

M. R. WHEELER (1987)

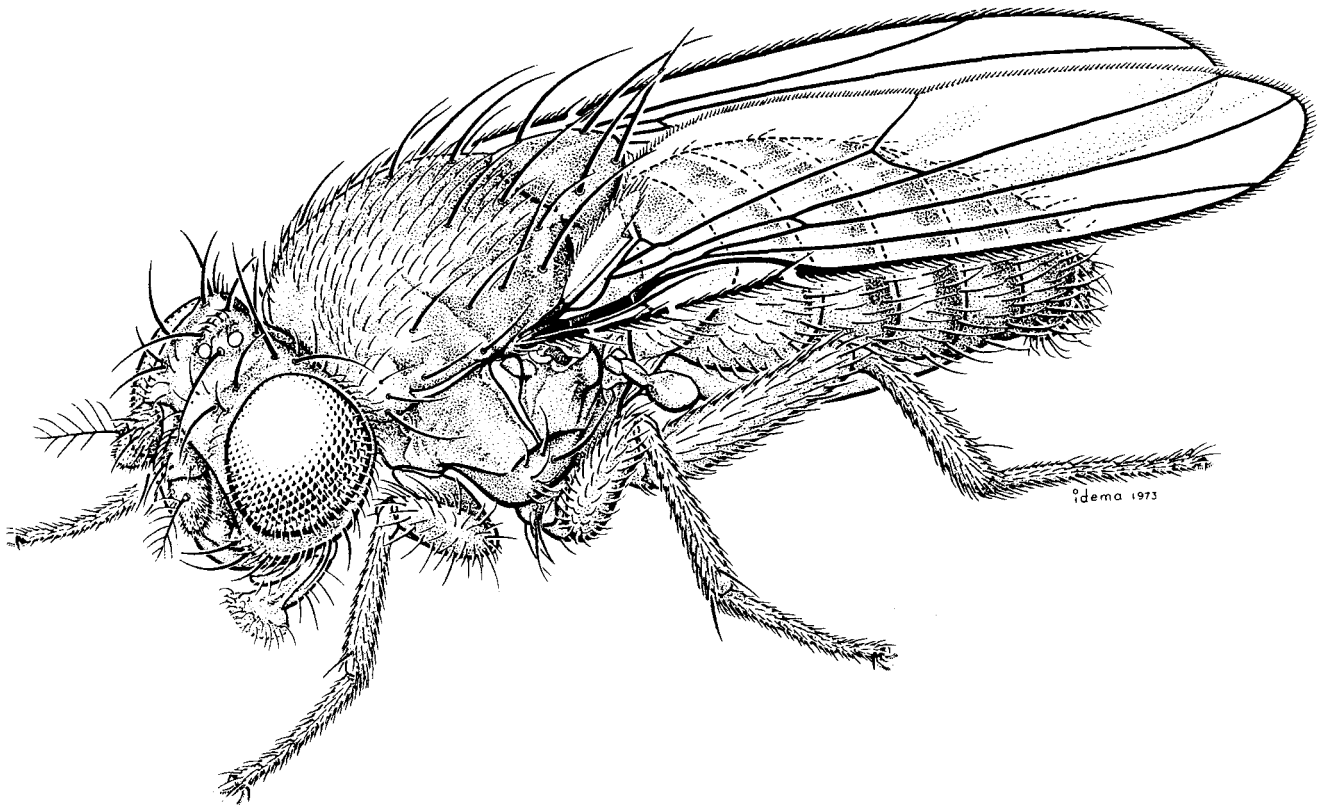


Fig. 95.1. Adult female of *Drosophila melanogaster* Meigen.

Small to moderately large flies (Fig. 1), 1–6 mm long in Nearctic species, usually with bright red eyes when alive. Body pruinose or shiny; color varying from yellow to brown to black, often with stripes or spots on thorax and a pattern of bands or spots on abdomen. Wing hyaline or with distinct darkened areas, sometimes wholly dark. Sexual dimorphism rare, when present involving differences in body color or pattern, body size, wing markings, head shape, or secondary sexual traits such as armature of foreleg.

