

SECTION 3
CHAPTER 11

HOUSEFLIES AND THEIR RELATIVES

LEARNING OBJECTIVES

After completely studying this chapter, you should be able to:

- Identify common fly pests.
- Describe the life cycle, habits, and habitats of common fly pests.
- Describe pest management procedures for controlling and managing fly pests, including sanitation, exclusion, and pesticide application.

Of the five most serious diseases in the world, flies, including mosquitoes, spread the organisms that are responsible for four: malaria, sleeping sickness, leishmaniasis, and filariasis. They also are responsible for spreading yellow fever, typhoid, and various diarrheal illnesses. In the United States, the toll of the worst afflictions—heart attacks, cancer and strokes—is annually numbered in the thousands; in the tropics, the dead and disabled from fly-borne diseases are counted by the *millions*. In the United States, flies are considered more annoying than dangerous. As recently as the turn of the 20th century, however, malaria and typhoid were major health problems.

Flies, the order Diptera, are one of the largest and most dynamic orders of insects. This vast order is characterized by having only *one pair of wings*. Most flies are small and soft-bodied with two large eyes on the front of the head.

Flies can be divided into two groups, depending on the appearance of the larvae and adults.

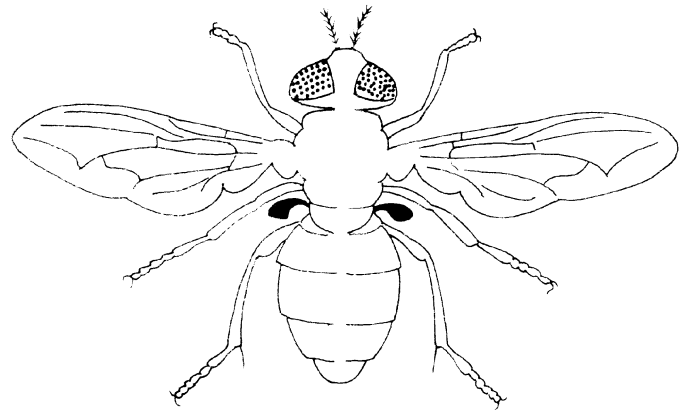


Figure 11.1. Flies and all other dipterans have one pair of wings while all other winged insects have two pairs. In place of the second pair, flies have knobbed balance organs called halteres (illustrated in black).

In Group 1:

- The adults are small—gnat- or mosquito-like with long antennae and slender legs.
- Larvae have head capsules and most live in water or moist soil.

In Group 2:

- The adults have stout bodies. Their antennae are short or not visible; some are relatively large but usually not long-legged.
- Larvae do not have discernible heads and are often maggot-like. Their harborage varies—they live in water, filth, soil, carcasses, plant tissues, or animal tissues.

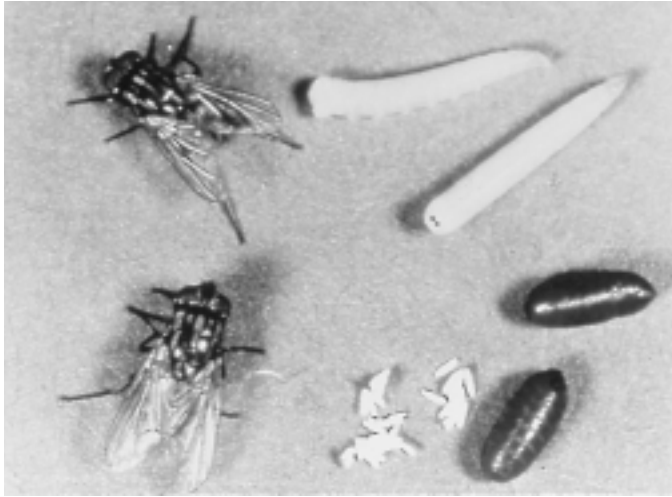


Figure 11.2. Housefly—eggs, larvae (maggots), and pupae.

Flies often tell the same story; they frequent garbage, dead animals and manure. Their larvae live in that material. To enter a house, they have flown inside through an open door or window, or they have moved from a dead animal in a wall.

LARGE FLIES

HOUSEFLIES, BLOWFLIES, AND OTHERS

Appearance

Both the **housefly** (*Musca domestica*), which lives on garbage or manure, and its close relative, the **face fly** (*Musca autumnalis*), which lives on fresh cattle manure, are about $\frac{1}{4}$ inch long. They have a dull gray thorax with dark stripes and a dark, dull abdomen with yellow sides.



Figure 11.3. Housefly (*musca domestica*).

Flesh flies (the family Sarcophagidae) live on meat scraps, dead animals, and dog excrement. They are more than $\frac{1}{4}$ inch long, have a dull gray thorax with three distinct dark stripes, and a gray checkerboard abdomen.



