

Glossary of characters and terms used in flower fly taxonomy

Most of the characters used in the key are the well known traditional ones and some are herein identified by reference to figures 1-10. More detailed information about these characters and others, as well as illustrations of them, can be found in the following basic references: Williston, 1887: 272-278; Shannon, 1922: 117-120, 1926a: 6-7; Hull, 1949: 259-268; Vockeroth, 1969: 17-23; Thompson, 1972: 77-84, 201, 1981: 13, 35-37; Hippa 1986; Speight 1987; Vockeroth & Thompson 1987: 713-717. Of these, the best and most comprehensive study of external morphology is that by Speight (1987). While the characters are the same, the nomenclature for them varies widely among these works. I have standardized on the nomenclature used in the new *Manual of Nearctic Diptera* (McAlpine 1981) except for a few words. I have used the classic Latin terms instead of their English equivalent as this makes my nomenclature more international. For examples, instead of "hairy," I have used *pilose*; instead of "band," *fascia*; instead of "stripe," *vitta*; instead of "upper," *dorsal*; instead of "fore, mid and hind" for legs and/or their components, *pro*, *meso* and *meta* are used; *et cetera*. This glossary equates the various terms used in flower fly literature with those used here. Terms in boldface are considered appropriate, inappropriate terms are in normal typeface.

abdomen. The posterior division of the insect body.

abdominal margin (Vockeroth 1969: 20) or "margined" (Curran 1925: 16) refers to the condition of having a premarginal sulcus on the abdomen.

aedeagal apodeme. A elongate rod anterior to and articulating with the aedeagus, where the attached muscles cause the motion of the aedeagus.

aedeagus. The male phallic organ, the median structure of the male genitalia, surrounded by hypandrium. In Syrphidae, articulating with the hypandrium dorsally and ventrally and laterally with the superior lobes (parameres).

alula is a broad lobe on the posterior base of the wing. The size, shape and vestiture of the alula are useful species characters.

anal cell. Same as cell CuP.

anal lobe is the area of the wing posterior to cell CuP. This area is frequently reduced in species with petiolate abdomens. The presence or absence of microtrichia on various areas of the anal lobe is a useful species character.

anatergum. The posterodorsal plate of the mesothoracic pleuron. The laterotergite (in part) of earlier authors. In some groups (*Allobaccha*) with a tuft of long pile.

anepimeron. Same as pteropleuron of earlier authors. Three distinct areas are recognized for taxonomic purposes: anterior, posterior and dorsomedial portions. The anterior portion is always pilose, the posterior is occasionally pilose and dorsomedial is only pilose in some crystalline genera (*Eristalinus*).

anepisternum. The anterodorsal plate of the mesothoracic pleuron. Mesopleuron of earlier authors. In Syrphidae, the anepisternum is differentiated into a flattened anterior portion and a convex posterior portion. The pilosity of these areas vary, forming a critical generic character.

antecoxal piece (Shannon, 1922: 120). Same as metasternum.

antenna. A multisegmented sensory organ situated anteriorly on the head between the frons dorsally and the face ventrally. The shape of the antenna is one of the most widely used

- character for recognition of genera; within genera the shape is usually constant, but antennal color does vary. The antenna consists of four major parts: the scape, pedicel, basoflagellomere and arista (*q.v.*). Traditionally, these were referred to as segments.
- antennal prominence (Curran 1925: 14). Same as frontal prominence.
- antennifer**. A special term used for the frontal prominence in some taxa of the tribe Cerioidini where the frontal prominence is greatly elongate and very narrow.
- anterior** (adv. anteriorly). Adjective (adverb) meaning before, in front, toward the head end. Opposite of posterior. See Orientation.
- anterior crossvein. Same as crossvein r-m.
- anterior mesonotal [pile] collar** (Vockeroth 1969: 18) refers to a transverse row of erect long pile on the anterior edge of the mesonotum. The collar is found in *Asarkina* and various species groups of *Ocyptamus*.
- anterior tentorial pit**. See tentorium.
- apical** (adv. apically). Adjective (adverb) meaning toward apex. See Orientation.
- apical cell. Same as cell R4+5.
- apical crossvein. Same as vein M1.
- appendix**. A supplementary extension of a crossvein or vein.
- arcuate**. Adjective for a macula or fascia which is slightly curved. The adjective lunulate is used for a more deeply curved macula. See Markings.
- arista**. The apical flagellomeres are usually reduced to a bristle-like structure, termed the arista. In most syrphids, the second and third flagellomeres are very small and only the fourth is greatly elongate; together they are termed the arista. In some groups (*Argentinomyia*), the third flagellomere is elongate. The usual number of flagellomeres in syrphids is three, not two as erroneously stated by McAlpine (1981: 16). The arista varies in its insertion point from dorsobasal to apical and may be bare, pectinate or plumose. See Antenna.
- aristomere. The flagellomeres that make up the arista are sometimes referred to as aristomeres.
- armature**. Armature can consist of both extension of the exoskeleton and vestiture (*q.v.*), but discussion is here limited to large multicellular extensions of the exoskeleton. The terminology used for armature of flower flies, especially of their legs, has been inconsistent with that used for other insects. For example, various authors refer to the metacoxal spur when spine is appropriate and use spines for setae. Following Snodgrass (1935: 69, also Torre-Bueno (Nichols 1989)), spine and spur are restricted to large elongate extension of the exoskeleton, which either articulate (spurs) or not (spines), but because these terms have been misused so extensively in flower fly literature, I will henceforth use their latin equivalents (**calcar** for spur, **spina** for spine). Other non-articulating forms of armature are: **dentis** (teeth), **liminae** (plates) and **carinae** (ridges). A **dens** (tooth) differs from a spina in being short, only as long as broad or shorter than broad, whereas spinae and calcaris are much longer than broad. **Carina** is sharp low ridge, which when greatly extended so as to become large, thin extension, is termed **lamina** (plates). A **ctenidium** (comb) is a closely set series of spinae. **Tubercle** is a large rounded protuberance of the exoskeleton.
- axillary lobe (Hull 1949: 260). Same as alula.

axillary vein (Hull 1949: 260). Same as vein A2.

band. Same as fascia.

bare. The condition of lacking pile, or when referring to the surface of the wing, lacking microtrichia. See vestiture.

barrette. Same as katepimeron.

basal (adv. basally). Adjective (adverb) meaning toward the base. See Orientation.

basal cells. Use cell R and BM.

basale. Same as epandrium (q.v.).

basicosta is a small scale-like structure anterior to the base of the vein C. Humeral plate of Speight (1987: 159).

basitarsis. Same as basotarsomere.

basoflagellomere. The third antennal segment of classical authors, but not a true segment. The first flagellomere is always greatly enlarged and varies greatly in shape. The shape is used extensively as a generic and specific character. See Antenna.

basotarsomere. The first tarsomere.

beaded as an adjective referring to the abdomen (Shannon 1926b). Same as abdomen with premarginal sulcus.

bristle. Same as seta.

calcar (pl. calcaris, adj. calcarate). An articulating elongate extension of the exoskeleton. In syrphids, this term is usually restricted to an apicoventral extension of the metafemur, such as in *Spilomyia* or the apical extensions of the scutellum, such as in *Microdon*. Spur of Snodgrass and Torre-Bueno. See armature.

calypter (pl. calypteres). The membrane connecting the thorax to posterior base of the wing forms two lobes, the calypteres. When the wing is folded, the calypteres are likewise, with the lobe attached to the thorax is referred to as the ventral calypter as it is lower in position and, the other lobe, the dorsal calypter, is upper in position. As a concession to standardization, the term calypter is used for squama. As Osten Sacken (1896, 1897) explain a century ago, the squama is the earlier (defined by Linnaeus 1758: 584) and more general term (hence, appropriate) for these structures, but as calypter became in more general use as the basis of the common terms for the two major groups of higher flies (acalypterates and calypterates), specialists (such as McAlpine) on those groups have insisted on standardizing on the specialized term, which is unique to Diptera.

carina (pl. carinae, adj. carinate). A sharp raised ridge-like extension of the exoskeleton. See armature.

cells. The cells of the wing are labelled on figure and are referred to by the name of the vein that forms the anterior margin of the cell.

cephalad. Same as anterior.

ceratostylate. An adjective introduced by Crampton (1942: 42) for a terminal arista which is short and thick, such as found in *Callicera* and Cerioidini.

cercus (pl. cerci). Plate laterad to the anus.

cheek. Same as gena. While cheek as used in classical dipterology is not the same as the morphological region termed gena, gena is used as its equivalent. Cheek was (and now gena is) used for the area ventrad of the eye.

cilia is the term used for the long, distinct pile found on the occiput.

claw. Apicodorsal projections on the apex of the tarsus.

comb. Same as ctenidium.

compound eye. Same as eye.

costal sections. The vein costa can be viewed as a series of sections defined by the various veins and crossvein that terminate in the costa. So, the first costal section is the area between base of the costa and crossvein bc, the second between bc and end of vein SC, third between end of vein SC and vein R1, fourth between vein R1 and R2+3 and the fifth between vein R2+3 and vein R4+5.

coxa (pl. coxae). The basal segment of the leg.

crossvein is a short vein connecting long veins and are referred to by the names of the two veins connected (lowercase) separated by a hyphen, such as crossvein r-m.

cubital cell. Same as cell CuA1.

dens (pl. dentis, adj. dentate). A large non-articulating extension of the exoskeleton that is as wide or wider than high. Same as tooth (teeth). See armature.

dichoptic is the condition when the eyes are separated. Females are always dichoptic, males may be dichoptic. The alternative condition is holoptic (*q.v.*).

discal cell. Same as cell dm.

distal. Same as apical.

dorsal (adv. dorsally, dorsad). Adjective (adverb) meaning of or belonging to upper surface. Opposite of ventral. See Orientation.

ejaculatory apodeme. Median sclerotized structure of the sperm pump to which the muscle are attached. In shape, ranges from a simple short rod to a triangular plate to umbrella-shape piece.

emarginate. An adjective used in phrases such as "scutellum emarginate" or "abdomen emarginate." This condition is here referred as "scutellum with pre-marginal sulcus." See pre-marginal sulcus.

epandrium is the dorsal sclerite (9th tergum) of the male genitalia to which the surstyli are attached.

Speight (1987: 166) to avoid controversy caused by using terms linked to particular theories of origins of genitalic sclerites uses basale for the epandrium and theca for hypandrium.

epaulet. Same as tegula.

