespread; Williston 1887

Face concave, its lower margin not produced forward beyond level of base of antenna (Fig. 37) ..... ***Brachypalpus*** (***Brachypalpus*** Macquart)
1 sp., *oarus* (Walker); eastern

93. Ventral scutellar fringe present (as in Fig. 63). Face black in background color. Abdomen black, without pale markings 94

Ventral scutellar fringe absent or face partly yellow in background color. Abdomen often with yellow markings 95

94. Face concave, not produced forward below. Crossvein r-m situated beyond middle of cell dm. Large robust long-haired flies, mimicking bumblebees ..... ***Pocota*** Lepeletier & Serville
1 sp., *bomboides* Hunter; western

Face tuberculate, produced strongly forward below (Fig. 23). Crossvein r-m situated before middle of cell dm (Fig. 49). Small slender short-haired flies, not mimicking bumblebees .... ***Cynorhinella*** Curran, in part
see couplets 66 and 79

95. Abdomen black, with three pairs of large yellow spots. Wing with anterior margin brown; crossvein r-m situated at outer third of cell dm. Frontal prominence strong, distinct (Fig. 27).... ***Somula*** Macquart
2 spp.; eastern; Curran 1925*b*

Abdomen black, without large yellow spots; sides or basolateral angles of tergites sometimes yellow (Fig. 101) or apical tergites sometimes red. Wing hyaline or uniformly brownish; crossvein r-m at most situated slightly beyond middle of cell dm. Frontal prominence weak.... ***Blera*** Billberg, in part
see couplet 89

96. Apical portion of M_1 curved strongly toward wing base (Fig. 56) 97

M_1 outwardly oblique (Fig. 52) 99

97. Anterior anepisternum haired (as in Fig. 65). Long-haired flies, mimicking bumblebees ... ***Volucella*** Geoffroy
1 sp., *bombylans* (Linnaeus); widespread

Anterior anepisternum bare. Short-haired flies, not mimicking bumblebees 98

98. Face with median and lateral tubercles (Fig. 28). Posterior half of anepimeron haired; notopleuron greatly enlarged and produced posteriorly. Wing membrane without microtrichia. Metallic green or purple species .... ***Ornidia*** Lepeletier & Serville
1 sp., *obesa* (Fabricius); southern

Face with median tubercle only. Posterior half of anepimeron bare; notopleuron not enlarged. Species usually not metallic, but if so, then wing membrane extensively trichose ..... ***Copestylum*** Macquart
39 spp.; widespread; Curran 1930*c*, 1935, 1939*a* (as part of *Volucella* and as *Volucellosia* Curran)

99. Eye and face densely haired (Fig. 31) ..... ***Pyritis*** Hunter
2 spp.; western; Osburn 1904

Eye bare; face on lower half haired only laterally along eye margin 100

100. Metasternum bare; ventral scutellar fringe absent ..... ***Brachyopa*** Meigen....101

Metasternum haired; ventral scutellar fringe present (as in Fig. 63) 102

101. Apical section of R_{4+5} longer than crossvein r-m. Hind tibia with short strong black spines on anterior surface. Anepisternum, postalar callus, and scutellum with strong bristles. Face of male with tubercle .... ***Brachyopa*** (***Hammerschmidtia*** Schummel)
1 sp., *ferruginea* Fallén; widespread

Apical section of R_{4+5} shorter than crossvein r-m (Fig. 52). Hind tibia without spines. Thorax with at most very weak bristles. Face of male without tubercle.... ***Brachyopa*** (***Brachyopa*** Meigen), in part
see couplet 70

102. Face usually entirely black or brownish black. If face orange medially, then anepisternum or notopleuron or both with bristles. Abdomen dark, without yellow markings ..... ***Hiatomyia*** Shannon
22 spp.; widespread; Hull and Fluke 1950

Face usually entirely yellow. If face yellow with black median stripe, then thorax without bristles. Abdomen usually with yellow markings 103

103. Apical portion of M_1 curved toward wing base (Fig. 57). Anterior anepisternum haired (as in Fig. 65). Hind femur with apicoventral flange .... ***Merodon*** Meigen
1 sp., *equestris* (Fabricius); widespread

M_1 outwardly oblique (Figs. 58–60). Anterior anepisternum bare. Hind femur without such a flange.....104