Adult. Head (Figs. 2–4): eye usually with distinct pile, rarely bare. Three orbital bristles present; usually the anterior one proclinate and the posterior two reclinate, but varying in location on orbital plate; proclinate orbital bristle usually farther from eye margin than either of the reclinate ones. Ocellar bristles large or small; postocellar bristles usually large, sometimes small, always convergent, rarely absent; inner and outer vertical bristles large. Frontal vitta with scattered setulae, sometimes densely so. Face more or less carinate, sometimes flat; one to several well-developed vibrissae present. Arista usually plumose with both dorsal and ventral rays, but sometimes bare, or micropubescent, or with a single dorsal branch, or with a few dorsal branches and none ventral, or some other variation.

Thorax: scutum (Fig. 5) usually with two pairs of postsutural dorsocentral bristles, rarely with just one or with more than two pairs; acrostichal setulae sometimes arranged in two rows, usually in four, six, or eight rows, but with more numerous rows in some genera; prescutellar acrostichal bristles sometimes well-developed; presutural supra-alar bristle only rarely well-developed; postsutural supra-alar bristle present; postalar bristle present; one or two postpronotal bristles present; two notopleural and one to three strong katepisternal bristles present; proepisternal and proepimeral bristles present or absent; anepisternum and anepimeron bare. Legs usually moderately long and slender (Fig. 1); tibiae with apical and preapical dorsal bristles, variable in size. Wing venation usually simple (Figs. 6, 7); C with humeral and subcostal breaks; Sc vestigial apically, but fused with R_1 in *Stegana* Meigen; crossveins r-m and dm-cu always present, but supernumerary crossveins occurring in a few species; A_1 present, or greatly reduced; cells bm and dm sometimes separated by crossvein bm-cu (Fig. 6), sometimes confluent (Fig. 7).

Abdomen: six spiracles usually present in male, seven in female. Male terminalia (Figs. 13, 14) (Hsu 1949; Wheeler and Takada 1963, 1966, 1971; Wheeler 1968; McAlpine

1968) bilaterally symmetric with few exceptions; epandrium (genital arch) with or without lobes or processes on ventral margin; surstylus (clasper) usually with few to many prensisetae or teeth, sometimes subdivided into outer (primary) and inner (secondary, paralobes) lobes; hypandrium U-shaped; gonopods (lateral part of anterior gonopophyses, of Wheeler and Takada 1966) weakly (most *Drosophila* Fallén) to strongly developed (*Paracacoxenus* Hardy); parameres (medial part of anterior gonopophyses of Wheeler and Takada 1966) small to large and heavily sclerotized, sometimes with additional lobes or processes (*Paracacoxenus*); aedeagus short and simple to elongate and very complex; aedeagal apodeme usually elongate and mostly free from hypandrium; ejaculatory apodeme small to relatively large; sternite 10 usually reduced and simple, sometimes with lobes or processes (*Acletotoxenus* von Frauenfeld); cerci (anal plates) short and ventrally directed, sometimes with a coarsely spinose lobe at ventral apex. Female terminalia (Figs. 8–12) with tergite 7 free from sternite 7; sternite 8 frequently divided along midline and modified to form a pair of ovipositor plates (egg guides); hypoproct (subanal plate) simple; epiproct free from bases of cerci in some species, in others indistinguishably fused with cerci; cerci free from each other and from epiproct in some species, in others fused with each other and with epiproct; two spermathecae present, sclerotized, of various sizes and shapes.

Egg. Usually with terminal filaments, from one to about ten depending on the species, but sometimes without filaments.

Larva. Opaque white, with one pair of each of anterior and posterior spiracles. Posterior spiracles usually tan, but black in some species (Figs. 15–19).

Puparium. Tan to brown, with both anterior and posterior spiracles prominent. Anterior spiracles often on elongated stalks (Fig. 20).