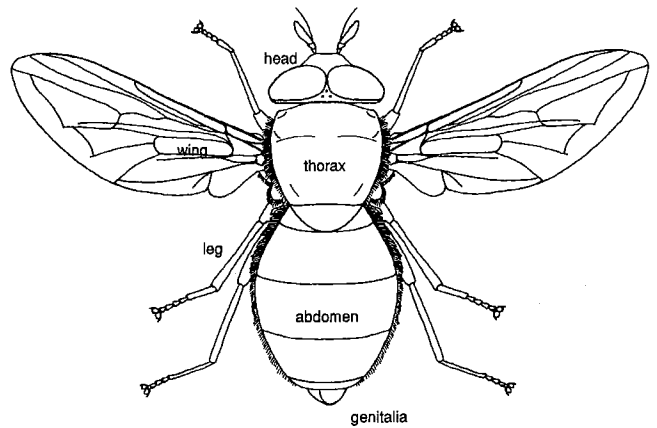


Fig. 1. Body parts, dorsal view.

eye is the term used for the large compound eye that occupies most of the side of the head. The small simple eyes on the vertex are referred to as ocelli (*q.v.*).

eye contiguity. In males, when the eyes are holoptic, the line of juncture is termed the eye contiguity. The length of this contiguity varies significantly in some genera (*Palpada*) and is a useful species character.

face. The anteroventromedial area of the head, bordered laterally by the eyes and genae, dorsally by antennae and frons, and ventrally by subcranial cavity where the mouthparts are situated. Sometimes there is a distinctly demarked region between the face and eyes, this area being the paraface (*q.v.*). The shape of the facial region is one of the most important characters for the higher classification of syrphids (see Thompson 1972: 77).

facet. The cornea of the individual ommatidia which make up the compound eye.

facial groove. Same as anterior tentorial pit.

facial pit (Curran 1925: 14). Same as anterior tentorial pit.

facial stripes. Same as paraface.

facial tubercle. See tubercle.

fascia (pl. fasciae, adj. fasciate) is a transverse (lateral to lateral) line.

femur (pl. femora). The third segment of the leg.

fifth vein. Same as veins Cu (basally) and CuA1 (apically).

first antennal segment. Same as scape.

first basal cell. Same as cell R.

first vein. Same as veins R (basally) and R1 (apically).

first posterior cell. Same as cell R4+5.

flagellomere. A division of the flagellum. In Syrphidae and most higher flies (Muscomorpha), the first flagellomere is greatly enlarged (usually, but incorrectly referred to 3rd segment. See basoflagellomere) and the apical flagellomeres are reduced to a bristle-like structure, called the arista (*q.v.*).

flagellum. The third segment of the antenna. The flagellum is divided into flagellomeres.

flange. Same as lamina. See armature.

fourth vein. Same as Vein M.

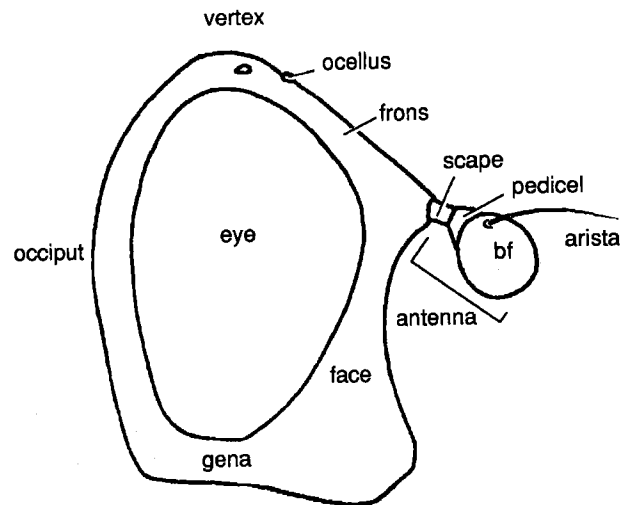


Fig. 2. Head parts, lateral view. bf = basoflagellomere.

frons. The anterodorsomedial area of the head, bounded laterally by the eyes, dorsally by the vertex, and ventrally by the antennae. The anterior edge is usually differentiated and termed the lunule.

front. Same as frons.

frontal lunule. Same as lunule.

frontal prominence. In some syrphids, the region (face and frons) around the bases of the antennae is produced anteriorly, the result is termed the frontal prominence (frontal tubercle of Speight (1987: 145). In some cerioidines (tribe Cerioidini), where the frontal prominence is well developed as an elongate pedicel, the term antennifer is used.

frontal triangle. In males, when the eyes are holoptic, the frons forms a triangle area here called the frontal triangle. The shape of this triangle varies greatly and is used as a species character.

frontal tubercle. Same as frontal prominence.

gena (pl. genae) is the lateral area of the head ventrad to the eyes, anterior to the occiput and posterior to the face. The term is used as equivalent to the cheek and represents the ventrad area to the eyes, which is a larger area than the precisely defined morphological region.

genitalia. The reproductive structures.

hair (adj. hairy). Same as pile.

halter (pl. halteres). The modified second wing that consists of the base, pedicel (stem) and capitulum (head).

head. The anterior division of the insect body.

holoptic is the condition when the eyes are contiguous dorsally. Males are usually holoptic. The alternative is dichoptic (*q.v.*).

humeral crossvein. A crossvein between the costa and subcosta veins at the basal of the wing. Same as crossvein h.

humeral plate. Same as basicosta.

humerus. Same as postpronotum.

hyaline. Transparent. When hyaline is used to described a wing, it means without a dark pattern except the stigma may be dark.

hypandrium is the ventral sclerite of the male genitalia. Called theca by Speight (1987: 166).

hypopleuron. As used by Curran (1934: 489, 486), the hypopleuron corresponds to the ventroposterior part of the meron and metaepisternum.

Incisure. In some syrphids, such as *Palpada lindneri* (fig. 18), the posterior margins of some of the abdominal terga become semimembranous and are differently colored, usually yellow. Hence, the phrase "abdominal incisures yellow" is used (Williston 1887: 288).

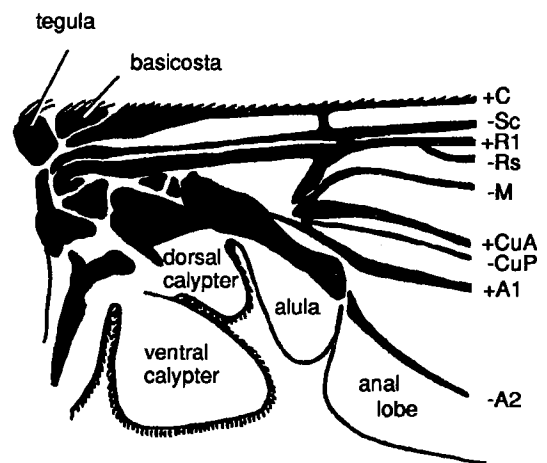


Fig. 3. Wing base, dorsal view.

katatergum is the dorsoposterior plate of the mesothoracic pleuron anteroventrad of the anatergum. Katatergite of McAlpine, laterotergite (in part) of earlier authors.

katepimeron is the posteroventral plate of the mesothoracic pleuron, dorsad of the meron. Frequently the demarcation between the katepimeron and meron is weak. The katepimeron is occasionally pilose. Barrette of earlier authors.

katapisternum is the anteroventral plate of the mesothoracic pleuron. Sternopleuron of earlier authors.

lamina (pl. laminae, adj. laminate). A large thin extension of the exoskeleton. Plate or flange of various authors. See armature.

lateral (adv. laterally, laterad). Adjective (adverb) meaning of the side, away from the center. Opposite of medial. See Orientation.

lateral facial strip (Shannon, 1922: 118). Same as paraface.

lateral postnota. Used by Speight (1987: 159) for the anatergum and katatergum.

laterotergite. Same as anatergum. Sometimes used in the plural for both katatergum and anatergum (Speight 1987).

leg. The ventrolateral locomotion organs.

length. See size.

lingula. An apicomedial projection on the venter of the hypandrium.

lunulate. An adjective for macula which is crescent-shaped. Less strongly curved maculae are described as arcuate. See Markings.

lunule is the area of different texture on the anterior edge of the frons. This area is usually shiny, bare and frequently differently colored than the rest of the frons.

macula (pl. maculae) is any kind of marking that is not a vitta or fascia. The term is usually used with adjectives to describe the mark, such as arcuate, lunulate, rectangular, punctate and triangular (*q.v.*).

marginal cell. Same as cell R1.

markings (pattern). Flower flies usually display intricate bright color patterns, made up of various kinds of markings. These markings are of three basic types: fasciae, maculae and vittae (bands, marks and stripes). Various adjectives, such as arcuate, lunulate, punctate, etc., are used to more precisely define these markings.

medial. Adjective meaning of the middle, towards the center. Opposite of lateral. See Orientation.

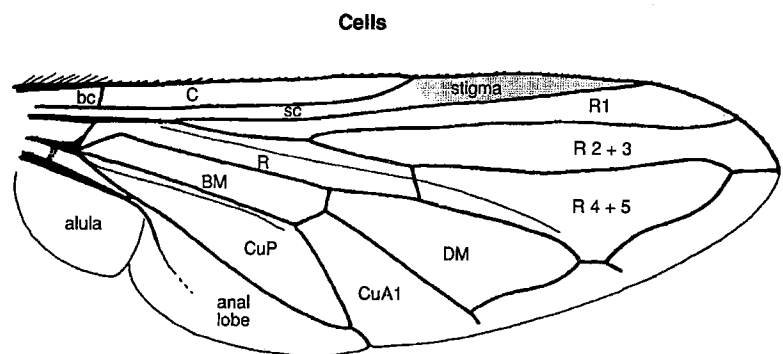


Fig. 4. Cells of wing, dorsal view.

Mediastinal cell (Hull 1949: 260). Same as 2nd costal cell.

meron is the posteroventral plate of the mesothoracic pleuron ventrad to katepimeron. The demarcation between these two plates is usually indistinct. The meron is bare except the posterior margin anterior to the posterior spiracle may be pilose (see posterior spiracular fringe).

meropleuron (meropleurite) is the term for the fusion plate of the katepimeron and meron. Same as hypopleuron of earlier workers.

meso-. A prefix used to indicate the middle (mid) leg or its components, such as mesotibia.

mesonotal [pile] collar. Some syrphine groups (*Asarkina*, *Ocyptamus*) have a transverse row of longer and more erect pile, which Vockeroth (1969: 18) termed the anterior mesonotal collar.

mesonotum is the term for the dorsal part of the mid thoracic segment and includes both the scutum and scutellum. Frequently incorrectly used for just the scutum.

mesoanepisternum. Same as anepisternum.

mesoanepimeron. Same as anepimeron.

mesopleuron. Same as anepisternum.

Mesoscutellar lobe. Same as scutellum.

Mesoscutum. Same as mesonotum.