Figure 11.4. Flesh fly, family Sarcophagidae.

Blowflies (the family Calliphoridae) are about $\frac{1}{4}$ inch long. Their thorax and abdomen are shiny black, metallic green or bronze, or they have a metallic blue abdomen with a dull thorax. They live on dead animals, meat scraps in garbage, and wet-mixed garbage.

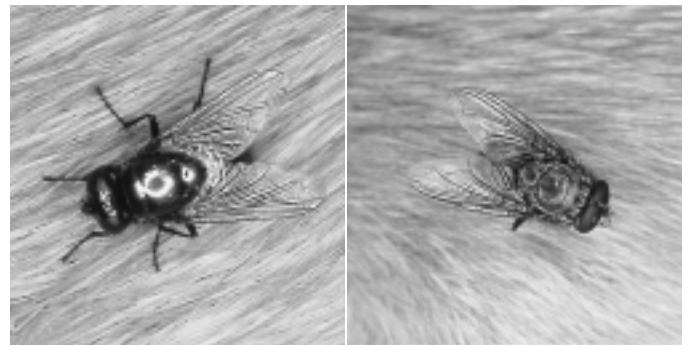


Figure 11.5. Blowflies: greenbottle fly, *Phaenicia sericata* (left), and bluebottle fly, *Calliphora vicina* (right).

The **cluster fly** (*Pollenia rudis*) is also in the family Calliphoridae. It is slightly more than $\frac{1}{4}$ inch long. Its thorax is covered with gray or yellowish hairs; it has no stripes. Its abdomen is dark gray with light patches.

In favorable weather, housefly larvae mature in 6 to 10 days and blowflies in 3 to 9 days. They live in refuse only from the egg-laying to the mature larval stage. Then the mature larvae crawl away to pupate, emerging as adults later.

CONTROL AND MANAGEMENT OF LARGE FLIES

Inspection

When any of these flies become problems inside, their breeding site and their larvae will usually be close by. If animals are nearby, investigate for manure concentrations. Garbage cans and dumpsters are often the problem source; even soil where garbage has decomposed will support infestations.

- Houseflies infest most garbage, manure (horses, cattle, poultry, pet), and filth accumulations.

- Face flies need fresh cattle manure for egg laying.
- Flesh flies, like blowflies, live in pet manure, meat scraps in garbage, and dead animals.
- Blowflies are scavengers and live in manure, carrion, dead birds, and dead rodents in wall voids and chimneys. One blowfly, called the cluster fly, parasitizes earthworms.
- Look for fly sources where buildings are infested. Observe sanitation in the areas where flies are problems.
- The most common means of fly entry is through open doors. Look for door props and hooks, as well as gaps where broom handles are stuck over hinges to hold the door open or for doors that do not fit tightly.
- Evaluate garbage management. Garbage left in the building or on loading docks is an attractant. Garbage should be removed from the premises *twice* a week.

Habitat Alteration

Emphasize **sanitation** to remove food and breeding sites. If sanitation cannot be improved, other methods of control will not be effective. Make the following recommendations to clients:

- Remove breeding materials such as garbage and manure.
- Clean garbage cans and dumpsters regularly, and clean up any fresh overflow immediately.
- Clean food-delivery spills immediately.
- Drain wet areas around garbage collection sites.
- Keep loading docks clean.

Use **exclusion** techniques to prevent flies from entering, such as:

- Caulk and tighten around all openings, such as screens, doors, windows, ventilators, and eaves.
- Install air curtains where doors remain open for deliveries, etc.
- Install automatic door closers.
- Replace white security lights inside and outside with yellow lights so flies are not attracted to the building.

Pesticide Application

- Fly strips can be placed in low-access rooms, such as attics and storerooms.
- Fly bait can eliminate adult flies when methods are in place that reduce breeding sites.
- Aerosol contact sprays can be used to knock down adult flies after elimination of breeding sites and exclusion methods are in effect.
- Ultra-low dosage applications of non-residual pesticides can be used if an adult infestation must be quickly reduced outside.

Non-chemical controls include:

- Electric flytraps will control only a low level of adult flies. Watch these traps to see what kinds of flies are being caught.
- Do not place blacklight flytraps where they will attract insects from outside. Do not put them in competition with other lights, such as those from vending machines, etc.

Follow-up

Regularly check sanitation and exclusion methods to see that they are being maintained. Observe client and worker habits that run counter to the pest management program (sanitation, habitat alteration, and so forth). Hold training clinics for workers about fly management.

ATTIC FLIES, CLUSTER FLIES

Cluster flies—along with houseflies, face flies, some blowflies, and flesh flies—normally overwinter as adults. In nature, overwintering locations are under bark, in hollow parts of trees, or under the bark of logs. They begin seeking shelter at the end of the hot part of summer. If they begin investigating structure walls in their search for winter harborage, their upward movement often brings them to openings under siding, ventilators, and weep holes in masonry, cracks around windows, wire penetrations, wall voids, and openings around the roof. Unused attics are good overwintering sites.