Biology and behavior. Larval food habits are varied; most species feed on microorganisms in spoiled fruits, slime fluxes, fungi, rotting cacti, or other decaying organic matter. Some occur in flowers or in flowing sap of tree wounds.

Larvae of many species of *Scaptomyza* Hardy are leaf miners; those of *Cladochaeta* Coquillett, as far as known, are ectoparasites of nymphs of Cercopidae; those of *Pseudiasata* Coquillett prey on Pseudococcidae. Numerous species, mainly *Drosophila*, can be maintained in the laboratory on artificial media and are therefore often used in research in genetics, cytology, and insect physiology.

Classification and distribution. The family is large, with about 60 genera containing nearly 3000 described species (Wheeler 1981a). Many of the genera are limited to tropical regions of the world. More than half (56%) of the species of the family belong to the large genus *Drosophila*; 40% of approximately 175 known Nearctic species of the family belong to it (Wheeler 1981b). It has been divided into 15 so-called subgenera (for Nearctic subgenera see Wheeler 1965), but many of them are weakly differentiated and poorly defined. To date no key has been devised to satisfactorily separate them, and no attempt is made here to segregate them. The same usually applies for the subgenera currently recognized in *Stegana*, *Amiota* Loew, *Leucophenga* Mik, and *Scaptomyza*.

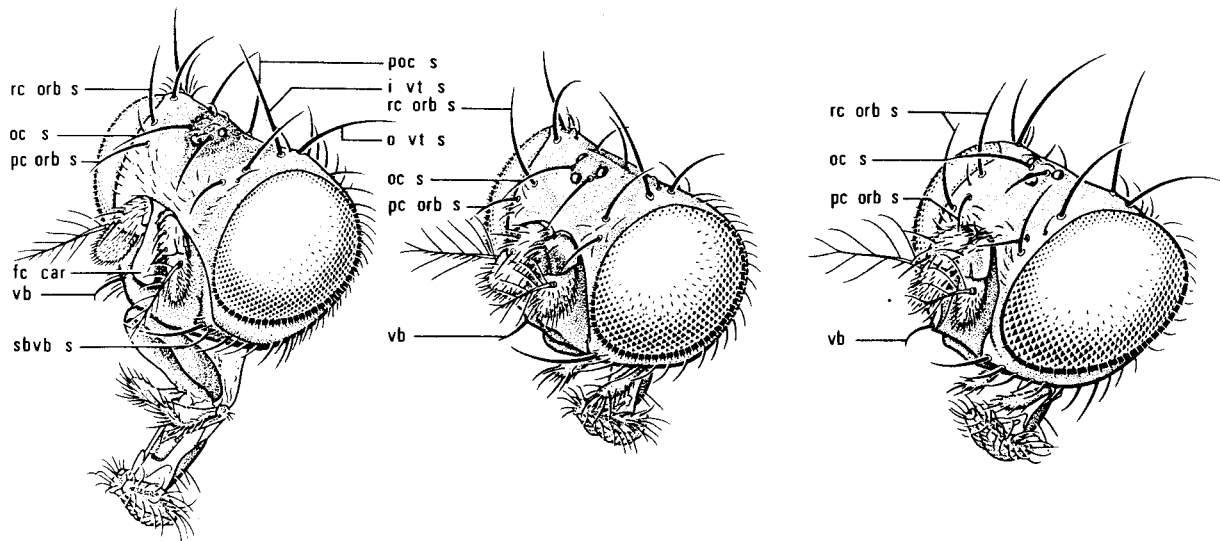
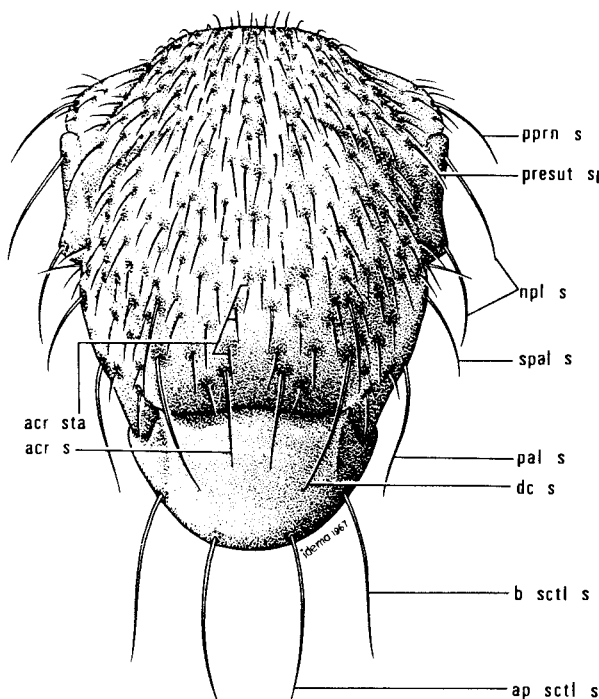
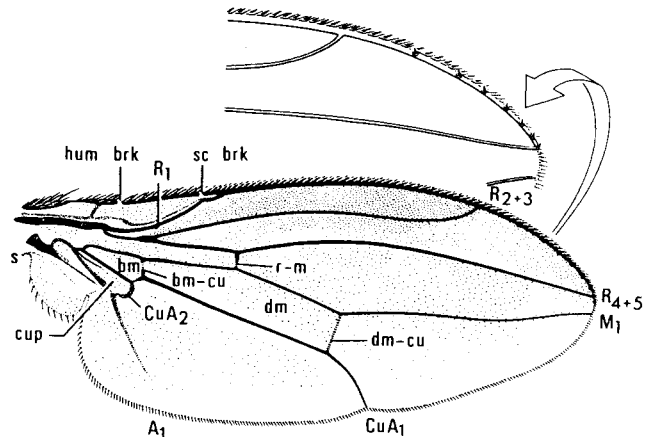
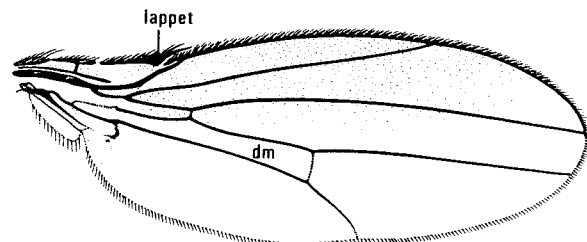
The three Nearctic species assigned to *Gitona* in the following key are not congeneric with the Palaearctic *Gitona* Meigen, including the type-species *G. distigma* Meigen (McAlpine 1968). The correct generic assignment of these three species is still uncertain.