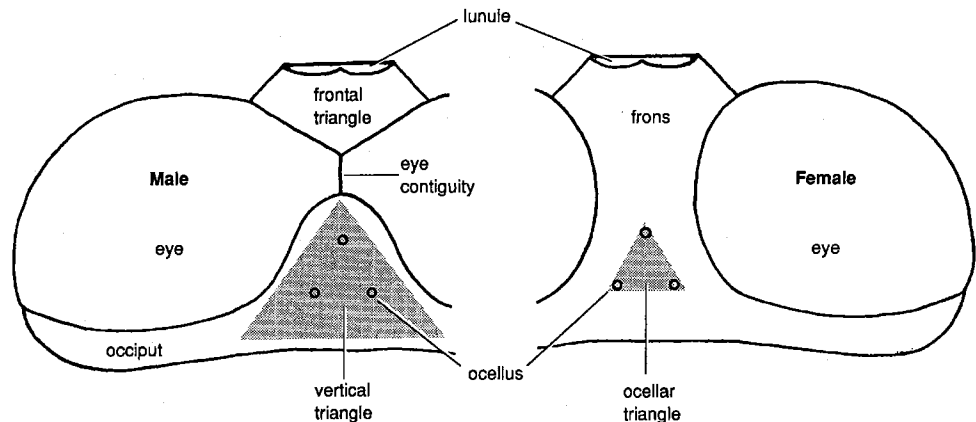


Fig. 5. Head parts, dorsal view.

meta-. A prefix used to indicate the last (hind) leg or its components, such as metafemur.

metapleuron of Curran (1934: 489) and others is a combination of the katatergum and anatergum. This term is also used sometimes for metathoracic pleuron.

metathoracic spiracular pile patch (Thompson 1972: 83). Same as posterior spiracular fringe.

metasternum. The area anterior to metacoxa and ventrad to the meron. The presence or absence of pile on the metasternum as well as the degree of development of the metasternum are important characters for the higher classification of syrphids. As noted

by Speight (1987: 158) and others, the metasternum is not the appropriate morphological term for this structure, which is more properly the metabasisterno-precoxite, a term which Speight admits is not likely to be met with general approval. Hence, he introduced the new term premetacoxite. As all taxonomic work has used metasternum since Shannon introduced it, this usage is accepted here.

metathoracic pleuron. The lateral portions of the reduced third thoracic segment. Only the metepimeron and metepisternum may provide taxonomic characters.

metepimeron. The posterior portion of the metathoracic pleuron.

metepisternum. The anterior portion of the metathoracic pleuron.

microtrichose (noun, microtrichium (singular), microtrichia (plural)). Small pile-like extension of exoskeleton. See vestiture.

notopleuron is the anterolateral region of the scutum bounded by postpronotum anteriorly and transverse suture.

ocellar triangle is a region on vertex defined by the ocelli. The ocellar triangle is a subregion of the vertical triangle, not synonymous with it.

Notal wing lamina. A large flap-like extension of the mesonotum covering the base of the wing. Found only in some merodontine genera (*Nausigaster*).

Notal wing shield (Thompson 1972). Same as notal wing lamina.

ocellar tubercle. Same as ocellar triangle.

ocellus (pl. ocelli). One of the three simple eyes present dorsally between the larger compound eyes.

occiput. The posterior area of the head, limited anteriorly by the eyes, dorsally by vertex and ventrally by genae. In some groups, the occiput may be uniformly swollen (*Microdon (Rhoga)*) or swollen dorsal (*Rhopalosyrphus*). In other groups, the nature of the vestiture on the lateral portions of occiput is an important species group character (see Thompson 1981: 35). Speight (1987: 145) used the term post-ocular orbit for the lateral portion.

orbital strips. Same as paraface.

orientation. A fly or any object can be divided by three planes, the horizontal, sagittal and transverse planes, each plane being 90 degrees to the other. While there are numerous terms to describe orientation, only 4 pairs of terms are really all that are necessary: anterior - posterior, apical - basal, dorsal - ventral and lateral - medial (*q.v.*).

paraface (parafacial, adj). In some flower flies, the anterior tentorial arms are elongate and separate off a narrow strip from the face. This area, paraface, is usually very narrow, pilose and pollinose, whereas the face is frequently bare and shiny. McAlpine (1981) uses the term "para-

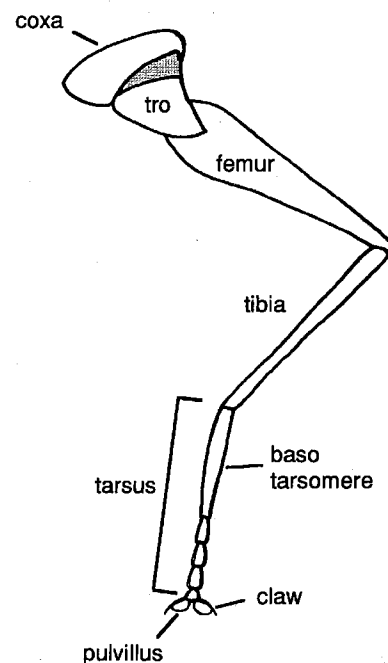


Fig. 6. Leg part, lateral view

facial," but as this is an adjective, the noun is preferred in most sentence constructions. Speight (1987: 144) use the term orbital strips.

paramere of McAlpine (1981) is the superior lobe (*q.v.*).

pectus. A descriptive term used for the ventral area of the thorax, including the ventral half of the katepisternum, metasternum and ventral portion of meron (Williston 1887: 288, Curran 1934: 488).

pedicel. The second segment of the antenna, situated between the scape and flagellum. This term is sometimes used for the frontal prominence.

petiole, petiolate. A petiole is a stem and petiolate is an adjective meaning having a stem. In syrphid taxonomy, these terms are used in reference to various cells of the wing and to the shape of the abdomen.

pile (pilis (singular), adj. **pilose**). The latin noun for hair, pilis the singular and pilose for the adjective. Pilose is the condition of having hairs. See vestiture.

plate. Same as lamina. See armature.

pleurotergite. Same as katatergum.

plumula. A fringed posterior extension of the dorsal edge of anepimeron, which lies ventral to the calypter.

pollinose (pollen (singular)). The condition of being covered with opaque material that may appear like fine powder or dust. The material is microtrichia. In syrphids, the term pollinose is used generally for any body area (except wing) covered by microtrichia. See vestiture.

postalar callus is the posterolateral region of the mesoscutum separated from the scutum proper by a broad shallow furrow.

postalar pile tuft is situated on postalar ridge anterior to the postalar callus and posterior to the wing base.

posterior (adv. posteriorly). Adjective (adverb) meaning behind, in back, away from head end. Opposite of anterior. See Orientation.

posterior cell. Same as cell R4+5.

posterior crossvein. Same as crossvein dm-cu.

posterior lobe [of wing] (Hull 1949: 260). Same as alula.

posterior spiracular fringe is

a row or patch of long pile anterior to and / or ventrad of the posterior spiracle. The character was introduced by Thompson (1972: 83) as the metathoracic spiracular pile patch.

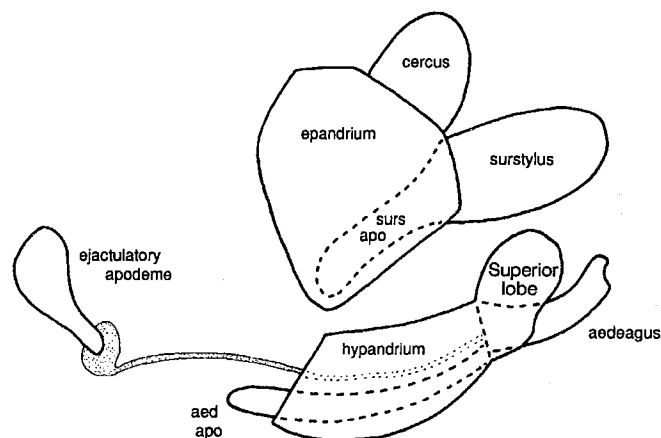


Fig. 7. Male genitalia parts, lateral view

postmetacoxal bridge is a sclerotized band that extends the metathoracic pleura from one side to the other. The exact nature of the structure is not known, but the bridge occurs in microdontines, some syrphines and eristalines. Except for the microdontines, this bridge tends to be correlated with petiolate abdomens and enlarged metafemora.

post-ocular orbit. A term for the lateral portion of the occiput.

postpronotum is a distinct plate on the anterolateral corner of the mesonotum. Humerus of traditional authors.

premarginal sulcus. A shallow groove (farrow) mesial to the margin of a sclerite. In flower flies, premarginal sulci are commonly found on the scutellum and abdomen. The term **lira** is used for the bead-like ridge that is formed by the sulcus. In earlier literature, the presence of the sulcus was referred to by stating that the structure was "emarginate or margined," such as abdomen margined or emarginate.

premetacoxite. Same as metasternum.

presutural area, callus, depression. Same as notopleuron, notopleural callus or depression.

pro-. A prefix used to indicate the first (fore) leg or its components, such as profemur.

pronotum is the dorsal part of the anterior most thoracic segment. The pronotum is greatly reduced in Diptera. Only the posterior portion is distinct in flies (see postpronotum). Sometimes pronotum is used as synonymous with postpronotum.

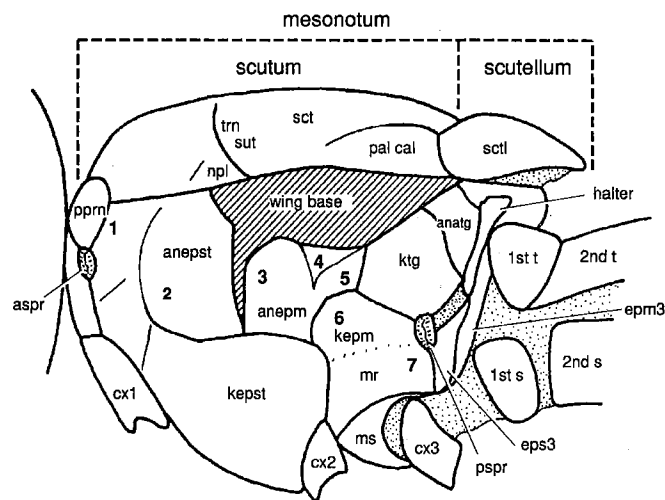


Fig. 8. Thorax and base of abdomen, parts, lateral view.

