

Study of **INSECTS**

Sixth Edition

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(1989)



Saunders College Publishing

Philadelphia Ft. Worth Chicago San Francisco Montreal

Toronto London Sydney Tokyo

pentine mines, that is, narrow winding mines that increase in width as the larva grows. This is the largest family of acalyprate muscoids, with nearly 500 North American species.

Family Opomyzidae: The opomyzids are small to minute flies that are usually found in grassy areas. The known larvae feed in the stems of various grasses. Only 13 species occur in North America, and most of these occur in the West or in Canada; none is common. Ten of the species of opomyzids are in the genus *Geomÿza*, which has the wings much narrowed at the base, without an alula and with no development of an anal lobe.

Family Anthomyzidae: These flies are small and somewhat elongate, and some species have pictured wings. This is a fairly small group (10 North American species), but its members are sometimes fairly common in grass and low vegetation, especially in marshy areas. The larvae live in marsh grasses and sedges.

Family Aulacigástridae: This group includes five relatively rare species that occur in the East, *Aulacigáster leucopèza* (Meigen), *Stenomícra angustàta* Coquillett, and three species of *Cyamóps*. *Aulacigáster leucopèza* is a small blackish fly, about 2.5 mm in length, with the face banded with white, brown, and orange. Adults occur on (and larvae breed in) sap flows from tree wounds. The other four species are yellowish to brownish and are generally found in grasses.

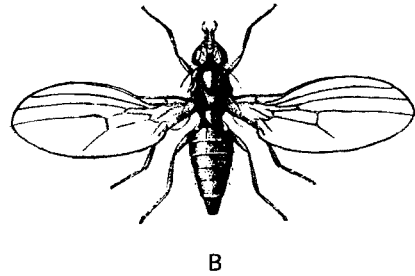
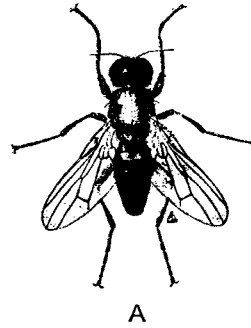
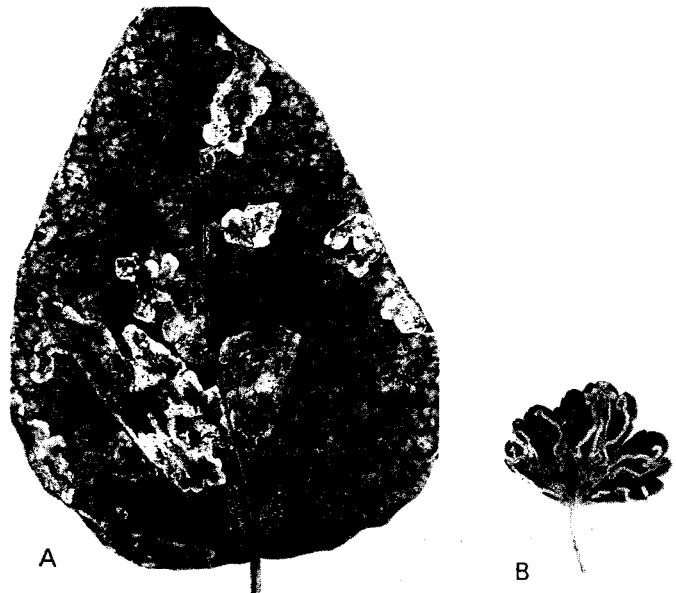


Figure 32-69. A, adult of the cheese skipper, *Pióphila càsei* (L.) (Piophílidae); B, a leaf-miner fly, *Cerodóntha dorsàlis* (Loew) (Agromÿzidae). (Courtesy of USDA.)

Figure 32-70. Leaf mines of agromyza flies. A, the catalpa leaf miner, *Phytòbia clàra* (Melander); B, the columbine leaf miner, *Phytomÿza aquilegívora* Spencer. (Courtesy of the Ohio Agricultural Research and Development Center.)



Family Periscolididae: The three North American species in this family are widely distributed but rare. They are usually found around the sap flowing from tree wounds. One species has been reared from fermenting oak sap.

Family Asteiidae: This family contains small to minute flies (usually 2 mm in length or less), most of which can be recognized by the distinctive venation (Figure 32-20A): R_{2+3} ending in the costa close to R_1 . In *Leiomýza*, R_{2+3} ends well beyond R_1 , at about three-fourths the wing length. Only 19 species occur in North America, and little is known of their habits.