Morphological variation within the family is great; many exceptions to the traits described above occur in certain aberrant species (Wheeler 1981a).

Three fossil species are known. *Drosophila berryi* Cockerell was found in amber from Colombia, South America (Cockerell 1923). The age is uncertain but thought to be Holocene or Pleistocene, or even Tertiary. Wheeler (1963) reported two poorly preserved specimens similar to *Neotanygastrella* Duda in amber from Chiapas, Mexico. Their age is believed to be late Oligocene or early Miocene. *Electrophortica succini* Hennig was described from four specimens from Baltic amber (Hennig 1965) dating back to early Tertiary. These specimens show many resemblances to modern *Amiota*.

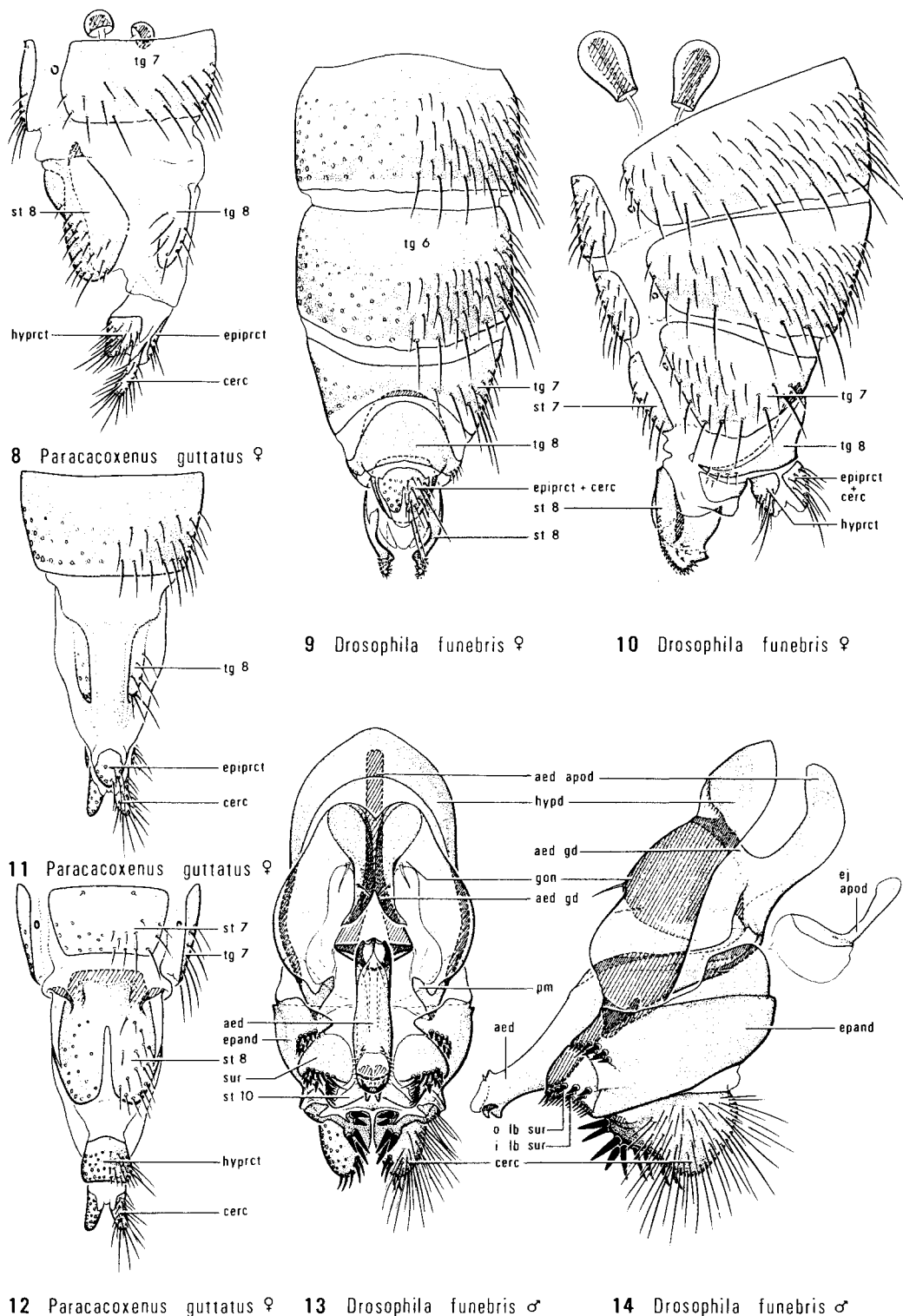
Key to genera

1. C deeply incised at subcostal break, and protruding as a thick black lappet (Fig. 7) 2
Subcostal break normal, not forming a protruding lappet (Fig. 6) 4
2. One pair of dorsocentral bristles present; scutellum velvety. Body dark above, pale below *Mycodrosophila* Oldenberg
3 spp.; widespread; Wheeler and Takada 1963
At least two pairs of dorsocentral bristles present (Fig. 5); scutellum not velvety. Body color various 3
3. Anterior dorsocentral bristles far forward, at or near the transverse suture. Facial carina very large; antennal bases far apart. Acrostichal setulae arranged in two to four rows *Dettopsomyia* Lamb
1 sp., *nigrovittata* (Malloch); introduced in California
Anterior dorsocentral bristles fairly close to posterior ones. Facial carina small and narrow. Acrostichal setulae arranged in four to eight rows *Paramycodrosophila* Duda
2 spp.; southern U.S.A.