1 = anterior anepisternum; 2 = posterior anepisternum; 3 = anterior anepimeron; 4 = dorsomedial anepimeron; 5 = posterior anepimeron; 6 = katepimeron; 7 = area where the posterior spiracular fringe is found; 1st T, 2nd T = terga, first and second; 1st S, 2nd S = sterna, first and second; anatg = anatergum; anepm = anepimeron; anepst = anepisternum; aspr = anterior spiracle; cx1, cx2, cx3 = coxa, fore, mid and hind; epm3 = metaepimeron; eps3 = metaepisternum; ktg = katatergum; kepm = katepimeron; kepst = katepisternum; mr = meron; ms = metasternum; pal cal = postalar callus; ppn = postpronotum; pspr = posterior spiracle; sctl = scutellum; sct = scutum; trn sut = transverse suture.

proximal. Same as basal.

pruinose. Same as pollinose. See vestiture.

pteropleuron. Same as anepimeron. Pteropleuron of Curran (1934: 489) is a combination of mesoanepimeron, mesokatepimeron and meron.

pubescent is an adjective referring to having very long dense microtrichia, which appears like velvet. Sometimes a sclerite may appear to be pilose because the pubescence is long, but closer inspection should reveal the lack of alveoli (sockets, pits) at the base of the microtrichia. See vestiture.

pulvillus is the apicolateral pad on the apex of the tarsus.

punctum (pl. puncta) refers to a small round pit or hole in the integument.

punctate is an adjective used to modify macula to refer to a round spot. Rarely the adjective is used to refer to the integument (as in genus *Nausigaster*) or to pollinose areas (as on the face of *Carposcalis* species), in these cases it means that the integument or the pollinosity has small round pits.

rim refers to a bead-like ridge which is created by a shallow pre-marginal furrow. Same as lira.

scale is a broadly flattened pilis (hair).

scape. The basal or first segment of the antenna.

scutellar fringe. Same as ventral scutellar fringe.

scutellum is the posterior part of the notum. In flies, scutellum is accepted to apply to the mesoscutellum only. The shape, pile and color of the scutellum offer valuable species characters. The apicoventral margin of the scutellum frequently has pile and such pile is referred to as the "ventral scutellar fringe" (*q.v.*). The dorsoapical margin of the scutellum may appear to have a rim, which is created by a premarginal sulcus or furrow (see rim).

scutum. The large anterior portion of the notum. In flies, scutum is accepted to apply to the mesoscutum.

second antennal segment. Same as pedicel.

second basal cell. Same as cell BM.

second posterior cell (Hull 1949: 260). Same as cell DM.

second vein. Same as vein R2+3.

seta (pl. setae, adj. setate). A long thick macrotrichium. Bristles of various authors. See vestiture.

setula (pl. setulae, adj. setulate). A short thick macrotrichium. See vestiture.

size. Syrphids do vary in size, especially the predaceous syrphines due to larval food consumption. Hence, accuracy in measurements need not be high and is usually only whole millimeters. The usual size measurements are body and wing length: Wing length is measured from the basicosta to apex; body length from tip of antenna to tip of abdomen.

spiracle. In Diptera, there are only two thoracic spiracle, the meso and metathoracic spiracles, which are for convenience referred to as the anterior and posterior spiracles. The thoracic spiracles are mainly used as landmarks to identify the various parts of the pleuron. However, in some cristaline groups, the size of the posterior spiracle varies and is used as a generic characters.

spina (pl. spinae, adj. spinate, spinose). A non-articulating elongate extension of the exoskeleton. Spine of Snodgrass and Torre-Bueno. See armature.

spine. Same as a seta, usually described as "short spinose seta." The term usually is used for seta found apicoventrally on metafemur of Milesiine syrphids, such as in the genus *Xylota*. Also, used for elongate non-articulating extensions of the exoskeleton. See armature.

spot. Same as macula.

spur. Same as calcar. See armature. Sometimes spur has been used in reference to wing venation. Spur in this sense is a short supplementary extension to a vein or crossvein, which is here referred to as an appendix (*q.v.*).

spurious vein. The sclerotization of the convexity between the radial and medial field of the wing appears like a vein and is termed the spurious vein.

squama. Same as calypter.

sternopleuron. Same as katepisternum.

sternite. Same as sternum.

sternum (pl. sterna). The ventral plate of an abdominal segment. While McAlpine (1981) recommends the use of sternite as the remaining plate in Diptera is only part of the whole, I have accepted the reasoning of Snodgrass (1935, 1963) and followed the tradition of Crampton and have used the sternum.

stigmatal (stigmatal) crossvein. A thickening of the wing membrane in the stigmatal area which appears like a crossvein.

stripe. Same as vitta.

style is a term for the arista when the arista is thick (stout) and apical (terminal) in position.

Speight (1987: 166) uses style for the surstylus.

subapical cell (Hull 1949: 260). Same as cell R4+5.

subepaulet. Same as basicosta.

submarginal cell. Same as cell R2+3.

subscutellar fringe. Same as ventral scutellar fringe.

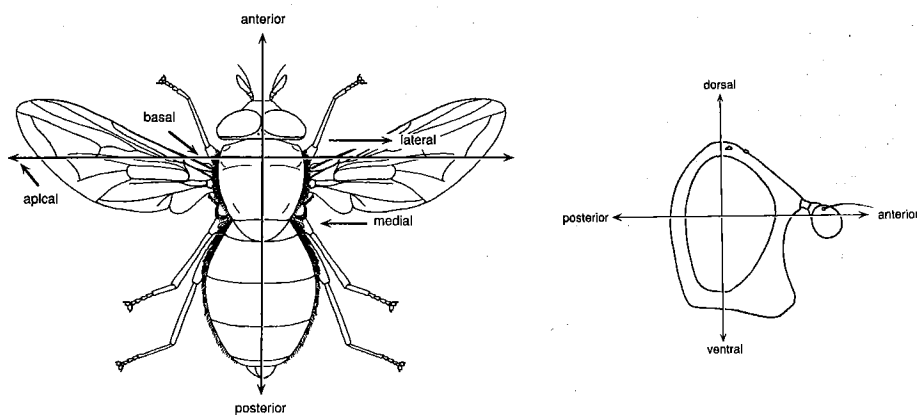


Fig. 9. Orientation of a fly, dorsal and lateral views.

sulcus (sulci, sulcate). A groove or shallow depression of purely functional origin. In flower flies, the scutellum and abdomen frequently have premarginal sulci (*q.v.*)

superior lobe. This is the paramere of McAlpine (1981). The use of paramere in the Manual was enforced by editorial policy. There is no clear evidence to suggest that the articulating structure laterad to the aedeagus in syrphids is the paramere, it may be a gonopod. In some syrphid groups (microdontines), this structure is missing, in others it is articulating (syrphines) or fused to the hypandrium (most eristalines). Until the exact homology of parts of the male genitalia can be worked out, I prefer to use the neutral term originally introduced by Metcalf (1921) for this structure.

surstylus (pl. styli). The clasping organs of the male genitalia.

surstylar apodeme is a plate ventrad to the cercus, is surrounded by the epandrium, dorsally articulates with or is fused to the surstyli, and ventrally articulates with the dorsoanterior margin of the hypandrium.

tarsus (pl. tarsi). The fifth part of the leg.

tarsomere (pl. tarsomeres). The parts of the tarsus.

tegula is a large scale-like structure at the anterior base of the wing, the color of which is a useful species character among the eristalines.

tenth sternum is the same as surstylar apodeme.

tentorium is an invagination of the exoskeleton for form a support structure for the head. Where the exoskeleton is invaginated, pits are formed. These pits are either oval or elongate.

tergite. Same as tergum.

tergum (pl. terga). The dorsal plate of an abdominal segment. As explained under sternum, I prefer to use the tergum instead of tergite.

terminal. Same as apical.

terminalia. Same as genitalia.

theca. Same as hypandrium.

third antennal segment. Same as basoflagellomere.

third vein. Same as vein R4+5.

thorax. The second (middle) division of the insect body.

tibia (pl. tibiae). The fourth part of the leg.

tomentose is an adjective used to refer to very thick and opaque pile as found in the genera *Meromacrus* and *Quichuana*.

tooth (teeth). Same as dens (dentis). See armature.

transverse sulcus. Same as transverse suture.

transverse suture. A transverse sulcus that runs across the mesonotum just anterior to bases of the wings. Speight (1987: 154) correctly notes that as this feature is intra-scutal, the proper term is sulcus, not suture. However, the traditional taxonomic usage is retained here.

trochanter. The small second part of the leg, connecting the coxa to the femur.

tubercle (adj. tuberculate). The face is frequently produced anteromedially into a distinct swelling, termed the tubercle. The presence or absence of a tubercle is frequently used

as a generic character and the shape as a species character. Tubercle is used for small distinct rounded protuberance elsewhere, such as on the metafemur.

unmarginate as in "abdomen unmarginate." This condition is referred to as "abdomen with premarginal sulcus." See premarginal sulcus.

vein M1. When vein M2 is present (usually as a short spur vein at the apicoposterior corner of cell R4+5), then clearly the apical crossvein of earlier authors is vein M1. When vein M2 is lost, then the crossvein should be referred to as the last section of vein M. However for consistency, I always refer to the vein closing cell R4+5 as vein M1.

veins. The names for the veins follows the "Comstock-Needham" system as interpreted and presented by McAlpine (1981) and labelled in figure.

ventral (adv. ventrally, ventrad). Adjective (adverb) meaning of or belonging to lower surface. Opposite of dorsal. See Orientation.

ventral scutellar fringe. The ventral surface of the scutellum may have long pile, which is referred to as the ventral scutellar fringe or scutellum with ventral fringe.

vertical bump (Curran 1925: 14). Same as ocellar triangle.

vertical triangle. In males when the eyes are holoptic, the vertex forma a triangular area, termed the vertical triangle. The shape of this triangle can vary greatly and is used as a species group character in *Ocyptamus* (Thompson 1981).

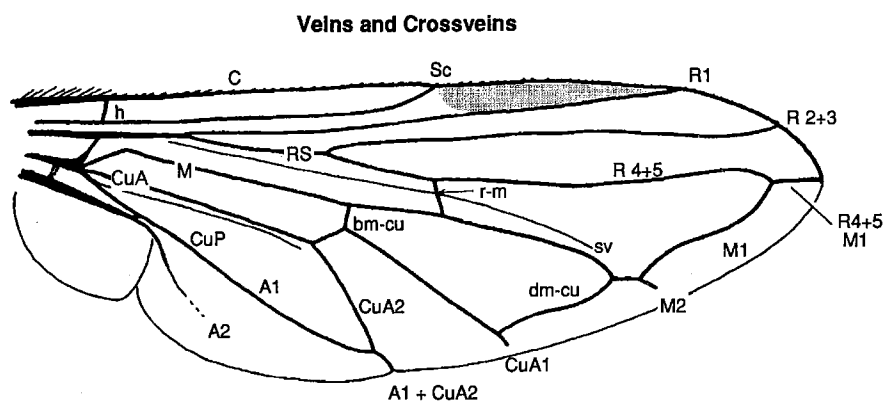


Fig. 10. Veins of wing, dorsal view.

vertex is the dorsal most portion of the head, bounded by the frons anteriorly, the eyes laterally and the occiput posteriorly. The ocellar triangle is within the vertex. The vertex is frequently of different color, pollinosity and pile than the frons.

vestiture. The integument of flies is covered with two basic types of vestiture: microtrichia and macrotrichia. While there are only these two fundamental types, the form of each varies greatly, giving raise to a long complex history of conflicting terminology. Microtrichia have been referred to as tomentum, pubescence, pruinescence, pollinosity, etc. Macrotrichia includes setae (bristles), pile (hair) and setulae (spines). Macrotrichia differ from microtrichia as they are connected to nerves and are surrounded at the base

by a membranous alveolus (socket). I have followed Linnaeus and earlier dipterists and have standardized on the following terms for the various types of vestiture found in syrphids. Macrotrichia are divided into three kinds based on thickness and length: setae are long and thick; setulae are short and thick; and pile is used for long or short thin macrotrichia. Pile is pleural, with pilis singular, and pilose, the adjective. Sometimes adjectives are used to describe specialized pile, such as tomentose pile, for the specialized thick, opaque pile found in the genera *Meromacrus* and *Quichuana*. Only two terms are used for microtrichia even though microtrichia can vary greatly in shape. Microtrichia (usually as the adjective, microtrichose) are used from the vestiture of the wing membrane. Pollen (usually as the adjective, pollinose) is used for the microtrichia on body.

villis (pl. villi). Same as wing microtrichium. See vestiture.

vitta (pl. vittae, adj. vittate) is an anterior to posterior (longitudinal) line. See Markings.

wing is the large dorsolateral membranous flight organ.