Family Milichiidae: The milichiids are small flies, usually black or silvery in color, and are sometimes fairly common in open areas. The larvae generally live in decaying plant or animal materials. Many of them have a slender proboscis. This group is a small one, with about three dozen North American species.

Family Cárnidae: This small group (16 North American species) was formerly considered a subfamily of the Milichiidae. These flies may be separated from the Milichiidae by the characters given in the key (couplet 134). One species, *Cárnus hemápterus* Nitzsch, is a bloodsucking ectoparasite of birds.

Family Braulidae—Bee Lice: This family contains a single species, *Braulia caëca* Nitzsch, which occurs in various parts of the world but is quite rare in North America. It is wingless and 1.2–1.5 mm in length and is found in bee hives, usually attached to the bees. The adults apparently feed on nectar and pollen at the bee's mouth.

Family Coelòpidae—Seaweed Flies: The members of this family are medium-sized to small flies, usually dark brown or black in color, and have the dorsum of the thorax conspicuously flattened and the body and legs very bristly (Figure 32-71). These flies occur along the seashore and are particularly abundant where various seaweeds have washed up. The larvae breed in the seaweed (chiefly kelp) in tremendous numbers, mainly just above the high tidemark in seaweed that has begun to rot. The adults swarming over the seaweed often attract large numbers of shore birds, which feed on them. Seaweed flies feed on flowers and sometimes cluster so thickly on the flowers near the shore that a single sweep of a net may yield a hundred or more individuals. Four of the five North American species occur along the Pacific Coast. The other, *Coelòpa frígida* (Fabricius), occurs along the Atlantic Coast from Rhode Island north.

Family Dryomýzidae: This is a small group (11 North American species) of relatively rare flies that are similar to the Sciomýzidae. Three species in two

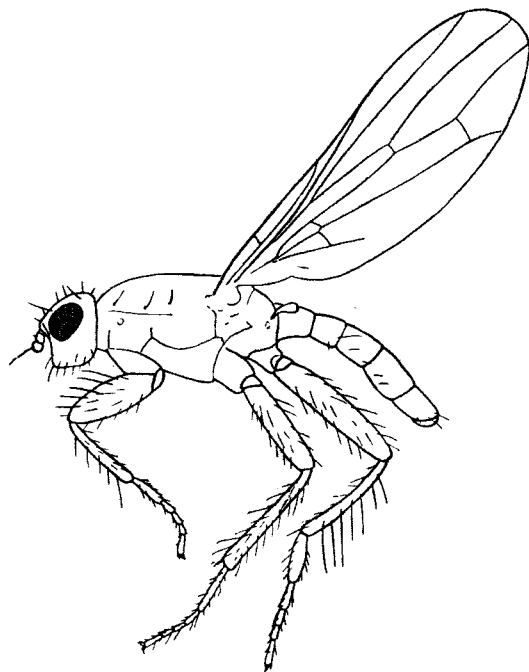


Figure 32-71. A seaweed fly, *Coelòpa* sp. (Coelòpidae).

genera (*Helcomýza* and *Heterocheila*, formerly placed in the family Helcomýzidae) occur along the Pacific coast from Oregon to Alaska. Their larvae live in rotting seaweed. The remaining species in the family are widely distributed and are usually found in moist woods. Their larvae occur in decaying organic matter.

Family Sciomýzidae—Marsh Flies: The marsh flies are small to medium-sized flies that are usually yellowish or brownish and have the antennae extending forward (Figure 32-72). Many species have spotted or patterned wings, and a characteristic bristle near the middle of the anterior face of the middle tibia. This is a fair-sized group (nearly 177 North American species), and many species are common insects. They usually occur along the banks of ponds and streams and in marshes, swamps, and woods. The larvae feed on snails, snail eggs, and slugs, generally as predators.

Family Ropaloméridae: This is a small group of about 30 species, most of them occurring in Central and South America. They are of medium size and usually brownish or grayish in color, with the first posterior (R_5) cell narrowed apically, the femora thickened, and the hind tibiae often dilated. Our only species, *Rhýtidops floridénsis* (Aldrich), occurs

the hind tarsi (Figure 32-23A). Many have the longitudinal veins somewhat shortened and not reaching the wing margin (Figure 32-23D). This is a fairly sized group (241 North American species) whose members are common in swampy places near excrement. They often occur in large numbers about manure piles. The larvae live in excrement and refuse.

