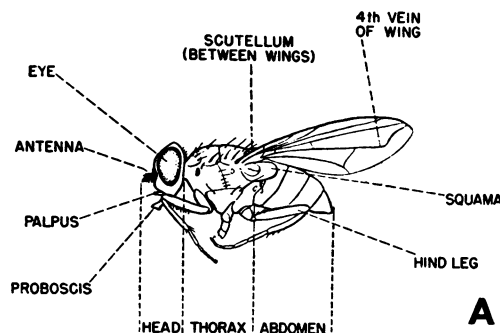


Identifying Common Flies

By HAROLD R. DODGE, Ph.D.



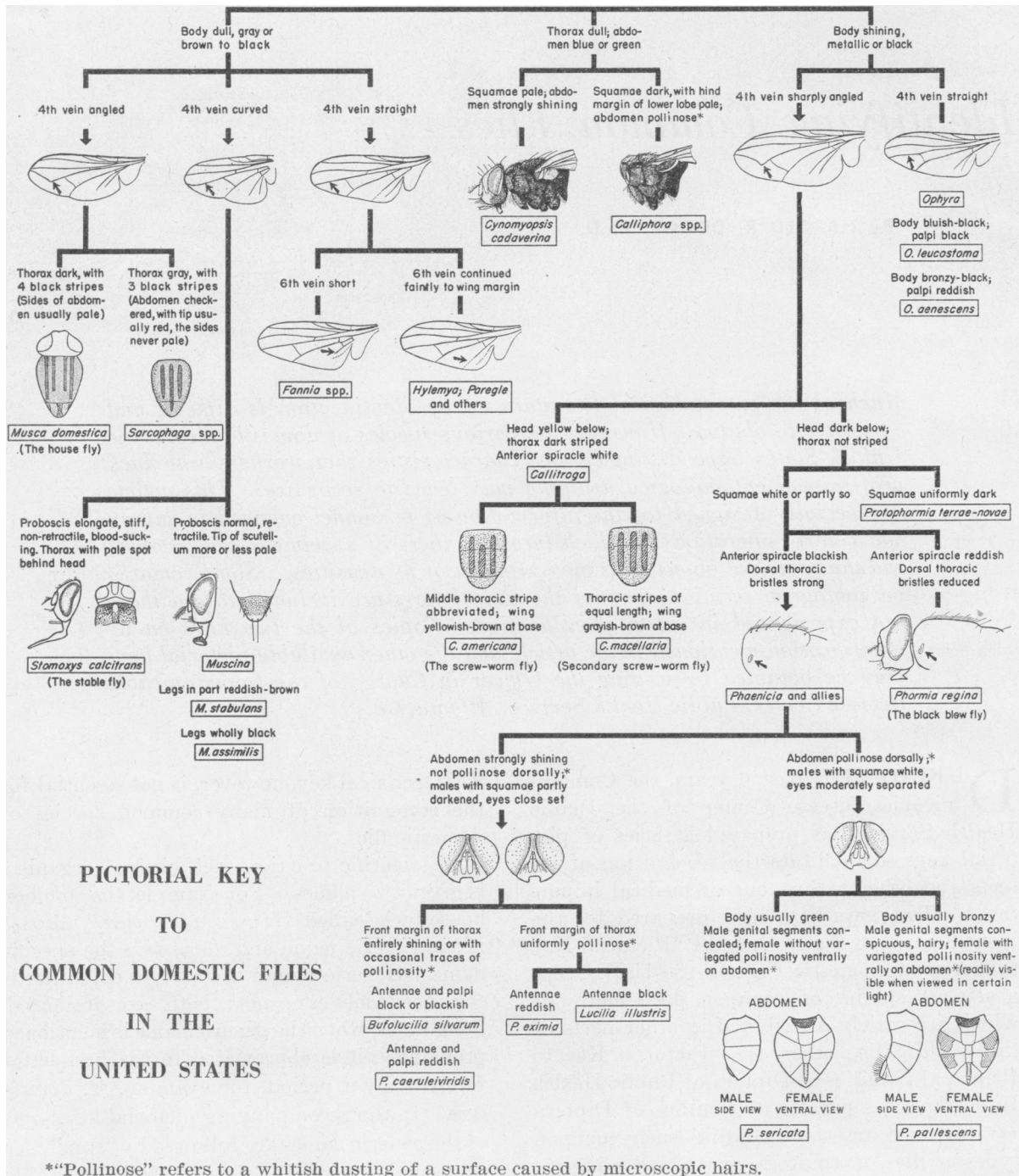
Much of the entomological literature on fly identification is difficult and expensive to obtain. However, the various species of domestic flies in the United States have distinguishing characteristics that workers who lack professional entomological training may learn to recognize. This article is especially designed for the information of personnel engaged in survey and control operations in which large numbers of specimens are involved and the principal objective is measurement of fly densities. Some remarks on zoological terminology and the use of keys are included to aid those not experienced in insect identification. Copies of the two keys on fly identification mentioned in the article and the other available pictorial keys may be obtained by writing the Officer in Charge of the Communicable Disease Center, Public Health Service, Atlanta, Ga.