104. Cell r_{2+3} open to wing margin (Figs. 58, 59) 105

Cell r_{2+3} closed before wing margin (Fig. 60).....116

105. Arista plumose (as in Fig. 31) 106

Arista bare 107

106. Abdomen with yellow markings, or, if entirely black, tergites 2–4 entirely black-haired. Body short-haired. Flies not mimicking bumblebees ..... ***Sericomyia*** Meigen
11 spp.; widespread, including Arctic; Curran 1934

Abdomen entirely black, with some or all of tergites 2–4 red- or yellow-haired. Body with longer hairs. Flies mimicking bumblebees ..... ***Arctophila*** Schiner
2 spp.; western; Osburn 1908

107. Lower two-thirds of face haired only lateral to frontogenal suture; male holoptic; face of female concave. Hind femur without anterior basal patch of short dense black setulae. Apical section of A_1 elongate, sometimes not reaching wing margin (Fig. 55) 108

Lower two-thirds of face haired medial to frontogenal suture, usually with only a narrow median stripe bare (Figs. 32, 33); male holoptic or dichoptic; face of female tuberculate or straight. Hind femur with anterior basal patch of short dense black setulae (as in Fig. 89). Apical section of A_1 short, curved abruptly toward wing margin just beyond apex of cell *cup* (Figs. 58, 59) 109

108. Metasternum haired. Apical section of A_1 long, straight, not reaching wing margin (Fig. 55). Hind tibia of male with strong ventral spur (Fig. 90) ..... ***Teuchocnemis*** Osten Sacken, in part
see couplet 81

Metasternum bare. Apical section of A_1 turned caudally to reach wing margin. Hind tibia of male simple, without spur ..... ***Pterallastes*** Loew
1 sp., *thoracicus* Loew; eastern

109. Wing membrane partly bare on basal third. Eye bare or haired. Scutum not striped. Abdomen dark, without pale markings. Long-haired flies, mimicking bumbleblees or other hairy bees (Fig. 3) ..... ***Mallota*** Meigen
9 spp.; widespread; Curran 1940

Wing membrane entirely covered with microtrichia. Eye bare. Scutum usually with longitudinal stripes. Abdomen usually with pale markings. Short-haired flies, not mimicking hairy bees 110

110. Pterostigma elongate, not simulating a crossvein, at most slightly darkened basally (Fig. 58). Abdomen oval, with large orange markings on at least tergite 2 .... ***Helophilus*** Meigen
10 spp.; widespread, including Arctic; Curran and Fluke 1926

Pterostigma very short, simulating a crossvein (Fig. 59). Abdomen oval to slender, variable in color 111

111. Face pale, yellow to orange in background color and completely pale pruinose 112

Face mainly black in background color, pale pruinose laterally but shining black medially 113

112. Hind tibia produced apicoventrally as an acute or rounded spur, with ventral knife-edged carina on basal half; carina continuing less distinctly posteroventrally to or almost to tibial apex (Fig. 91) ..... ***Lejops*** (***Anasimyia*** Schiner)
10 spp.; widespread; Curran and Fluke 1926 (as *Lejops* Rondani and *Eurimyia* Bigot)

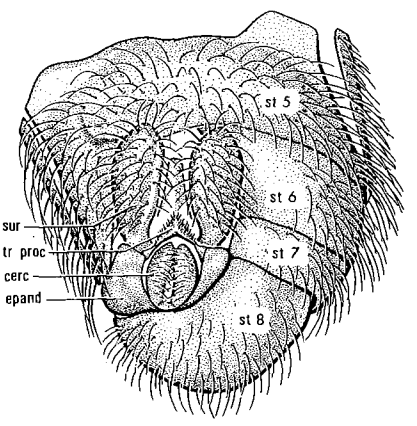
Hind tibia truncate apically, with ventral carina restricted to basal half and with apical half rounded below (Fig. 92) ..... ***Parhelophilus*** Girschner
8 spp.; widespread; Curran and Fluke 1926

113. Male with hind femur enlarged, arcuate, with basal and subapical ventral tubercles; hind tibia arcuate and produced into a long apical spur (Fig. 85). Female with sternites 1 and 3 swollen; sternite 1 overlapping sternite 2; sternite 2 reduced, sunken, membranous medially (Fig. 93) ..... ***Lejops*** (***Polydontomyia*** Williston)
1 sp., *curvipes* (Wiedemann); widespread