Flies hidden in attic cracks will begin flying to windows on warm winter days. They often make their way down through closets and chimney cracks into living spaces of the house. This same behavior takes place in office buildings, hospitals, and other structures.

Control and Management of Attic Flies, Cluster Flies

Inspection

Frequently finding flies dead at windows may indicate an attic fly infestation.

Habitat Alteration

- Caulk cracks and crevices as much as possible.
- Tighten up and caulk around windows and screen ventilating spaces under the roof.

Pesticide Application

- Use liquid pressurized sprays or dusts where flies have collected in wall voids. Likewise, treat around window and door frames and other cracks and crevices.
- Use aerosols or space sprays where large numbers of flies are active. These formulations will control exposed individuals.
- Hang sticky fly strips in front of attic windows, especially east windows.
- Apply residual pesticides labeled for fly control to surfaces where flies rest, provided those surfaces are not used by people.

SMALL FLIES

FRUIT FLIES AND PHORID FLIES

Drosophila and the Family Phoridae

These small flies (from two different fly families) often are mistaken for each other. They are about $\frac{1}{8}$ inch long and somewhat similar looking, but their biology and management are very different. Treatments of these fly infestations are a good example of the site-specific nature of successful pest management.



Figure 11.6. Fruit flies are small flies about $\frac{1}{8}$ inch long.

FRUIT FLIES

Several species of *Drosophila* have been immensely beneficial to mankind because of their use in the study of genetics and heredity. Fruit flies are attracted to nearly any material that is fermented by yeast. These small flies commonly have bright red eyes, although some species' eyes are dull dark red. The head and thorax are yellowish to brown, and the abdomen is light brown to dark with yellow bands.

The wing vein structure is important and can be seen with a hand lens. It consists of a thickened vein bordering the front margin of the wing from the attachment at the thorax to the wing tip. Four other long veins can be seen on the rest of the wing.

In a common fruit fly infestation, flies are attracted to the sweet odor of fermentation in ripe fruit, such as bananas; they lay their eggs in the cracks of the peel. Fruit fly larvae hatch, then feed on yeast cells in the fruit. The life cycle can be completed in not much more than a week.

Newly emerged adults are attracted to lights, but egg-laying females will not leave fermenting materials. Fruits, vegetables, beer, fermenting water from refrigerators, humidifiers, sink drains, sour mops and rags, and fermenting pet food are examples of fermenting material. Infestations are common in orchards, breweries, restaurants, canneries, hospitals, and homes.



Figure 11.7. Fruit fly, *Drosophila* spp.

Control and Management of Fruit Flies

Inspection

When certain the infesting insect is a fruit fly, look for fermenting materials. Begin with ripe fruit and vegetables, then proceed to less obvious possibilities.

- Use flytraps baited with bananas to find the most heavily infested areas when the source is very obscure.
- Be sure to inspect the outside of the building near windows.

Habitat Alteration

- Close up gaps where flies can enter.
- Use small-mesh screening to exclude these small flies.
- Discard or clean infested material.
- Use precautions to remove flies before fruit is brought to terminal points when the infestation originates in the field or orchard. Infestations in canneries and fruit markets are particularly difficult to manage.

PHORID FLIES

Phorids or humpbacked flies are about the same size as fruit flies or a little smaller. They are dark brown and look humpbacked—because the small head is located low on the front bulge of the thorax.

Wing venation consists of several short, thickened veins on the fore margin of the wing near the attachment to the thorax. These veins do not extend to the wing tip, and other veins are weak or nearly invisible. Phorids run in short jerks.

These flies become problems when they infest decomposing plant or animal matter. Buried animals, garbage, or broken sewer lines support large numbers of phorids. Phorids also infest bodies in mausoleums.

Adults are able to emerge from the underground infestation site upward through several feet of soil. If broken

sewer lines are under buildings, phorids can come up through cracks in concrete floors or around floor drains. When water and sewage wash out cavities in the soil around the pipe, immense numbers of flies are produced.



Figure 11.8. Humpbacked or phorid fly, family Phoridae.

Control and Management of Phorid Flies

Inspection

Carefully identify the infesting fly as a phorid. Locate the area where most flies appear. Ask clients if there have been sewer problems, buried garbage, or decaying vegetable or animal matter close by.

Habitat Alteration

- Remove decaying matter and soil contaminated by it.
- Where sewer lines must be repaired, insist that sewage-contaminated soil also be removed.
- Caulk all floor and wall cracks where flies may enter.

MOTH FLIES OR DRAIN FLIES

The Family Psychodidae

Moth flies are about $\frac{1}{8}$ inch long. Their dark color comes from tiny hairs that cover the wings, which are held in roof-like fashion over the body. Moth flies have long, drooping antennae.

