

Common Flies (Order Diptera) in the Wichita Mountains and Surrounding Areas

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Introduction

The Diptera is divided into three suborders, the Nematocera (crane flies, mosquitoes, midges), Brachycera (soldier flies, horse flies, robber flies, bee flies), and Cyclorhapha (house flies, blow flies, flesh flies). Dipterans have a single pair of wings, the forewings. The hindwings are reduced to knobbed appendices, the halteres, that function as balancing organs. The compound eyes are well-developed and the mouth parts are designed for sucking, cutting, or piercing. As in other insects, each leg consists of six articulated segments, the coxa, trochanter, femur, tibia, tarsus, and pretarsus or claws.

The Diptera undergo full metamorphosis. The larvae are legless and feed on various organic materials, including nectar, fruit, decaying plants, insects, carrion, and even the animal flesh. The adults of some species, such as mosquitoes and black flies, feed on blood. Some species, including the robber flies, are predaceous, while others are parasitic on other insects. There are about 17,000 species of dipterans in the U.S. and Canada. This guide includes only a few of the more common families and species found in our area. All photos in this guide were taken by the author using a Canon PowerShot SX110 IS camera.

The scientific name of a plant or animal consists of the genus and species, written in *italics*. The genus is written in full the first time that it is mentioned in a paper (e.g. *Musca domestica*). Thereafter, the genus name is abbreviated to its initial (e.g. *M. domestica*). If more than one genus with the same initial are mentioned in a paper, each genus is spelled out to avoid confusion. Often, the genus name is followed by sp. (for one species) or spp. (for more than

one species). For example, *Musca* sp. indicates that a fly belongs to the genus *Musca*, but the writer is unsure about the species. *Musca* spp. means that the writer is referring to two or more species in this genus. Relying on only common names for a given species may lead to confusion, since more than one common name may be used for the same species, or the same name may be applied to more than one species. Using the scientific name, which is the same in any language or region, eliminates this problem. Furthermore, only scientific names are used in the scientific literature. Less than 2% of known insect species in the U.S. have approved common names. Common names are not capitalized.

Family Tipulidae (crane flies)

Crane flies have long, thin legs and an elongated abdomen, and may resemble giant mosquitoes (Fig. 1). The front end of the head is elongated and snout-like, and the thorax has a V-shaped suture. The more common species in the area are $\frac{3}{4}$ - 1 inch long. Crane flies are common in early spring and may feed on nectar. These dipterans are attracted to lights and will readily fly inside homes.



Figure 1. A crane fly, *Tipula* sp.

The greyish, elongated, and cylindrical larvae are known as "leatherjackets" (Fig 2) and are found in moist soil and decaying vegetation.



Figure 2. Crane fly larva

Family Culicidae (mosquitoes)

Mosquitoes are delicate-looking dipterans, with a hump-like thorax, a thin long abdomen, and a fringe of minute hair-like scales along the wing veins. The proboscis-like mouthparts in females are designed for piercing and sucking. The antennae are almost as long as the mouthparts. The head tilts downward, and during feeding is held down at an almost 90° angle. Male mosquitoes have plumose (feather-like) antennae and feed on nectar and other sweet plant secretions. Females feed on the blood of diverse vertebrates, including mammals. The mosquito bite causes itching and irritation, and some species are vectors for disease-causing organisms. In tropical regions mosquitoes transmit diseases such as malaria, yellow fever, and dengue. In the U.S. mosquitoes are vectors of the West Nile virus. To date 29 West Nile cases, but no fatalities, have been reported in Oklahoma (CDC, 2016).

Depending on the species, female mosquitoes lay eggs on or near ponds and temporary pools, in cavities such as tree holes and containers that may be store rainwater, and in areas subject to periodic flooding. The larvae are aquatic and feed on suspended protozoans, algae, and other microorganisms.

About 150 species of mosquitoes have been

recorded in temperate North America. Of these, some 25 species, mostly in the genera *Culex*, *Anopheles*, and *Aedes* are potential disease vectors. Two species found in our area are the Asian tiger mosquito, *Aedes albopictus*, and *A. aegypti* (Fig. 3). Both have white markings on the abdomen and hind tarsi, but *A. aegypti* has lyre-shaped mark on the thorax while *A. albopictus* has longitudinal silvery line.



Figure 3. An *Aedes aegypti* mosquito

Family Chironomidae (midges)

Midges are small and delicate dipterans that superficially resemble mosquitoes in size and appearance. Unlike mosquitoes, they lack a proboscis-like mouthparts, and the thorax is straight, not bent or humped. The antennae in males are long and plumose, but short and filiform in females. The abdomen is thin and long. At rest *Chironomus* midges keep the front legs extended and pointing forward (Fig. 4).