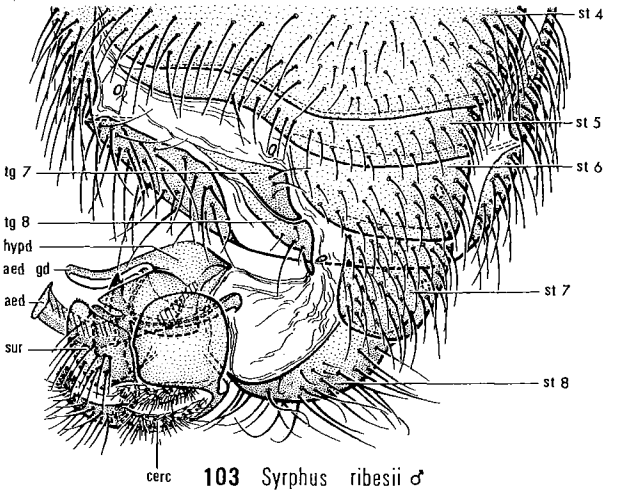
Male without ventral femoral tubercles or apical tibial spur. Female with normal flat abdominal sternites 114

114. Ocellar triangle very large; posterior ocelli closer to eye margins than to midpoint between them (Fig. 39). Abdomen partly reddish in background color or with pairs of white pruinose arcuate spots, or both ..... ***Lejops*** (***Asemosyrphus*** Bigot)
1 sp., *polygrammus* (Loew); western

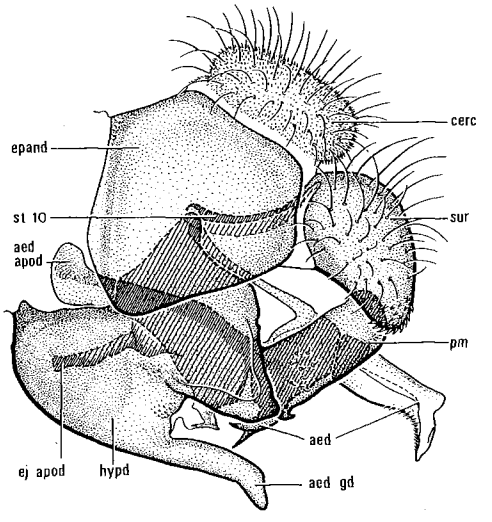
Ocellar triangle small; posterior ocelli not closer to eye margins than to midpoint between them. Abdomen black, without white pruinose arcuate spots 115