DURING THE past 6 years, the Communicable Disease Center of the Public Health Service has prepared a series of pictorial keys to facilitate the recognition of insects and other arthropods of medical importance. Two keys have been prepared for the identification of flies. One, the "Pictorial Key to Common Domestic Flies in the U. S.," separates 21 species of common flies, many of which are widely distributed in other parts of the world. The other, the "Pictorial Key to Principal Families of Diptera of Public Health Importance," separates 24 families of Diptera (two-winged insects including such common types as flies, mosquitoes, gnats, and midges).

Dr. Dodge, an entomologist with the Communicable Disease Center of the Public Health Service, is engaged in research work on flies.

This technical key, however, is not essential for the recognition of many common species of domestic flies.

In scientific practice, each kind of organism is given two names. For example, the common housefly is called "*Musca domestica*." *Musca* is the generic name and *domestica* the specific name. Generic names are always capitalized; specific names are not; both are italicized. Sometimes, when the generic name is mentioned previously, it is abbreviated to the first letter followed by a period, for example, *M. domestica*. In the accompanying pictorial key, some of the generic names are followed by "spp." An example is *Sarcophaga* spp. This means that more than one species occurs within the genus *Sarcophaga* but that the key does not separate the species. Often the name or an abbreviation of the name of the person who described the species is given after the specific name. For



*"Pollinose" refers to a whitish dusting of a surface caused by microscopic hairs.

example, the name of the common housefly may be followed by the name "Linnaeus," sometimes abbreviated Linn. or L.

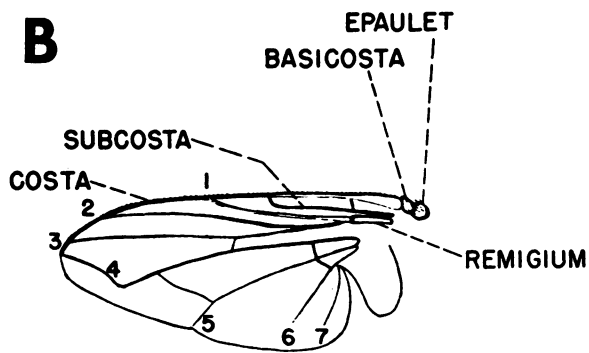
A family constitutes a group of related genera. For example, the family "Muscidae" includes *Musca*, *Muscina*, *Ophyra*, *Stomoxys*, and related genera. Sometimes unrelated genera superficially resemble each other closely. On the other hand, members within one family may be quite diverse in general appearance. Thus, it is much simpler to recognize the housefly than to recognize its family characteristics. In fly control operations, the family name of a fly is of secondary importance; therefore, only the material in the "Pictorial Key to Common Domestic Flies in the U. S." is presented here.

Use of the Key

Identification keys are merely guides used to distinguish between closely related species. The most common type of key consists of a series of choices or "couplets," each containing two or more alternatives; each alternative refers the user to a succeeding couplet until the specimen under consideration is keyed or "run out" to a certain identity or name. In pictorial keys, most or all of the characteristics used in the couplets are illustrated.