2 *Drosophila colorata* ♀3 *Microdrosophila quadrata* ♀4 *Chymomyza amoena* ♀5 *Paracacoxenus guttatus* ♂6 *Stegana coleoptrata* ♂7 *Mycodrosophila claytonae* ♂

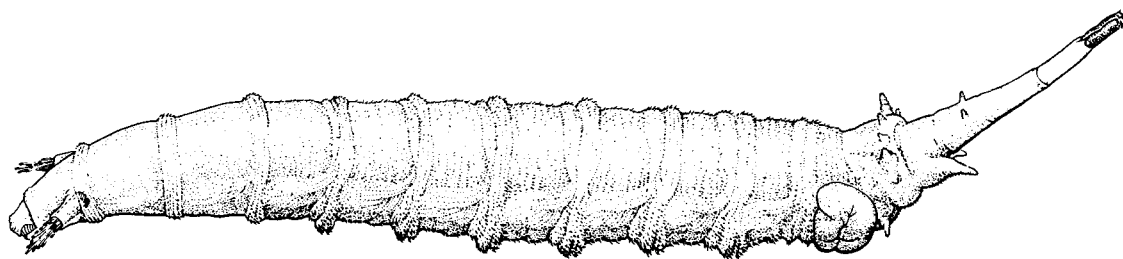
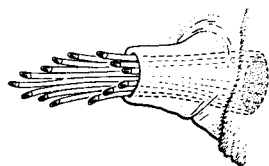
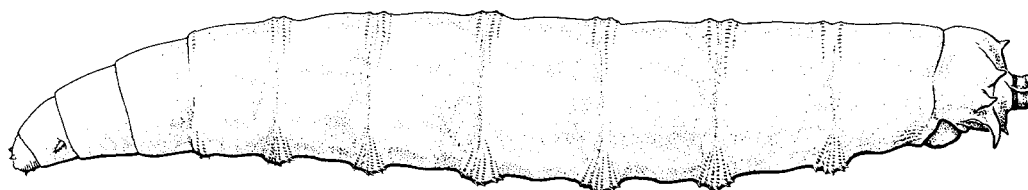
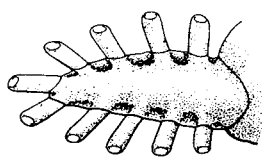
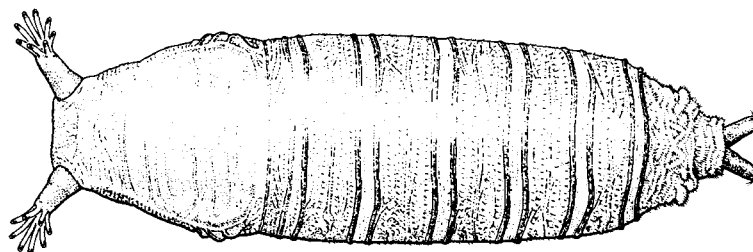
Figs. 95.2-7. Heads, thorax, and wings: heads of (2) *Drosophila colorata* Walker, (3) *Microdrosophila quadrata* (Sturtevant), and (4) *Chymomyza amoena* (Loew); (5) thorax of *Paracacoxenus guttatus* Hardy & Wheeler, dorsal view; wings of (6) *Stegana coleoptrata* (Scopoli) and (7) *Mycodrosophila claytonae* Wheeler & Takada.

Abbreviations: acr s, acrostichal seta; acr sta, acrostichal setula; ap sctl s, apical scutellar seta; b sctl s, basal scutellar seta; dc s, dorsocentral seta; fc car, facial carina; hum brk, humeral break; i vt s, inner vertical seta; npl s, notopleural seta; oc s, ocellar seta; o vt s, outer vertical seta; pal s, postalar seta; pc orb s, proclinate orbital seta; poc s, postocellar seta; pprn s, postpronotal seta; presut spal s, presutural supra-alar seta; rc orb s, reclinate orbital seta; sbvb s, subvibrissal seta; sc brk, subcostal break; spal s, supra-alar seta; vb, vibrissa.