Acknowledgements

I thank David A. Grimaldi, the American Museum of Natural History, New York (AMNH); K. G. V. Smith, Adrian Pont and Brian Pitkin, the Natural History Museum (formerly the British Museum (Natural History)), London (BMNH); Paul Arnaud, California Academy of Natural Sciences, San Francisco (CAS); George Wallace and Chen Young, Carnegie Museum of Natural History, Pittsburg (CMS); J. R. Vockeroth, Canadian National Collection, Agriculture Canada, Ottawa (CNC); Manuel Zumbado, Instituto Nacional de Biodiversidad, Heredia (INBio); A. O. Bachmann and Adriana Oliva, Museo Argentino de Ciencias "Bernardino Rivadavia," Buenos Aires; Jesus S. Moure, Departamento de Zoología, Universidade Federal do Paraná, Curitiba (MZFUP); Nelson Papavero and Francisca do Val, Museu de Zoologia, Universidade de São Paulo, São Paulo (MZUSP); Ruth Lichtenberg, Naturhistorisches Museum, Vienna (NMW); W. Tobias, Senkenbergische Museum, Frankfurt am Main (SMF); Uwe Kallweit, Staatlichen Museum für Tierkunde, Dresden; Paul Hanson, University of Costa Rica, San José (UCR); Danilo Cepeda M., Universidad de Chile, Santiago (UCS); H. Schumann and Marion Kotrba, Zoologisches Museum der Humboldt-Universität, Berlin; for permission to study material in their care. I also thank Drs. Neal Evenhuis, Bishop Museum, Honolulu; Wayne N. Mathis, Department of Entomology, Smithsonian Institution, Washington (USNM); J. R. Vockeroth, Canadian National Collection, Agriculture Canada, Ottawa; Arnold Menke, Douglass R. Miller, Alan Norrbom, Systematic Entomology Laboratory, USDA, Washington; for their critical reviews of the manuscript. Adrian Pont reviewed the translation of *Pia*, for which I am grateful.

Literature cited

- Aguilera P., A. & Pacheco V., C.
1995 Determinacion de depredadores del pulgon del avellano europeo, *Myzocallis coryli* (Goeze) (Homoptera: Aphididae) en la IX region de Chile. *Revta Chil. Entomol.* 22: 17-19.
- Arroyo, M. T. K., Primack, R. & Armesto, J.
1982 Community studies in pollination ecology in the high temperate Andes of Central Chile. I. Pollination mechanisms and altitudinal variation. *Amer. J. Bot.* 69: 82-97.
- Capelle, K. J.
1956 The genus *Rhopalosyrphus*, with a description of a new species from Arizona. *J. Kansas Entomol. Soc.* 29: 170-175.
- Carrera, M. & Lenko, K.
1958 Descrição de duas espécies novas de *Mixogaster* (Diptera, Syrphidae) e observações sobre o inquilinismo de uma delas em ninhos de *Iridomyrmex humilis*, a "formiga argentina". *Studia Entomol.* 1: 465-486.
- Carrera, M., Lopes, H. de S. & Lane, J.
1947 Contribuição ao conhecimento dos "Microdontinae" neotrópicos e descrição de duas novas espécies de "*Nausigaster*" Williston (Diptera, Syrphidae). *Revta Brasil. Biol.* 7: 471-486.
- Collin, J. E.
1920 *Eumerus strigatus* Fallen and *tuberculatus* Rondani (Diptera, Syrphidae). *Entomol. mon. Mag.* (3)6: 102-106, pl. 3.
- Crampton, G. C.
1942 The external morphology of the Diptera. *State Conn. State Geol. Nat. Hist. Surv., Bull.* 64: 10-165.
- Curran, C. H.
1925 Contribution to a monograph of the American Syrphidae from north of Mexico. *Kansas Univ. Sci. Bull.* (1924) 15: 7-216.
1934a *The families and genera of North American Diptera.* 512 pp. New York
1934b Diptera of Kartabo, Bartica District, British Guiana. *Bull. Amer. Mus. Nat. Hist.* 66: 287-532.
1939 Synopsis of the American species of *Volucella* (Syrphidae; Diptera). Part I. Table of species. *Amer. Mus. Novit.* 1027, 7 pp.
1941 New American Syrphidae. *Bull. Amer. Mus. Nat. Hist.* 78: 243-304.
1951 Synopsis of the North American species of *Spilomyia* (Syrphidae, Diptera). *Amer. Mus. Novit.* 1492, 11 pp.
1953 Notes and description of some Mydidae and Syrphidae. *Amer. Mus. Novit.* 1645, 15 pp.
- Doesburg, P. H. van
1966 Syrphidae from Suriname. Additional records and descriptions. *Stud. Fauna Suriname (Natuurwet. Stud. Suriname)* 9 (25): 61-107.
- Dusek, J. & Laska, P.
1985 A review of the genus *Scaeva* Fabricius (Diptera: Syrphidae) with the description of a new species from Chile. *Acta entomol. bohemoslovaca* 82: 206-228.

- Enderlein, G.
1938 Beiträge zur Kenntnis der Syrphiden. *Sitzber. Gesell. Naturf. Freunde, Berlin* 1937: 192-237.
- Fish, D. & Beaver, R. A.
1978 A bibliography of the aquatic fauna inhabiting Bromeliads (Bromeliaceae) and Pitcher plants (Nepenthaceae and Sarraceniaceae). *Proc. Ant-Mosquito Assoc. 49th Meeting* :12-19.
- Fluke, C. L.
1937 New South American Syrphidae (Diptera). *Amer. Mus. Novit.* 941, 14 pp.
1942 Revision of the Neotropical Syrphini related to *Syrphus* (Diptera, Syrphidae). *Amer. Mus. Novit.* 1201, 24 pp.
1943 A new genus and new species of Syrphidae (Diptera) from Ecuador. *Ann. Entomol. Soc. Amer.* 36: 425-431.
1945 The Melanostomini of the Neotropical Region (Diptera, Syrphidae). *Amer. Mus. Novit.* 1272, 29 pp.
1951a The genus "*Dolichogyna*" (Diptera, Syrphidae). *Acta Zool. Lilloana* 12: 465-478.
1951b Syrphid flies related to *Volucella scutellata* Macquart. *Amer. Mus. Novit.* 1503, 33 pp.
- Fluke, C. L. & Weems, H. V., Jr.
1956 The Myoleptini of the Americas (Diptera, Syrphidae). *Amer. Mus. Novit.* 1758, 23 pp.
- Freitas, C. D.
1983 Estudos sobre os Syrphidae neotrópicais. 1. Redescricao de *Pseudodorus clavatus* (Fabricius, 1974)(Diptera). *Revta brasil. Biol.* [1982] 42: 583-587.
1989 Descrição da fema, genitalia do macho e larva de *Ocyrtamus sativus* (Curran 1941) (Diptera: Syrphidae). *Mem. Inst. Oswaldo Cruz, Rio de Janeiro* 84 (suppl. 4): 219-22.
- Garces González, G. & Rodriguez Velázquez, D.
1994 Nuevos registros de sirfidos (Diptera: Syrphidae) para Cuba. *Revta Biol. Trop.* 42: 386-387.
- Gerdes, C.
1975 A new species of Ecuadorean *Toxomerus* (Diptera: Syrphidae). *Entomol. News* [1974] 85: 279-283.
1975 Notes on types of *Toxomerus* (Diptera: Syrphidae). *Entomol. News* 86: 13-22.
- Guppy, P. L.
1913 Life-history of syrphid fly predaceous on froghopper nymphs. *Bull. Dept. Agric. Trinidad & Tobago* 12: 159-161.
1914 Breeding and colonizing the syrphid. *Bull. Dept. Agric. Trinidad & Tobago* 13: 217-223, pls. 1-2.
- Harbach, R. E.
1974 A new Neotropical syrphid fly, *Mesograptia apegensis* (Diptera: Syrphidae). *Proc. Entomol. Soc. Washington* 76: 31-34.
1984 A new species of *Toxomerus* (Diptera, Syrphidae) from Brazil with notes on three related species. *Proc. Entomol. Soc. Washington* 86: 840-844.
- Hippa, H.
1978 Classification of Xylotini (Diptera: Syrphidae). *Acta Zool. Fennica* 156, 153 pp.

- 1986 Morphology and taxonomic value of the female external genitalia of Syrphidae and some other Diptera by new methodology. *Annales zool. fenn.* 23: 307-320.
- 1990 The genus *Milesia* Latreille (Diptera, Syrphidae). *Acta Zool. Fenn.* 187, 226 pp.
- Hippa, H. & Thompson, F. C.
- 1983 *Meropidia*, a new genus of flower flies (Diptera: Syrphidae) from South America. *Papeis avuls. Zool. S. Paulo* 35: 109-115.
- 1994 Revision of the *Sterphus cybele* species group (Diptera: Syrphidae). *Proc. Ent. Soc. Wash.* 96: 483-495.
- Hogue, C. L. & Miller, S. E.
- 1981 Entomofauna of Cocos Island, Costa Rica. *Atoll Res. Bull.* 250, 28 pp. [no syrphids]
- Hull, F. M.
- 1938 Exotic forms of syrphid flies. *Ann. Carnegie Mus.* 27: 121-128, pl. 8.
- 1942 The flies of the genus *Meromacrus*. *Amer. Mus. Novit.* 1200, 19 pp.
- 1943a The genus *Mesogramma*. *Entomol. Amer.* 23: 1-41.
- 1943b The genus *Ceriogaster* Williston (Syrphidae). *Revta Soc. Entomol. Argentina* 12: 138-140.
- 1946a The genus *Quichuana* Knab. *Amer. Mus. Novit.* 1317, 17 pp.
- 1946b The genus *Lepidostola* Mik. *Amer. Mus. Novit.* 1326, 15 pp.
- 1949a The morphology and inter-relationship of the genera of syrphid flies, recent and fossil. *Trans. zool. Soc. London* 26(4): 257-408.
- 1949b The genus *Baccha* from the New World. *Entomol. Amer.* 27 [1947]: 89-291.
- 1954 The genus *Mixogaster* Macquart (Diptera: Syrphidae). *Amer. Mus. Novit.* 1652, 32 pp.
- Jiron, L. F. & Gonzalez, I. M.
- 1990 *Index of entomological publications of Costa Rica updated to 1985*. i-xiii, 13-433 pp. Univ. Costa Rica, San Jose
- Jiron, L. F. & Hedstrom, I.
- 1985 Pollination ecology of Mango (*Mangifera indica* L.) (Anacardiaceae) in the neotropical Region. *Turrialba* 35: 269-277.
- Lagrange, E. B.
- 1986 Notas sobre el genero *Palpada* Macquart, 1834 (Diptera Syrphidae). *Neotropica (La Plata)* 32: 97-103.
- 1987 Una nueva especie del genero *Palpada* Macquart, 1834 (Insecta, Diptera, Syrphidae). *Neotropica (La Plata)* 33: 41-44.
- 1989 Revision de las especies Argentinas del grupo *scutellaris* del genero *Palpada* Macquart, 1834 (Diptera, Syrphidae). *Neotropica (La Plata)* 35: 15-34.
- 1990a Revision de las especies Argentinae del grupo *agrorum* del genero *Palpada* Macquart, 1834 (Diptera, Syrphidae). *Revta Assoc. cien. nat. Litoral* 21: 3-40.
- 1990b Las especies Argentinas del genero *Meromacrus* Rondani (Diptera, Syrphidae). *Revta bras. Ent.* 34: 489-498.
- 1992a Revision de las especies Argentinas del grupo *vinetorum* del genero *Palpada* Macquart 1834 (Diptera, Syrphidae). *Revta Soc. ent. Argentina* 50: 145-166.
- 1992b Dos especies nuevas del genero *Dolichogyna* (Diptera: Syrphidae). *Neotropica (La Plata)* 38: 119-126.
- Lindner, E.
- 1928 Die Ausbeute der Deutschen Chaco-Expedition. Diptera. Einleitung, I. Trypetidae und II. Pterocallidae. *Konowia* 7: 24-36.