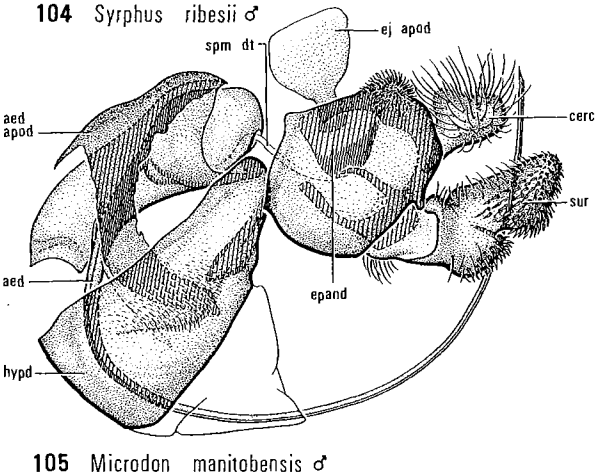
102 Toxomerus geminatus ♂



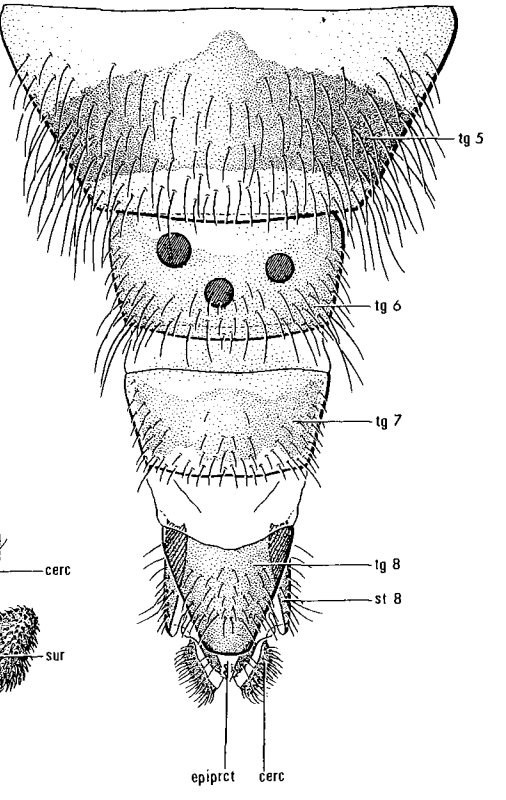
103 Syrphus ribesii ♂



104 Syrphus ribesii ♂



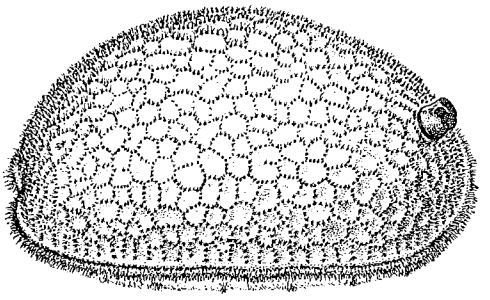
105 Microdon manitobensis ♂



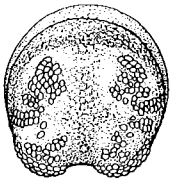
106 Syrphus ribesii ♀

Figs. 52.102–106. Apices of abdomen and terminalia: ventral views of apex of male abdomen and terminalia of (102) *Toxomerus geminatus* (Say) and (103) *Syrphus ribesii* (Linnaeus) (with terminalia exposed); lateral views of male terminalia of (104) *Syrphus ribesii* and (105) *Microdon manitobensis* Curran; (106) dorsal view of female terminalia of *Syrphus ribesii*.

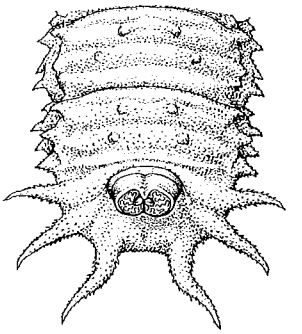
Abbreviations: aed, aedeagus; aed apod, aedeagal apodeme; aed gd, aedeagal guide; cerc, cercus; ej apod, ejaculatory apodeme; epand, epandrium; epiprct, epiproct; hypd, hypandrium; pm, paramere; spm dt, sperm duct; st, sternite; sur, surstylus; tg, tergite; tr proc, triangular process.