Larvae live in the gelatinous material in sink drain traps and sewers. Where sinks regularly overflow, these flies build up in the overflow pipe. When drain traps of sinks, commodes, and floor drains dry out, large numbers can enter dwellings from the sewer.

Drain traps should be cleaned mechanically or with drain cleaners. Without larval control, adults will constantly emerge.

In sewage treatment plants, drain flies feed on the gelatinous material that collects on stones in trickling filter beds. Over time, however, cast skins from these filter

flies can slow down water drainage. When sewage treatment plant filter beds malfunction or become “out of balance,” the moth flies can become problems in nearby neighborhoods. The filter bed should be cleaned by reverse- or back-flushing.



Figure 11.9. Moth fly or drain fly, family Psychodidae.

FUNGUS GNATS

The Families Mycetophilidae and Sciaridae

Fungus gnats are slender, delicate, mosquito-like insects. Their larvae infest moist soil and feed on fungi associated with decaying vegetation. Indoors, fungus gnats infest flowerpots. They also build up in pigeon droppings on outside ledges, then enter dwellings through nearby windows.



Figure 11.10. Dark-winged fungus gnat, family Sciaridae.

MIDGES

The Family Chironomidae

Midges look very much like mosquitoes but do not bite. Midge larvae live in water, especially in quiet, still water.

Adult midges are often a food source for spiders on buildings and monuments (see Web-weaving Spiders, Chapter 13). The adults fly to lights and enter dwellings through gaps.

Management is site-specific; pesticides are generally not useful. Manipulating lights to shine away from buildings will reduce midge attraction. As part of the pest management plan, note flight periods and times. The larvae of some species of midges indicate a larger pollution problem.

SECTION 3
CHAPTER 11

Review Questions

Chapter 11: Houseflies and Their Relatives

Write the answers to the following questions and then check your answers with those in Appendix A in the back of this manual.

- Briefly describe the two major divisions of the order Diptera characterized by form and give an example for each.
- Match the following to the appropriate description.
 - Fruit fly (*Drosophila*)
 - Phorid fly
 - Both

_____ 2. Small in size.
_____ 3. Look humpbacked (small head).
_____ 4. Often have red eyes.
_____ 5. Attracted to yeast-producing materials.

SUMMARY

Flies, insects with complete metamorphosis in the order Diptera, are characterized by having only one pair of wings. These insects are responsible for millions of deaths each year because of their disease-vectoring ability, particularly in less-developed countries. In urban areas, flies contaminate food and people in restaurants, hospitals, and homes. They are annoying indicators of sanitation, structural, and cultural problems.

- _____ 6. Can infest buried refuse and emerge in buildings.
_____ 7. Visible vein and cross veins on wings.
_____ 8. Run in short jerks.
_____ 9. Veins do not extend to wing tip.
_____ 10. Trap with banana-baited material.
_____ 11. Most likely infesting a brewery.
_____ 12. Remove sewage-contaminated soil to control.
_____ 13. Infest manure.

14-21. Match the following to the appropriate description.

- Houseflies
 - Face flies
 - Flesh flies
 - Blowflies
 - Cluster flies
 - All of the above
- _____ 14. Resemble face flies—dull gray thorax, dull abdomen with yellow sides.
_____ 15. Solid metallic green, bronze, blue, or black.
_____ 16. Yellow or gray hairs cover thorax.
_____ 17. Gray thorax with three distinct stripes.
_____ 18. Larvae parasitize earthworms.
_____ 19. Most commonly enter through doors.
_____ 20. Attracted to garbage.
_____ 21. Need fresh cattle manure for egg laying.

22. Cluster flies (along with houseflies, face flies, some blowflies, and flesh flies) are referred to as "attic flies" because they often overwinter as adults in unused attics.
- A. True
 - B. False
23. Cluster flies can be a nuisance inside buildings on warm winter days.
- A. True
 - B. False
24. List at least three pest management procedures for controlling attic/cluster flies.
25. Describe a pest management scenario for house flies/blowflies in which you inspect the area around the structure, recommend sanitation and exclusion methods, and apply a pesticide.
26. List at least three pest management procedures for fruit fly or *Drosophila* infestations.
- 27-32. Match the following to the appropriate description.
- A. Moth or drain flies
 - B. Fungus gnats
 - C. Midges
- _____ 27. Infest flowerpots.
- _____ 28. Long, drooping antennae.
- _____ 29. Manipulate lights to reduce attraction.
- _____ 30. Larvae live in gelatinous material.
- _____ 31. Clean out sewage plant filter beds to control.
- _____ 32. Larvae live in water.
33. Pesticide application alone, without proper sanitation, will be enough to control fly pests.
- A. True
 - B. False