- Linnaeus, C.
1758 *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Ed. 10, Vol. 1. 284 pp. L. Salvii, Holmiae [=Stockholm].
- Maes, J.-M.
1989 Catalogo de los Insectos controladores biologicos en Nicaragua. Volumen I. Insectos depredadores (Primera Parte). *Revta Nicarag. Entomol.* 8: 1-106.
- Maier, C. T.
1987 New distributional and rearing records for Neotropical flower flies (Diptera: Syrphidae). *Proc. Entomol. Soc. Washington* 89: 369.
- Maldonado Capriles, J. & Berrios, A.
1977 The immature stages of *Copestylum vacuum* (F.) (Diptera: Syrphidae), a new record for Puerto Rico. *J. Agric. Univ. Puerto Rico* 6: 395-399.
- McAlpine, J. F.
1981 Morphology and Terminology — Adults. Pp. 9-63. In McAlpine, J. F., *et alia* (eds.), *Manual of Nearctic Diptera*. Vol. 1, vi + pp. 1-674. Res. Br., Agric. Canada, Monogr. 27.
- Metcalf, C. L.
1921 The genitalia of male Syrphidae: their morphology, with especial reference to its taxonomic significance. *Ann. Ent. Soc. Amer.* 14: 169-214.
- Nichols, S. W. (compiler)
1989 *The Torre-Bueno glossary of Entomology*. Revised Edition. xvii + 840 pp. New York Entomological Society, New York
- Olesen, J. M.
1991 *Trigona*-mimicking hoverflies (Diptera: Syrphidae) in the Amazonian rainforest? *Brit. J. Ent. Nat. Hist.* 1991: 47.
- Oram, D. A.
1991 [*Syrphus octomaculatus* (Walker)(Syrphidae) from Falkland Islands.] P. 38. In Chandler, P. J. (compiler), Diptera. Pp. 35-38. In 1990 Annual Exhibition, Imperial College, London SW7—27 October 1990. *Brit. J. Ent. Nat. Hist.* 4: 19-61.
- Osten Sacken, C. R.
1896 Notice on the terms: Tegula, antitegula, squama and alula, as used in Dipterology. *Berlin. Ent. Zeitg* 1896: 285-288.
1897 On the terms Calyptratae and Acalyptratae, calypta and calyptra, as they have been used in entomology. (A supplement to my article: Notice on the terms: Tegula, antitegula, squama and alula in the Berl. Ent. Zeitschr. 1896, p. 285-288). *Berlin Ent. Zeitg* (1896) 41: 328-388.
- Peck, L. V.
1988 Family Syrphidae. Pp. 11-230. In Soos, A. (ed.), *Catalogue of Palaearctic Diptera*. Vol. 8, Syrphidae - Conopidae. 363 pp. Akademiai Kiado, Budapest.
- Philippi, R. A.
1865 Aufzählung der chilenischen Dipteren. *Verhandl. K.-k. Zool. Bot. Gesell. Wien 15 (Abhandl.)*: 595-782.
- Ramirez García, E.
1997 Syrphidae. Pp. 371-373. In González Soriano, E., Dirzo, R. & Vogt, R. C. (eds.), *Historia natural de Los Tuxtlas*. Universidad Nacional Autónoma de México, México. xiii + 648 pp.

Reiss, F. & Schacht, W.

- 1983 Die Typen der von J. B. v. Spix und C. F. Ph. v. Martius gesammelten und von M. Perty beschriebenen Dipterenarten (Insecta) in der Zoologischen Staatssammlung München. *Spixiana (Suppl.)* 9: 307-312.

Robinson, G. S.

- 1984 *Insects of the Falkland Islands: A checklist and bibliography*. ii + 38 pp. British Museum (Natural History), London

Sack, P.

- 1920 Die Gattungen *Salpingogaster* Schiner und *Meromacrus* Rondani. *Zool. Jahrb., Abt. System., Geog. Biol. Tiere* 43: 235-272.

Schmid, R.

- 1969 Notes on the reproductive biology of *Asterogyne martiana* (Palmae). Part I - Inflorescence and floral morphology: Phenology. Part II - Pollination by syrphid flies. *Principes* 14: 3-9, 39-49.

Sedman, Y. S.

- 1965 The genus *Valdivia* Shannon. *Proc. Entomol. Soc. Washington* 67: 197-201.
1975 A preliminary report on the Syrphidae (Diptera) of Belize, with the description of a new species. *Entomol. News* 86: 199-206.

Seifert, R. P.

- 1975 Clumps of *Heliconia* inflorescences as ecological islands. *Ecology* 56: 1416-1422.

Seifert, R. P. & Seifert, F. H.

- 1976a A community matrix analysis of *Heliconia* insect communities. *American Naturalist* 110: 461-483.
1976b Natural history of insects living in inflorescences of two species of *Heliconia*. *J. New York Entomol. Soc.* 84: 233-242.

Shannon, R. C.

- 1922 A revision of the Chilosini (Diptera, Syrphidae). *Ins. Insc. Menstr.* 10: 117-145.
1926a Review of the American xylofine syrphid-flies. *Proc. U. S. natn. Mus.* 69(9), 52 pp.
1926b The chrysotoxine syrphid-flies. *Proc. U. S. natn. Mus.* 69(11), 20 pp.

Shannon, R. C. & Aubertin, D.

- 1933 Syrphidae. *Diptera of Patagonia and South Chile*. Brit. Mus. (Nat. Hist.) VI (3): 120-170.

Snodgrass, R. E.

- 1935 *Principles of insect morphology*. ix + 667 pp. McGraw-Hill, New York.
1963 A contribution toward an encyclopedia of insect anatomy. *Smithsonian misc. coll.* 146 (2), vi + 48 pp.

Speight, M. C. D.

- 1987 External morphology of adult Syrphidae (Diptera). *Tijdschr. Entomol.* 130: 141-175.

Telford, H. S.

- 1975 The Syrphidae of Puerto Rico. *J. Agric. Univ. Puerto Rico* 57: 217-246.

Thompson, F. C.

- 1968 The placement of the subgenus *Protolepidostola* Hull (Diptera: Syrphidae) with description of two new species. *J. Kansas Entomol. Soc.* 41: 270-277.
1969 A new genus of microdontine flies (Diptera: Syrphidae) with notes on the placement of the subfamily. *Psyche* 76: 74-85.

- 1972 A contribution to a generic revision of the Neotropical Milesinae (Diptera: Syrphidae). *Arq. Zool., Sao Paulo* 23: 73-215.
- 1973 Review of the genus *Sterphus* Philippi (Diptera: Syrphidae). Part I. *Entomol. Amer.* 46: 185-240.
- 1973 De Geer's exotic *Musca* species (Diptera: Syrphidae and Calliphoridae). *Proc. Entomol. Soc. Washington* 75: 354-356.
- 1974 Corrections and restrictions of the type localities of some Neotropical Syrphidae (Diptera). *Revta Brasil. Entomol.* 18: 1-7.
- 1974 Description of the first known Ethiopian *Myolepta* species, with a review of the subgeneric classification of *Myolepta* (Diptera: Syrphidae). *Ann. Natal Mus.* 22: 325-334.
- 1975 Notes on the status and relationships of some genera in the tribe Milesiini (Diptera: Syrphidae). *Proc. Entomol. Soc. Washington* 77: 291-305.
- 1980 The North American species of *Callicera* Panzer (Diptera: Syrphidae). *Proc. Entomol. Soc. Washington* 82: 195-211.
- 1981 The flower flies of the West Indies (Diptera: Syrphidae). *Mem. Entomol. Soc. Washington* 9, 200 pp.
- 1982 Syrphidae. Pp. 464-465. In Hurlbert, S. H. & Villalobos-Figueroa, A. (eds.), *Aquatic biota of Mexico, Central America and the West Indies: (being a compilation of taxonomic bibliographies for the fauna and flora of island waters of Mesoamerica and the Caribbean region)*. San Diego State Univ., San Diego xv + 529 pp.
- 1988 Syrphidae (Diptera) described from unknown localities. *J. New York Entomol. Soc.* 96: 200-229.
- 1990 The flower fly genus *Ornidia* (Diptera: Syrphidae). *Proc. Entomol. Soc. Washington* 93: 248-261.
- 1997a *Spilomyia* flower flies of the New World (Diptera: Syrphidae). *Mem. Entomol. Soc. Washington* 18: 261-272.
- 1997b Revision of the *Eristalis* flower flies of the Americas south of the United States (Diptera: Syrphidae). *Proc. Entomol. Soc. Washington* 99: 209-237.
- Thompson, F. C., Fee, F. D. & Berzark, L. G.
1990 Two immigrant synanthropic flower flies (Diptera: Syrphidae) new to North America. *Entomol. News* 101: 69-74.
- Thompson, F. C. & Marnef, L.
1977 *Austroascia segersi*, a new genus and species (Diptera: Syrphidae). *Papeis Avulsos Zool., S. Paulo* 31: 1-6.
- Thompson, F. C., Vockeroth, J. R. & Sedman, Y. S.
1976 Family Syrphidae. *A Catalogue of the Diptera of the Americas south of the United States* 46, 195 pp.
- Vockeroth, J. R.
1964 The genus *Alipumilio* Shannon (Diptera: Syrphidae). *Canad. Entomol.* 96: 922-924.
- 1969 A revision of the genera of the Syrphini (Diptera: Syrphidae). *Mem. Entomol. Soc. Canada* 62, 176 pp.
- 1973 Three additional synonyms of *Allograpta* (Diptera: Syrphidae). *Canad. Entomol.* 105: 1101-1104.