In using the pictorial key shown, the general coloration of the body must first be determined. The housefly, for example, belongs in the gray-bodied group at the left. Three subdivisions of this group are based on the structure of the fourth wing vein. It can be observed even by the naked eye that this vein, which in many species ends behind the wing tip, is abruptly angled (not gradually curved) and ends before the wing tip, close to the end of the third wing vein. The presence of four dark stripes on the thorax and the usual yellowish coloration of the abdomen sets it apart from the various species of *Sarcophaga*.

Identifying another common fly, *Phaenicia sericata*, is not as simple. The uniformly greenish-colored body refers it to the group of species on the right side of the key. It will not be difficult to observe that the fourth vein is again abruptly angled or that the thorax is without obvious dark stripes, so it readily keys

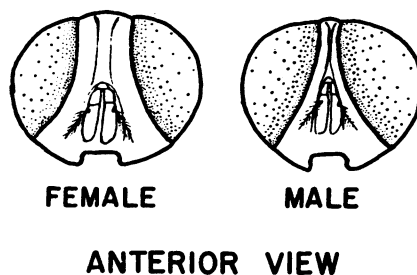


NO'S 1-7 ARE THE "LONGITUDINAL WING VEINS" USUALLY REFERRED TO AS "VEINS"

past *Ophyra* and *Callitroga*. But its separation from the remaining genera and species is rather difficult. The whitish squamae (see fig. A of whole fly for location of this structure) and lack of a reddish spot on the side of the thorax (see arrow in key illustration) will put it with "*Phaenicia* and allies." The dorsal pollen of the abdomen gives it a duller color than the very bright, shining abdomen of most species of this group, but if the specimen is of the male sex, in which the pollen is less evident, it is useful to check the color of the squamae and the width of the interocular space (see illustration at this point in the key and fig. C). *Phaenicia sericata* can be separated from the remaining species, *Phaenicia pallescens*, by its usual greenish color and the other characteristics shown in the key.

As familiarity with the various flies increases there will be less and less need to refer to the key. The observer may even notice that some flies have prominent differences not mentioned in the key. For example, *Phaenicia* and allies

USUAL DIFFERENCE IN INTEROCULAR SPACE OF MALE AND FEMALE FLIES



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are brighter colored than *Phormia* and *Protophormia*. In a key of this type, it is, of course, impossible to give all the outstanding characteristics. Some additional information on the various species follows. But it is advisable during the initial identification work to send representative determined specimens of all species to a specialist for confirmation.

Features of Common Species

Calliphora spp. and the allied species, *Aldrichina grahami*, a native of Asia now well established in California and Arizona, and *Eucaliphora lilaea*, a common western species that is rare in the East, are quite easily recognized by the narrow, crescent-shaped, white margin of the lower squama lobe. The identification of most species in this group is difficult, but two common species can be recognized as follows: *Calliphora vicina* (formerly called *erythrocephala*) has cheeks which are mainly reddish, and it has a reddish anterior thoracic spiracle; *Calliphora vomitoria* has a "beard" of reddish-yellow hairs on the lower hind margin of the head. The species of the *Calliphora* complex are common in the Northern Hemisphere in the spring and fall. In the southern States they occur chiefly in the winter months. They breed primarily in dead animal matter.

Callitroga americana and *Callitroga macellaria* range from Argentina to northern United States. They are very similar in general appearance but differ in habits. *C. macellaria* is a common fly over the greater portion of its range. It is readily attracted to traps and breeds in dead animal matter. *C. americana*, the "screw-worm" fly, is a primary parasite of mammals; its larvae occur in wounds and natural body orifices. Generally, it is larger in size than *C. macellaria* and the legs are usually nearly black. *Paralucilia wheeleri* is a western species which strongly resembles the two species of *Callitroga*, but it is distinguished from them by its dark brown squamae and longer palpi.