Family Curtonotidae: This group is represented in North America by a single species, *Curtonotum hélvum* (Loew), which occurs in the East. This species is about 6 mm in length, *Drosophila*-like in appearance, and light yellowish brown with dark brown markings. It occurs in high grass in moist places. The larva is unknown.

Family Drosophilidae—Pomace Flies or Small Fruit Flies: These flies are 3–4 mm in length and usually yellowish in color (Figure 32-74), and they are generally found around decaying vegetation and fruits. This group is a large one (190 North American species), and many species are very common. The pomace flies are often pests in the household when fruits are present. The larvae of most species occur in

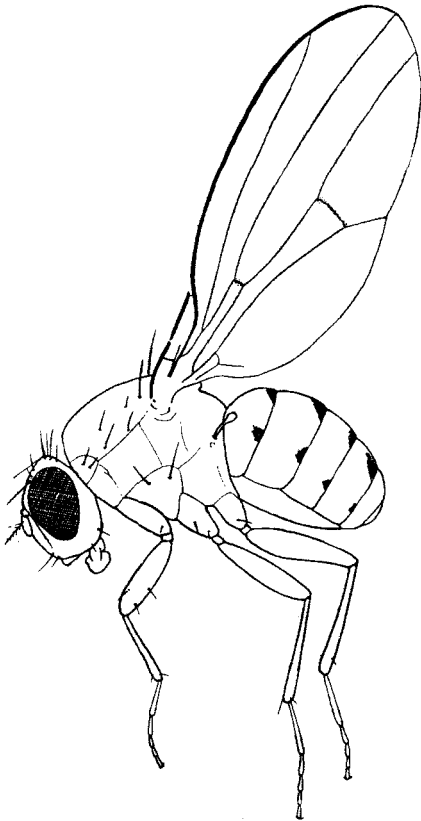


Figure 32-74. A pomace fly, *Drosophila* sp., 20×.

decaying fruits and fungi. In the case of the larvae living in fruits, it has been shown that the larvae actually feed on the yeasts growing in the fruits. A few species are ectoparasitic (on caterpillars) or predaceous (on mealybug and other small Homóptera) in the larval stage. Several species in this group, because of their short life span, giant salivary gland chromosomes, and ease of culturing, have been used extensively in studies of heredity.

Family Diastátidae: This is a small (seven North American species) but widely distributed group whose members resemble the *Drosophilidae* but are usually dark-colored. They are relatively rare, and little is known of their habits.

Family Camillidae: These flies resemble the *Drosophilidae*, but they are metallic, they lack sternopleural bristles, and they have the anal cell open apically. One species, *Camilla glàbra* (Fallén), has been reported from Ontario. Nothing is known of its biology.

Family Ephýdridae—Shore Flies: This is a large group (426 North American species), and some species are quite common. Shore flies are small to very small. Most of them are dark-colored, and a few have pictured wings. The adults are found in moist places: marshes, the shores of ponds and streams, and the seashore. The larvae are aquatic, and many species occur in brackish or even strongly saline or alkaline water. One western species, *Helaeomyia petròlei* (Coquillett), breeds in pools of crude petroleum. These flies often occur in enormous numbers. Pools along the seashore may sometimes be alive with the adults, which walk or cluster on the surface of the water (for example, *Éphydra ripària* Fallén; Figure 32-75). Along the shore of Great Salt Lake, ephydrids may arise from the ground in clouds, and a few sweeps of a net may yield a cupful. At one time the Indians gathered the puparia from the lake and ate them.

Family Chlorópidae—Grass Flies: The chloropids are small and rather bare flies, and some species are brightly colored with yellow and black. They are very common in meadows and other places where there is considerable grass, though they may be found in a variety of habitats. The larvae of most species feed in grass stems, and some are serious pests of cereals. A few are scavengers, and a few are parasitic or predaceous. Some of the chloropids (for example, *Hippélates*), which breed in decaying vegetation and excrement, are attracted to animal secretions and feed on pus, blood, and similar materials. They are particularly attracted to the eyes and are sometimes called eye gnats. These flies may act as vectors of yaws and pinkeye. This is a fairly large group, with 290 North American species.