- 1983 Nomenclatural notes on Nearctic Syrphinae, with description of new species *Syrphus* and keys to Nearctic species of *Didea*, *Epistrophe*, s. str., and *Syrphus* (Diptera: Syrphidae). *Canad. Entomol.* 115: 175-182.
- 1986 Revision of the New World species of *Paragus* Latreille (Diptera: Syrphidae). *Canad. Entomol.* 118: 183-198.
- 1990 Revision of the Nearctic species of *Platycheirus* (Diptera, Syrphidae). *Canad. Entomol.* 122: 659-766.
- Vockeroth, J. R. and F. C. Thompson
- 1987 52. Family Syrphidae. Pp. 52-743. In McAlpine, J. F., *et alia* (eds.), *Manual of Nearctic Diptera*. Vol. 2, vi + pp. 675-1332. *Res. Br., Agric. Canada, Monogr.* 28.
- Wheeler, W. M.
- 1924 Two extraordinary larval myrmecophiles from Panama. *Proc. Nat. Acad. Sci.* 10: 237-244.
- Williston, S. W.
- 1887 Synopsis of the North American Syrphidae. *Bull. U. S. natn. Mus.* 31, xxx + 335 pp. (1886).
- Zumbado, M. & Thompson, F. C.
- 1997 Nevas especies de *Sterphus* (Diptera: Syrphidae) de Costa Rica con notas sobre otras especies presentes en Costa Rica. *Southwest. Entomol.* 22: 79-90.

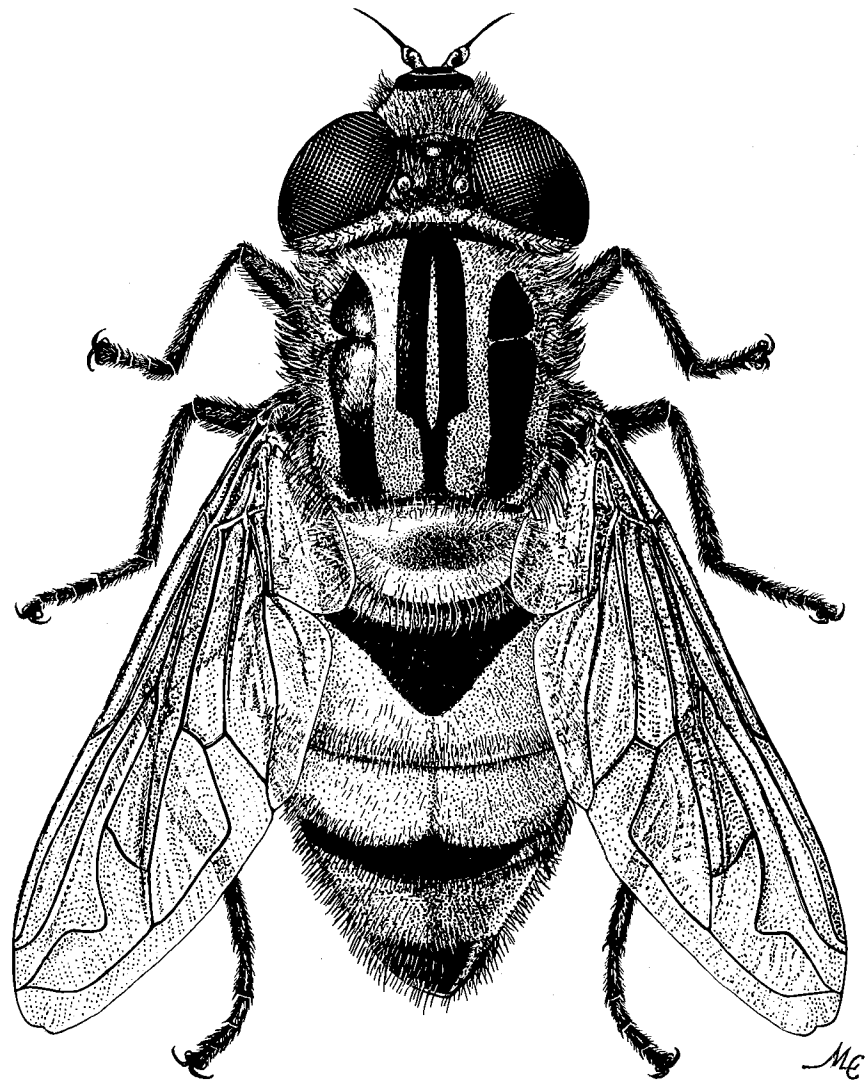


Fig. 11. Habitus, dorsal. *Ohmyia omya* Thompson.

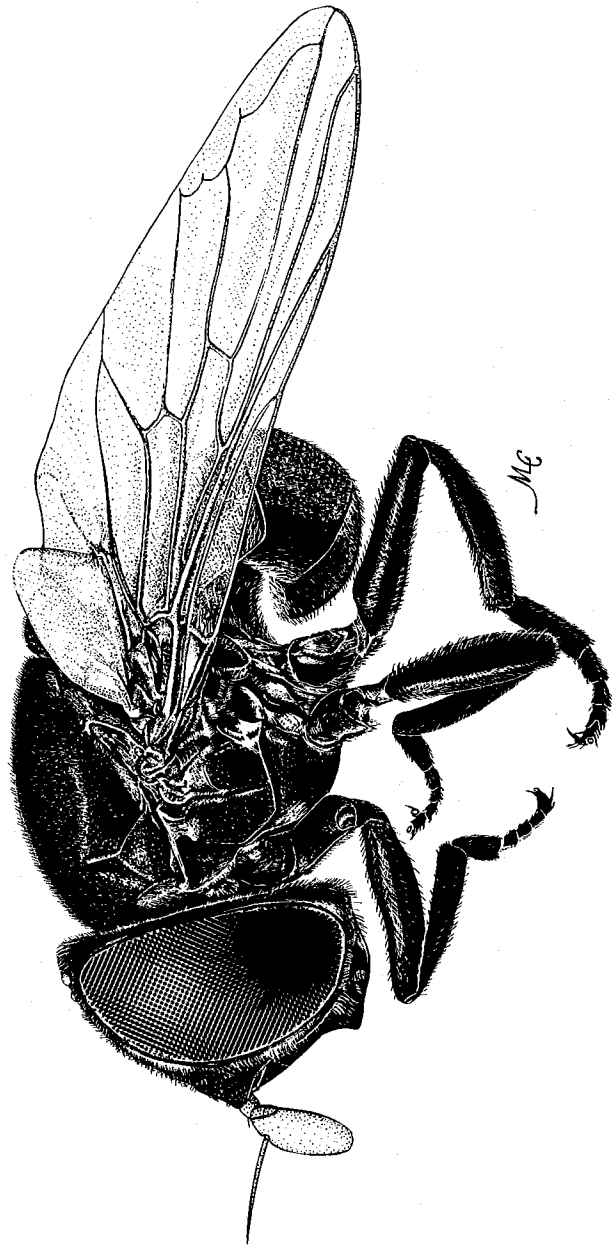
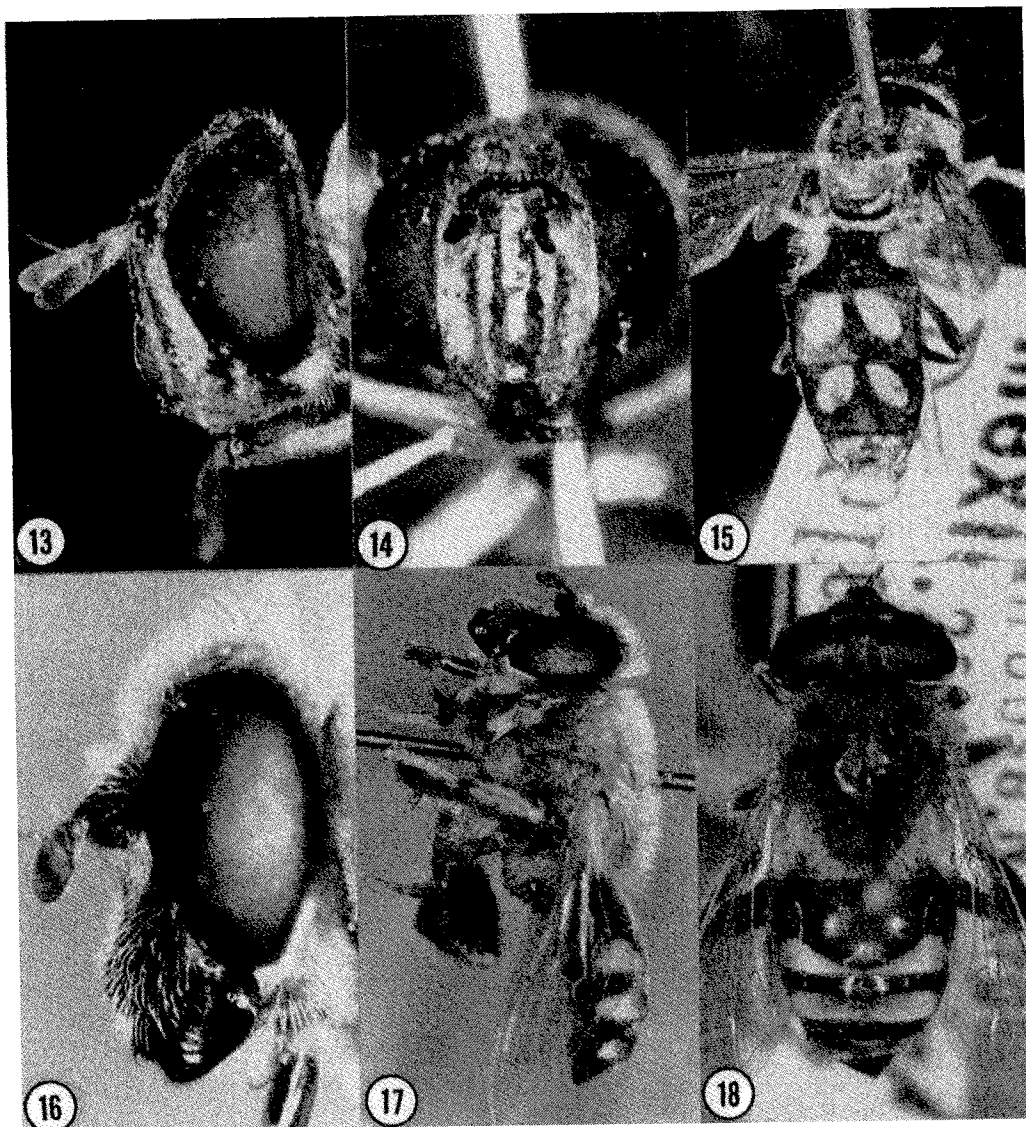
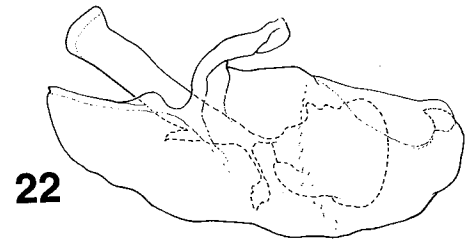
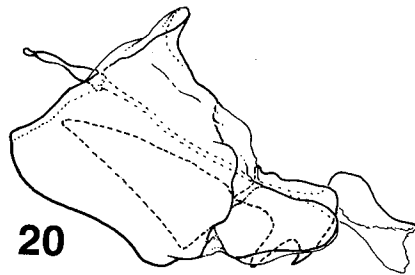
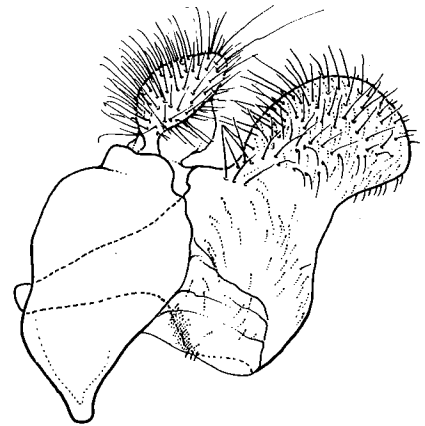
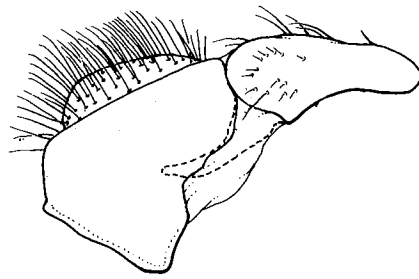
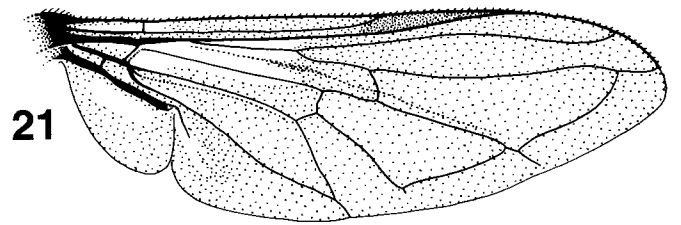