Figure 4. A midge, *Chironomus* sp., female

The larvae are aquatic and a major food source for fish in lakes and ponds. The adults emerge in large numbers early spring and are often attracted to lights. Midges are weak fliers and are easily caught in spider webs.

Family Stratiomyidae (soldier flies)

Soldier flies have three-segmented antennae, with their bases arising close together, and the second and third segments separating and forming a V. The abdomen is rather broad and flat. Some species are colorful, resembling bees or wasps (Figs. 5 - 6), and are often seen on wild flowers. One of the most common species in the area is the black soldier fly, *Hermetia illucens* (Fig. 6). The larvae (Fig. 7) are voracious and have an important role as decomposers of plant material, such as decaying fruit and vegetables, and are often common in compost piles. The adults and larvae are about $\frac{3}{4}$ inch long.



Figure 5. An unidentified soldier fly



Figure 6. Black soldier fly, *Hermetia illucens*



Figure 7. Black soldier fly larvae, *Hermetia illucens*

Family Tabanidae (horse & deer flies)

Tabanids are biting flies that feed on the blood of mammals. The antennae have three segments, the last one annulated. The eyes are unusually large and touch at the center of the head in males, but are separated by a gap in females. Their main food source is nectar, but females need a blood meal for egg production. In females, the piercing mouth parts consist of a fascicle of six sharp cutting blades (stylets) that serve to stab and cut the skin until blood flows. An anticoagulant is injected into the wound and the blood is then lapped up by a sponge-like structure (the labella). The larvae are aquatic or semi-aquatic, and the adults are powerful fliers.

The black horse fly, *Tabanus atratus* (Fig. 8), is about one inch long and common in the area.



Figure 8. Black horse fly, *Tabanus atratus*, female

The larva is elongated, pointed at both ends, and about 2 ¼ inches long. It is found in streams and resembles the mydas fly larva (Fig. 11).

Deer flies, *Chrysops* spp. (Fig. 9), are slightly larger than a housefly and often buzz around one's head with annoying persistence. The larva is found in the muddy edges of ponds. There are some 350 species of tabanids in the U.S. and Canada.



Figure 9. A deer fly, *Chrysops* sp., female

Family Mydidae (mydas flies)

This small family consists of only 45 species in the U.S. *Mydas clavatus* (Fig. 10) is the largest and most common species in our area, often reaching 1½ inches.



Figure 10. Mydas fly, *Mydas clavatus*

The body and wings are black, which contrasts with the bright orange coloration of the second abdominal segment. The last segment of the

antennae is enlarged (clubbed). Although it superficially resembles a large tarantula hawk (Pompiliidae: *Pepsis*), this fly is harmless. It feeds on nectar and may be seen visiting wild flowers in early summer. The white, elongate larva (Fig. 11) is found in moist soil and decaying wood where it preys on the larvae of scarab beetles.



Fig. 11. Mydas fly larvae

Family Asilidae (robber flies)

Robber flies range in size from a fraction of an inch to two inches. In most species the abdomen is long, thin, and tapers posteriorly. The beak-like mouthparts are designed for piercing. There is a deep notch on top of the head, between the large eyes, and a fringe of hairs partially covers the front and sides of the head (Figs. 12 - 13).



Figure 12. A common robber fly

The strong and spiny legs serve to grasp prey. Some species closely mimic bumble bees.

Robber flies prey on various flying insects, often larger than themselves, including other flies, wasps, bees, dragonflies, and grasshoppers. The prey is often captured on the wing and quickly stabbed with the sharp mouthparts, which also inject paralyzing neurotoxins into the wound. Robber flies can inflict a painful bite if handled. *Diogmites* sp. (Fig. 13) is a colorful, one inch long robber fly common in our area. This fly emits a high pitch buzzing sound during flight.



Figure 13. Robber fly, *Diogmites* sp.

Family Bombyliidae (bee flies)

These robust flies are often hairy, usually with a broad abdomen and long, straight, and thin beak-like mouthparts (Figs. 14 - 15). Some of them resemble bees.



Figure 14. A bee fly, *Villa* sp.

When at rest, the wings are kept outstretched, with the tips pointed backward. Bee flies feed on nectar and pollen and contribute to the

pollination of native plants. Bee flies parasitize insects in several orders, including other flies.



Figure 15. A bee fly, *Poecilanthrax* sp.

Family Syrphidae (flower or syrphid flies)

Some of the more common insects seen visiting flowers are syrphid flies, and many of them are wasp or bee mimics (Figs. 16 - 18). *Mallota* sp. (Fig. 17) is a bumble bee mimic. The drone fly, *Eristalis tenax* (Fig. 18) is a common honey bee mimic and an introduced species.