Cynomyopsis cadaverina is a common northern species allied to *Calliphora* and similar to that genus in habits and seasonal distribution. It is easily recognized through the nearly uniform white squamae which contrast sharply with the dark body, and by the more strongly

shining abdomen which in both sexes is more pointed.

Fannia spp. are moderately small, grayish or brownish flies, sometimes marked with yellow. Certain species are black and shining, but they never approach the highly polished black of *Ophyra*. *Fannia canicularis* is commonly known as the "little housefly" and *Fannia scalaris* as the "latrine fly." The sixth wing vein of *Fannia* is short and the seventh is sufficiently curved so that the two would, if continued, intersect before they reach the wing margin. *F. canicularis* and *F. scalaris* are nearly cosmopolitan in distribution, breeding in moist material of plant or animal origin.

Hylemya cilicrura and *Paregle cinerella* are two common examples of the Anthomyiinae, a subfamily characterized by the continuation of the sixth vein, though faintly, to the wing margin, and by the presence of fine, erect hairs subapically on the under side of the scutellum. In *H. cilicrura* the female has a characteristic reddish spot above the base of the antennae, and in the male the abdomen, viewed laterally, is quite flat. In *P. cinerella* the head usually is entirely black, and the male abdomen is not greatly flattened. Both species breed in vegetable matter, and they and allied species are sometimes important pests of crops. They are widely distributed in the United States.

M. domestica, the "housefly," is easily recognized by the characteristics mentioned in the key, and there are few other American flies which might be confused with it. These are, primarily, *F. canicularis*, *Stomoxys calcitrans*, and *Muscina*. In other parts of the world there are many species of the genus *Musca*. *M. domestica* breeds in garbage, vegetable matter, or excrement of herbivorous animals, and is widely distributed throughout the world.

Muscina stabulans, the "false stablefly" and *Muscina assimilis* are widely distributed species, both probably originating in the Old World. They are well-marked species, somewhat larger than the housefly, and have a moderately curved fourth vein. They breed primarily in plant and animal wastes where their larvae may prey upon other fly larvae. Two allied, larger species are relatively new to North America, *Muscina pascuorum* and *Muscina pabulorum*. They are distinguished from *M. assimilis*, which they

otherwise resemble, by their larger size, the reddish palpi (not black), and by the strongly curved fourth vein, ending in or before the wing tip.

Ophyra aenescens and *Ophyra leucostoma* are easily recognized by the highly polished, shining black body. *O. aenescens* is bronzy-black with yellowish squamae, while *O. leucostoma* is bluish black with dark squamae. The difference in body color between these two species, though slight, is remarkably constant. Both species are widely distributed in the United States; they apparently prefer to breed in animal matter.

Phaenicia and the related species, *Lucilia illustris* and *Bufolucilia silvarum*, are quite difficult for the beginner to separate. *Phaenicia sericata*, the most common species, is variable in body color, ranging from its usual green to bluish, and occasional specimens have a reddish, "coppery" luster. Together with its closest ally, *Phaenicia pallescens*, it may be distinguished from the remaining species by a whitish pollinosity on the upper surface of the abdomen, especially in the females, and by the separation of the male eyes by a distance equal to or greater than one-tenth the width of the head. *P. pallescens* is a smaller species with body usually bronzy colored, sometimes with greenish luster but never coppery red. It is common in the southern States and is a close relative of *Phaenicia cuprina*, an important pest in Australia and Africa. Both *P. sericata* and *P. pallescens* are primarily urban species, being common in market districts and city dumps.

Phaenicia caeruleiviridis, *Phaenicia eximia*, *Lucilia illustris*, and *Bufolucilia silvarum* agree in that the abdomen is highly shining dorsally, and the eyes of the male are separated by a distance less than one-tenth the width of the head. These species all breed in dead animal matter, except possibly *Bufolucilia*, which is known to be a parasite of frogs and toads. *P. caeruleiviridis* and *P. eximia*, in contrast to *P. sericata* and *P. pallescens*, are mainly "rural" in their habits, seldom being encountered in city business districts or city dumps. However, they frequently may be taken in residential areas. *P. caeruleiviridis* is widespread east of the Rocky Mountains; *P. eximia* is a neotropical species which occurs in Texas and Louisi-

ana; *L. illustris* and *B. silvarum* are widely distributed in the northern and western States.