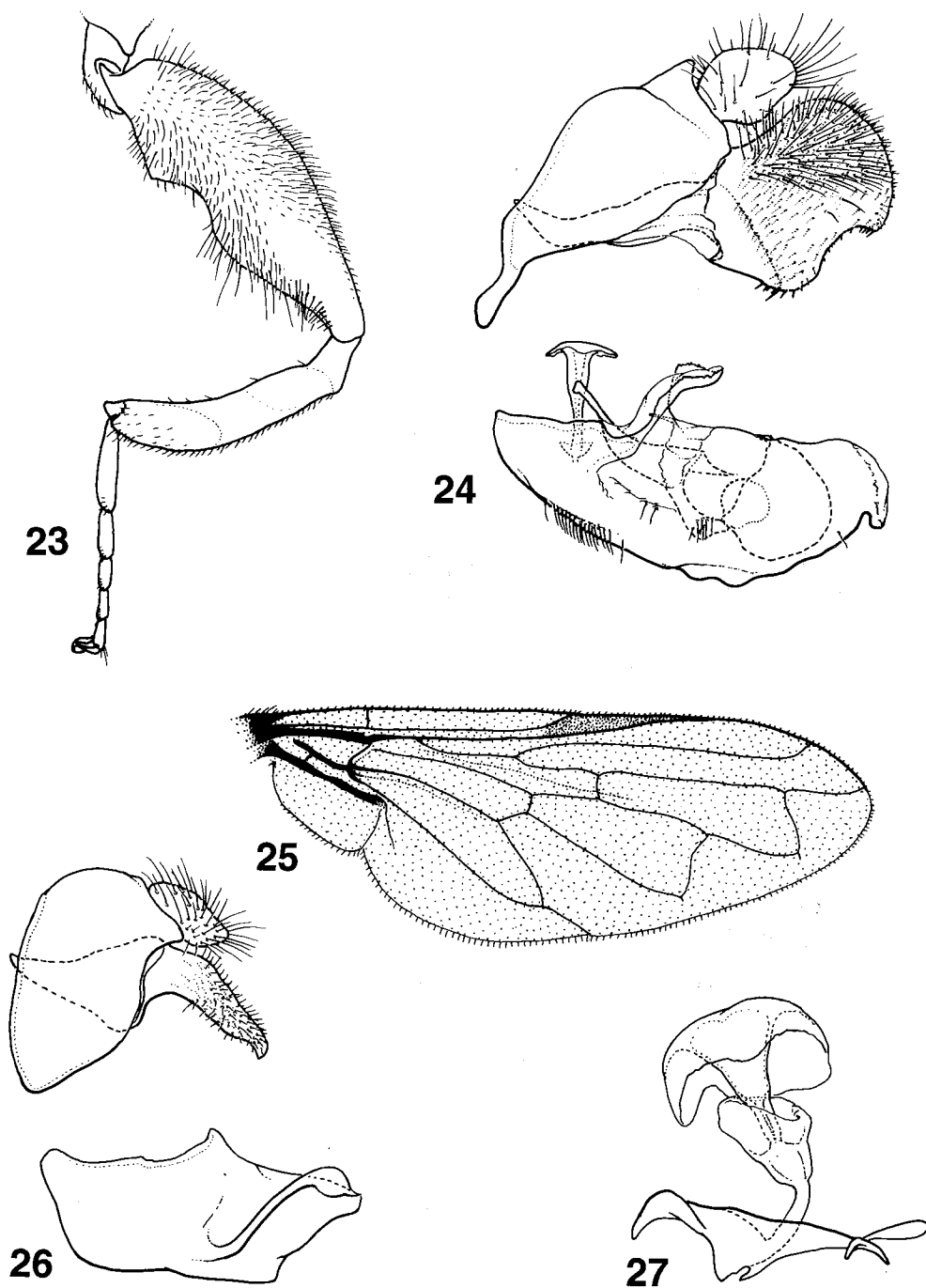
Fig. 12. Habitus, lateral. *Xela alex* Thompson.



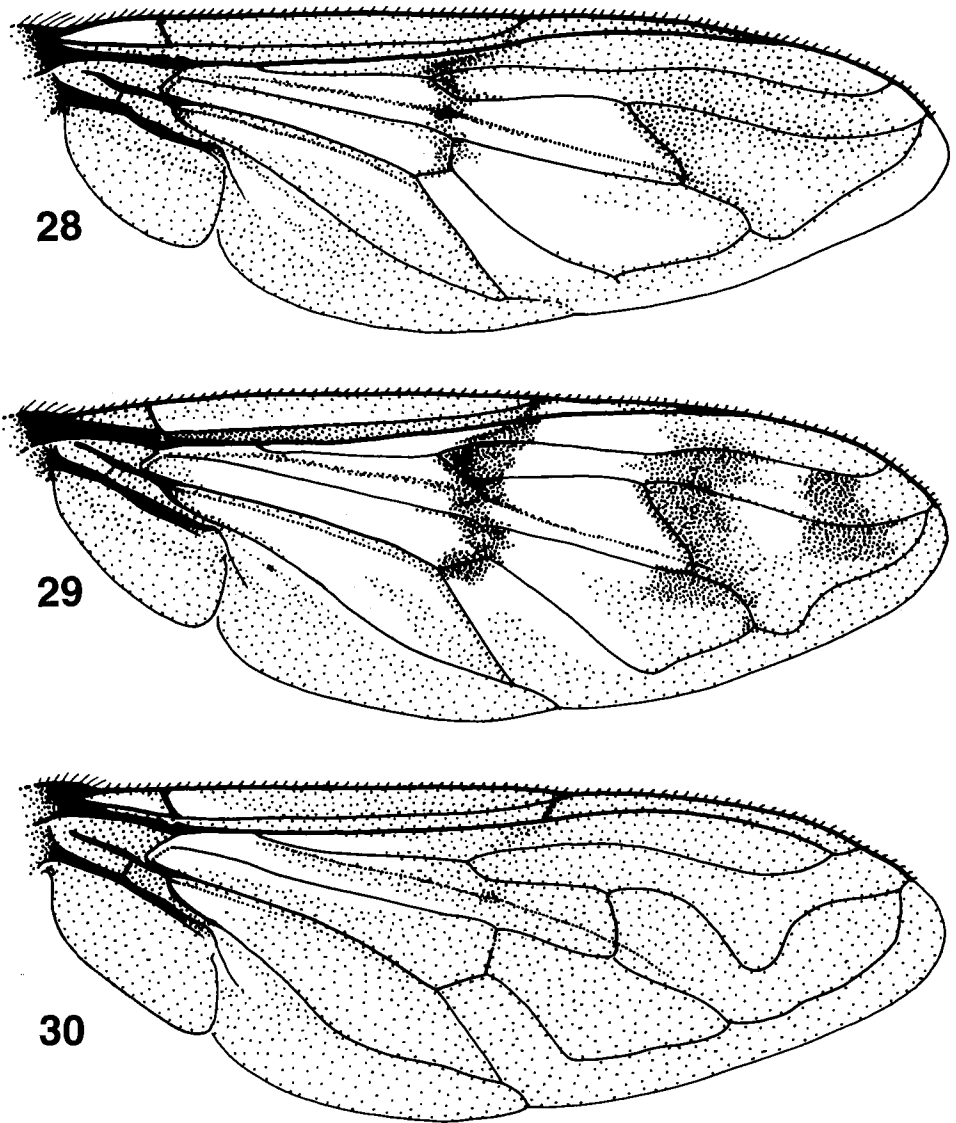
Figs. 13-18. 13-15, *Rhysoys octomaculatus* (Enderlein), holotype. 13. Head, lateral view; 14. Head, frontal view; 15. Habitus, posterior view. 16-18, *Palpada lindneri* Thompson, holotype. 16. Head, lateral view; 17. Habitus, lateral view; 18. Habitus, dorsal view.



Figs. 19-22. 19-21, *Metasyrphus rojasi* Marnet, holotype. 19. Abdominal pattern, dorsal view; 20. Male genitalia, lateral view; 21. wing, dorsal view. 22. *Ohmyia omya* Thompson, male genitalia, lateral view.



Figs. 23-27. 23-24, *Palpada megafemur* Thompson. 23. Meta femur, lateral view; 24. male genitalia, lateral view. 25-27. *Orthonevra chilensis* Thompson, holotype. 25. wing, dorsal view; 26. Male genitalia, lateral view; 27. Aedeagus and ejaculatory apodeme, lateral view.



Figs. 28-30. 28-30, wings, dorsal view. 28. *Macrometopia montensis* (Hull), holotype. 29. *Macrometopia maculipennis* Thompson, holotype. 30. *Palpada megafemur* Thompson.