Figs. 95.8–14. Terminalia: (8) left lateral, (11) dorsal, and (12) ventral views of female terminalia of *Paracacoxenus guttatus* Hardy & Wheeler; (9) dorsal and (10) ventral views of female terminalia of *Drosophila funebris* (Fabricius); (13) left lateral and (14) ventral views of male terminalia of *D. funebris*.

Abbreviations: aed, aedeagus; aed apod, aedeagal apodeme; aed gd, aedeagal guide; cerc, cercus; ej apod, ejaculatory apodeme; epand, epandrium; epiprct, epiproct; gon, gonopod; hypd, hypandrium; hypcrt, hypoproct; i lb sur, inner lobe of surstylus; o lb sur, outer lobe of surstylus; pm, paramere; st, sternite; sur, surstylus; tg, tergite.

15 *Drosophila* sp.16 *Drosophila* sp.17 *Drosophila melanogaster*18 *Chymomyza* sp.19 *Chymomyza* sp.20 *Drosophila melanogaster*

Figs. 95.15–20. Larvae and pupa: (15) mature larva of *Drosophila* sp., left lateral view; (16) details of anterior spiracle of larva of *Drosophila* sp.; (17) mature larva of *Drosophila melanogaster* Meigen, left lateral view; (18) mature larva of *Chymomyza* sp., left lateral view; (19) details of anterior spiracle (from puparium) of *Chymomyza* sp., left lateral view; (20) puparium of *Drosophila melanogaster*, dorsal view.

4. Scutum spotted (Fig. 5); spots sometimes partly fused into larger splotches5
Scutum unicolorous or with longitudinal stripes9
5. Prescutellar acrostichal bristles weak or absent; basal scutellar bristles convergent; proepisternal bristle absent *Drosophila* Fallén, in part 118 spp.; widespread; Patterson 1943, Wheeler 1981a and 1981b
Prescutellar acrostichal bristles well-developed (Fig. 5); basal scutellar bristles divergent (Fig. 5); proepisternal bristle present, although sometimes small6
6. Arista plumose, with numerous dorsal and ventral rays (as in Figs. 2–4). C weak or absent beyond end of R_{4+5} (as in Fig. 7) *Leucophenga* Mik, in part 7 spp.; widespread; Wheeler 1952
Arista bare or micropubescent, sometimes with a few short dorsal rays basally. C clearly continued to end of M_1 (as in Fig. 1)7
7. Wing with conspicuous dark spots. Facial carina large and prominent (as in Fig. 2). Tibiae with alternating light and dark bands *Amiota* (*Sinophthalmus* Coquillett) 1 sp., *picta* (Coquillett); southwestern U.S.A.
Wing clear, without spots. Facial carina only weakly developed. Tibiae faintly banded or not at all8
8. Cells bm and dm separated by a distinct crossvein (as in Fig. 6). Proepisternal bristles absent (Fig. 5). Dark species, with dark legs *Paracacoxenus* Hardy 1 sp., *guttatus* Hardy & Wheeler; northwestern America; McAlpine 1968
Cells bm and dm confluent (as in Fig. 7). Proepisternal bristles well-developed. Brownish species, with pale legs *Gitona* of American authors, not Meigen 3 spp.; southern U.S.A. (see Classification and distribution)
9. Arista bare or micropubescent; main stem straight, not bifurcate at apex. Anterior pair of orbital bristles proclinate or strongly convergent *Pseudiastata* Coquillett 2 spp.; southeastern U.S.A.
Arista with one to many dorsal rays and usually with some ventral rays; main stem often bifurcate apically (as in Figs. 2–4). Anterior pair of orbital bristles usually proclinate10
10. Prescutellar acrostichal bristles present (as in Fig. 5); basal scutellar bristles divergent (as in Fig. 5); proepisternal bristle usually present. Mostly large species, 4–6 mm long11
Prescutellar acrostichal bristles absent; basal scutellar bristles divergent or convergent; proepisternal bristle absent. Mostly smaller species, up to 3.5 mm long17
11. Frons very large, thickly covered with small setae. Large species, 5–6 mm or more in length12
Frons of normal size, with rather sparse scattered setae (Figs. 2–4). Species size usually less than 5 mm13
12. Frons with numerous small pits in addition to setae. Abdomen mainly black *Trachyleucophenga* Hendel 1 sp., unidentified; southern U.S.A.
Frons without pits. Abdomen tan to brown *Rhinoleucophenga* Hendel 1 sp., *obesa* (Loew); eastern U.S.A., west to Texas and Michigan
13. Wing entirely dark or with some darkly clouded areas (Fig. 6)14
Wing uniformly hyaline, without darkened areas16
14. C between apices of R_{2+3} and R_{4+5} with a series of small thorn-like spines along lower margin (Fig. 6). Proepisternal bristle present. Face flat or with a low carina. Species 4–5 mm long15
C without a series of thorn-like spines. Proepisternal bristle absent. Face flat. Small species, less than 2.5 mm long *Cladochaeta* Coquillett, in part 5 spp.; widespread; Wheeler and Takada 1971
15. Face carinate. C reaching apex of M_1 . R_{4+5} and M_1 strongly convergent apically (Fig. 6). Mid tibia with a row of strong posterodorsal bristles *Stegana* Meigen 3 spp.; widespread
Face flat. C weak or absent beyond end of R_{4+5} ; R_{4+5} and M_1 converging slightly or not at all. Mid tibia without strong bristles *Leucophenga* Mik, in part see couplet 6