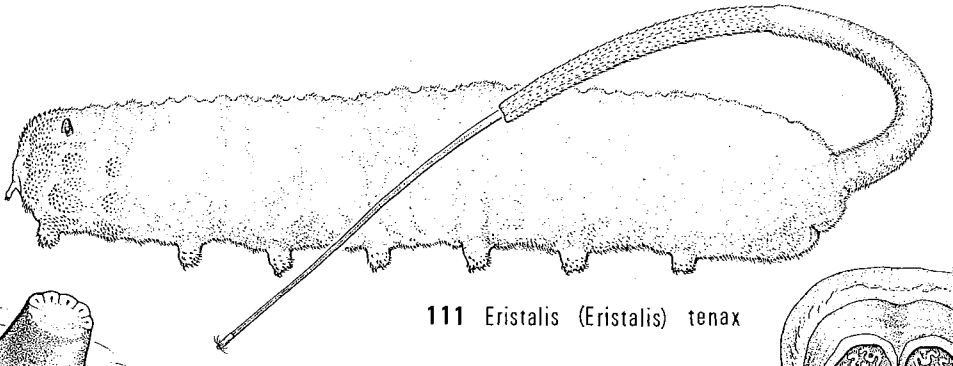
107 Microdon ruficrus



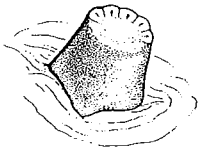
108 Microdon ruficrus



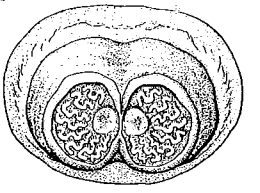
109 Volucella bombylans



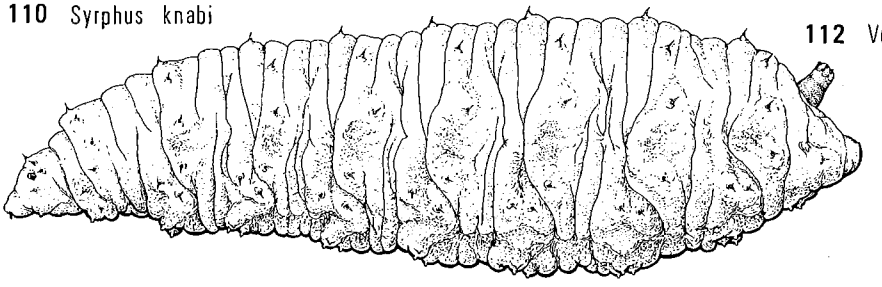
111 Eristalis (Eristalis) tenax



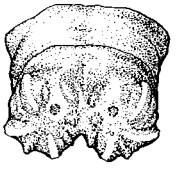
110 Syrphus knabi



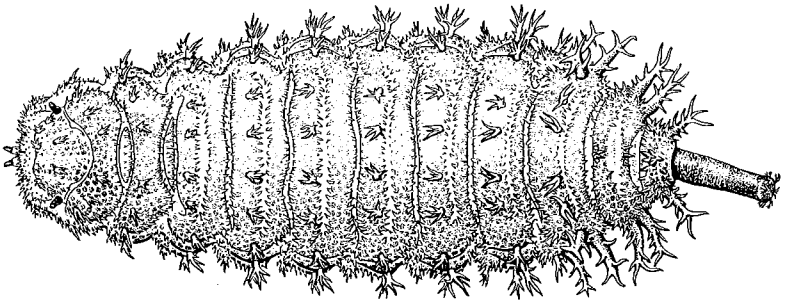
112 Volucella bombylans



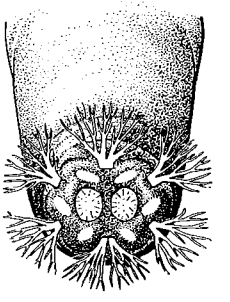
113 Syrphus knabi



114 Syrphus knabi



115 Brachyopa sp.



116 Brachyopa sp.

Figs. 52.107–116. Larvae: (107) *Microdon ruficrus* Williston, dorsolateral view; (108) terminal spiracles of *Microdon ruficrus*; (109) dorsal view of last three segments of *Volucella bombylans* (Linnaeus); (110) anterior spiracle of *Syrphus knabi* Shannon; (111) lateral view of *Eristalis* (*Eristalis*) *tenax* (Linnaeus); (112) spiracles of *Volucella bombylans*; (113) lateral view of *Syrphus knabi*; (114) terminal spiracles of *Syrphus knabi*; (115) dorsal view of *Brachyopa* sp.; (116) terminal spiracles of *Brachyopa* sp.

115. Face produced anteroventrally, almost straight, without distinct tubercle (Fig. 32). Length 10 mm or more ..... ***Lejops*** (***Arctosyrphus*** Frey)
1 sp., *willingii* (Smith); boreal

Face not produced anteroventrally, with large distinct tubercle (Fig. 33). Length 8 mm or less ..... ***Lejops*** (***Lunomyia*** Curran & Fluke)
1 sp., *cooleyi* (Seamans); central Nearctic

116. Metasternum bare. Hind femur without basal patch of black setulae .... ***Palumbia*** Rondani
1 sp., *inflata* (Macquart); doubtfully Nearctic; Thompson 1975

Metasternum haired (as in Fig. 76). Hind femur with basal patch of dense black setulae (Fig. 89) 117

117. Katepimeron, posterior half of anepimeron, meron, and metepisternum all bare 118

Katepimeron haired; other sclerites mentioned above frequently partly haired 119

118. Eye bare. Scutum with patches of yellow tomentum ..... ***Meromacrus*** Rondani
4 spp.; southern; Hull 1942*b*

Eye haired. Scutum without patches of yellow tomentum ..... ***Eristalis*** (***Eoseristalis*** Kanervo)
17 spp.; widespread; Curran 1930*a*, Telford 1970 (both as part of *Eristalis)*

119. Eye with dark spots. Triangular portion of anepimeron below wing base haired (Fig. 64); postalar ridge with tuft of strong black hairs (Fig. 78) ..... ***Eristalinus*** Rondani
1 sp., *aeneus* (Scopoli); widespread

Eye unicolorous. Triangular portion of anepimeron below wing base bare; postalar ridge bare 120

120. Meron bare, without hairs in front of or below posterior spiracle. Arista with short but distinct hairs on basal half. Eye densely haired, with two vertical bands of longer hairs. Wing membrane without microtrichia ..... ***Eristalis*** (***Eristalis*** Latreille)
1 sp., *tenax* (Linnaeus); widespread

Meron with fine pale hairs in front of or below spiracle. Arista bare. Eye haired above, without contrasting bands of longer hairs. Wing membrane with or without microtrichia ..... ***Palpada*** Macquart
10 spp.; central U.S.A. southward; Curran 1930*a*, Telford 1970 (both as part of *Eristalis)*

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