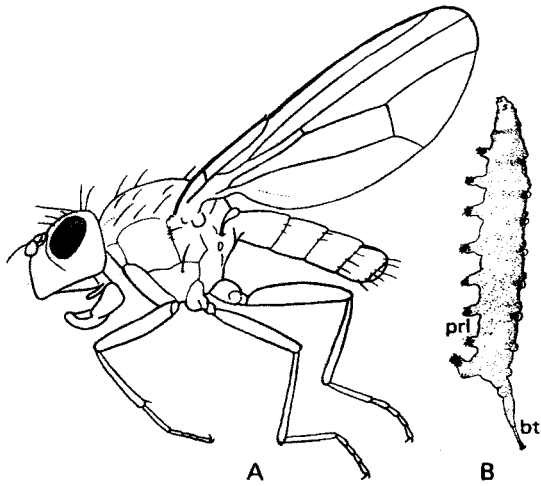


Figure 32-75. A shore fly, *Ephydra riparia* Fallén. A, adult, 10×; B, larva, 4×. *bt*, breathing tube; *prl*, prolegs. (B, courtesy of Peterson; reprinted by permission.)

Family Cryptochètidae: The flies in this group are somewhat similar to black flies (Simuliidae) and have habits similar to those of eye gnats (*Hippélates*, family Chlorópidae; see above). They can usually be recognized by the enlarged third antennal segment, which reaches nearly to the lower edge of the head and which lacks an arista but bears at its apex a short spine or tubercle. As far as known, the larvae are parasites of scale insects in the family Margaròdidae. This is principally an Old World group of flies, and only one species, *Cryptochèta icéryae* (Williston), occurs in the United States. It was introduced into California from Australia in the 1880s to control the cottony cushion scale, *Icerya purchasi*. This fly is about 1.5 mm in length and stout-bodied, with the head and thorax dark metallic blue and the abdomen shiny green. The introduction was a successful one. This fly is probably a more important natural enemy of the cottony cushion scale than the ladybird beetle *Rodólia cardínalis*, which was also introduced from Australia to control this scale insect.

Family Tethínidae: Most tethinids are seashore species, occurring in beach grass, in salt marshes, and around seaweed washed up on the shore. The majority are found along the Pacific Coast. The inland species occur mainly in alkaline areas. This is a small group (24 North American species), and its members are uncommon flies.

Family Canácidae—Beach Flies: The canacids are small flies that resemble the ephydrids in appearance and habits, but they have only a single break in

the costa, they have an anal cell, and the ocellar triangle is quite large (as in Figure 32-24A). Adults of the five rare North American species occur along the seashore in the southeastern states and in California. The larvae live in the algae washed up on the shore.

Section Calyprátæ—Calyprate Muscoid Flies: These flies occur nearly everywhere, often in large numbers. Some of the calyprate groups are fairly distinct and easily recognized, but others are not, and there are differences of opinion about the taxonomic placement of some.

For purposes of identification, the families in this section may be divided into four groups:

1. Flat and leathery, with the coxae separated, and winged or wingless; ectoparasites of birds and mammals: Hippobòscidae, Stréblidae, and Nycteribiidae.
2. Robust, hairy, beelike, with the mouthparts reduced (bot and warble flies): Oéstridae.
3. Somewhat similar to a house fly in general appearance, usually with no hypopleural or pteropleural bristles, and the R_s cell usually parallel-sided: Scathophágidae, Anthomyiidae, and Múscidae.
4. Similar to group 3, but with hypopleural and pteropleural bristles, and the R_s cell narrowed or closed distally: Calliphòridae, Sarcophágidae, Rhinophòridae, and Tachínidae.

Family Scathophágidae—Dung Flies: The members of this group are very similar to the Anthomyiidae (the family in which they are sometimes placed), but differ in having no fine hairs on the underside of the scutellum, usually just one sternopleural bristle, and no cruciate frontal bristles.

Probably the most common members of the Scathophágidae are yellowish and quite hairy, and their larvae live in dung. Other species are dark-colored, and the larvae live in a variety of situations: some are plant feeders (a few of these are leaf miners); some feed in rotting seaweeds; and some are aquatic. The Scathophágidae are a large group (148 North American species) and contain many common species.

Family Anthomyiidae: This is a large group (more than 500 North American species), and most are blackish and about the size of a house fly or smaller. They differ from the Múscidae in having the anal vein ($Cu_2 + 2A$) reaching the wing margin, at least as a fold. Most Anthomyiidae have fine hairs on the underside of the scutellum (Figure 32-13D). Those Anthomyiidae that lack these hairs (Fucelliinae) have cruciate frontal bristles and usually four sternopleural bristles, and they have the costa spinose.