16. Cells bm and dm separated by a crossvein (as in Fig. 6). Tan to black flies, with milky white markings on face, postpronotal lobes, and areas below wing bases. Species 3–5 mm long *Amiota* (*Amiota* Loew)
8 spp.; widespread
Cells bm and dm confluent (as in Fig. 7). Flies without milky white areas on face and thorax. Smaller species, 1.5–3 mm long *Drosophila* (*Scaptodrosophila* Duda)
3 spp.; southwestern U.S.A.
17. Apical scutellar bristles divergent (as in Fig. 5); anterior dorsocentral bristles placed far forward, at or near transverse suture. Proclinate orbital bristle arising laterally to strong reclinate orbital bristle (Fig. 3) *Microdrosophila* Malloch
1 sp., *quadrata* (Sturtevant); eastern Canada and U.S.A. west to Texas
Apical scutellar bristles cruciate; anterior dorsocentral bristles not placed far forward. Proclinate orbital bristle arising medially to reclinate orbital bristles (Figs. 2, 4) 18
18. Postocellar bristles small and inconspicuous; proclinate or inclinate orbital bristle arising posterior to, i.e. above, and about equal in size to anterior reclinate orbital bristle (Fig. 4). Inner margin of fore femur always armed with a row of short teeth *Chymomyza* Czerny
8 spp.; widespread; Wheeler 1952
Postocellar bristles usually well-developed; proclinate orbital bristle arising anterior to, i.e. below, anterior reclinate orbital bristle and distinctly stronger than it (Fig. 2). Fore femur rarely armed with a row of teeth 19
19. Face flat. Arista with one to five dorsal rays and one or no ventral rays. One strong katepisternal bristle present. Wing usually with darkened areas *Cladochaeta* Coquillett, in part
see couplet 14
Face carinate, at least on upper half (Fig. 2). Arista with numerous dorsal rays and one to many ventral rays. Usually two or three katepisternal bristles present. Wing clouded or not 20
20. Acrostichal setulae arranged in two or four rows. Arista with only one or two ventral rays. Slender flies, with rather long slender legs *Scaptomyza* Hardy
22 spp.; widespread; Wheeler and Takada 1966
Acrostichal setulae usually arranged in six or more rows, rarely in four rows. Arista usually with more than two ventral rays (Fig. 2). Body shape various *Drosophila* Fallén, in part
see couplet 5

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