Phormia regina and *Protophormia terrae-novae* should be recognized without difficulty through their key characteristics. Both species breed in animal matter and occur primarily during the cooler months of spring and fall, or, in the southern limits of their range, in the winter. *P. regina* is deceptively called the "black blowfly," for its body is not black. Both species are of darker coloration than the various species of the *Phaenicia* complex. *P. regina* is usually dark green; *P. terrae-novae* is usually dark blue. Both species are widespread in the Northern Hemisphere. *P. regina* is the more common species, being absent or rare only in the southernmost parts of the United States.

Sarcophaga spp. includes a large group of genera and species of the family Sarcophagidae. These flies vary from three-sixteenths to more than 1 inch in length, and with few exceptions have three dark stripes dorsally on a grayish thorax. Some tropical species are bright yellow with black markings, or even metallic blue or green. The abdomen typically has a "checkered" pollinose pattern of changeable light and dark areas, with genital segments usually reddish but sometimes black. Female sarcophagids deposit living young.

Stomoxys calcitrans, variously called the "stablefly," or "dogfly," or "biting housefly," is a common and very widespread pest of livestock and will bite man freely. It breeds in excrement of herbivores, or in accumulations of vegetable wastes such as piles of grass clippings or seaweed. The elongated, stiff proboscis is characteristic of this species. In repose it projects for a considerable distance in front of the head. In size and general coloration, *Stomoxys* resembles the housefly but is further distinguished from that species by the moderately bent fourth wing vein and by the whitish pollinose spot on the front margin of the thorax.

Two other genera not represented in the key rate mention. *Pollenia rudis* frequently enters houses or attics in large numbers in the fall; for this reason it is called the "clusterfly." Although it keys to *Musca* and *Sarcophaga*, it differs from these flies in having a thorax that is not striped but is partly clothed with crinkly

yellowish hairs, particularly on the sides. The larvae of this species are parasitic on earthworms.

Scopeuma spp. are dung breeding flies which occasionally are common, and which are characterized by dense yellowish hairs and by the slender body. They would key out with *Hylemya*. They occur during the cool months of the year from the Arctic to the southern States.

At times certain other species of flies may appear to be common. It is impossible with limited space to deal with all species which may be encountered, but the species considered here constitute the bulk of the flies commonly associated with man in North America.

NOTE: The writer is extremely interested in the study of *Sarcophaga* flies, and will welcome material from any source. Many of the parasitic species are rarely taken in fly traps, but are more likely to be collected by rearing from host or by general collecting. Some known hosts are grasshoppers, mantids, snails, wasps, bees, caterpillars, spiders or their egg masses, and beetles. Many species breed in carrion or excre-

ment. If flies are obtained by rearing from larvae, the pupal shells should be pinned with the flies, and the host, in the case of parasitic species, should be preserved. Males of some rare species may be found sunning themselves upon rocks or barren ground on hilltops.

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Regional Congenital Heart Program

The fourth regional program to help provide surgical and hospital care for children with congenital heart disease will be located at Johns Hopkins Hospital, Baltimore, where more than 1,200 "blue babies" have been operated on since 1945.

For the past 4 years, the Maryland State Department of Health has administered a small fund for congenital heart surgery for out-of-state children. Inclusion of the State in the regional program will extend and supplement this service to benefit children from the Middle Atlantic and Southern States. In special cases, children may be referred from other parts of the country if the care they need is available only at Johns Hopkins. Full geographic coverage for the country is planned upon completion of the regional heart center program.

Local funds, both public and private, in the State where the child resides, will be used for the major share of the costs. A special grant of the Children's Bureau, Federal Security Agency, may be used when such resources are not available. The grant will also provide convalescent sanatorium care and in-patient hospital care including special nursing and blood transfusions.

Regional programs previously approved are in New Haven, Conn., Chicago, Ill., and in San Francisco and Los Angeles, Calif.