Figure 16. A syrphid fly, *Metasyrphus* sp.

Although these flies are highly variable in form and coloration, with the help of a 10x magnifier syrphids can be identified at the family level by the presence of a spurious or false vein on the wings (see BugGuide, 2009). The larvae of some species feed on aphids and other small soft-bodied insects. These small slug-like or maggot-like larvae can be green, white, yellow, or transparent. Unlike caterpillars, these larvae

are legless, the front end tapers to a point, and the head is reduced to two black hooks (Fig. 19). Syrphid larvae are found on aphid-infested plants alongside lady beetles, lady beetle larvae, and other aphid predators.



Figure 17. A syrphid fly, *Mallota* sp.



Figure 18. Drone fly, *Eristalis tenax*



Figure 19. Syrphid fly larvae preying on aphids

Family Muscidae (muscid flies)

There are more than 600 species of muscid flies in the U.S. and Canada. Most of them are small, greyish, and usually resemble a house fly. The adults feed on nectar and other plant exudates. The larvae (maggots) breed in dung and decaying organic matter. Two common species in our area are the house fly, *Musca domestica* and the stable fly, *Stomoxys calcitrans*. In urban areas house flies breed in discarded food and similar organic waste. They can also reproduce in vast numbers in accumulated chicken and pig manure. Several parasitic wasps and predaceous insects help to control house fly larvae and pupae in well-managed manure. The thorax is grey with four longitudinal black stripes (Fig. 20). House flies lack the median longitudinal stripe found on the thorax of flesh flies. The abdomen is greyish and checkered. Food is ingested by means of the labellum, a sponge-like mouth part that absorbs liquid food.



Figure 20. House fly, *Musca domestica*

The stable fly (Fig. 21) looks like a house fly, but the abdomen is slightly broader, and it is a biting fly that feeds on the blood of mammals. This fly has a long and rigid, rasping-sucking beak that is partially folded under the head. The tip of the beak is armed with circular rows of sharp denticles along its outer rim. These denticles are used to scrape mammalian skin and cause bleeding. The blood is then absorbed by the hollow beak. This fly is common around cattle and other large herbivores and breeds in dung and decomposing plant material.



Figure 21. Stable fly, *Stomoxys calcitrans*

Family Sarcophagidae (flesh flies)

Flesh flies resemble large house flies. The thorax is grey, with three or five dark longitudinal stripes, including a median stripe (Fig. 22) The abdomen is grey and checkered. Most species are attracted to carrion, which is the rearing medium for their larvae. The adults feed on nectar, fruit juices, and honey dew.



Figure 22. Flesh fly, *Sarcophaga* sp.

Family Calliphoridae (blow flies)

Blow flies are metallic green, blue, or black, mostly larger than a house fly. The flies feed on nectar, pollen, and decaying organic matter, and the larvae on carrion, dung, and decaying plant material. Blow flies are among the first insects to discover and colonize dead mammals soon after death, at the onset of decomposition. The mass of maggots associated with recently dead animals are mostly blow fly larvae. In tropical

areas some species may also infest open wounds in cattle. Some of the more common species are the green bottle flies, *Lucilia* spp. (Figs. 23 - 24). These flies are metallic green, without stripes on the thorax, and slightly larger than a house fly.



Figure 23. Green bottle fly, *Lucilia* sp.



Figure 24. Green bottle flies inspecting a dead deer mouse

Family Tachinidae (tachinid flies)

Tachinid flies can be recognized by the large bristles on the posterior end of the abdomen and the well-developed postscutellum (Figs 25 - 26). The postscutellum is a shelf-like protuberance found under the edge of the scutellum. The scutellum is the u-shaped sclerotized plate on the thorax that extends over the abdomen. The postscutellum is best seen from a side, with a 10x magnifier. Tachinid flies parasitize Lepidoptera larvae and other insects, including some agricultural pests. This family consists of almost 1300 species in the U.S. and Canada.



Figure 25. An unidentified tachinid fly



Figure 26. Tachinid fly, *Archytas* sp.

Family Oestridae (bot flies)

This is a family of about 40 species in the U.S., including 26 species in the genus *Cuterebra*. Bot fly larvae are internal parasites of various mammals, including rabbits, rodents, horses, sheep, cattle, and deer. The large and robust flies have atrophied mouth parts, do not feed, and only live a few weeks. Some species resemble bumble bees. Bot flies in the genus *Cuterebra* parasitize deer mice, wood rats, squirrels, cottontails, and occasionally dogs.

A species of *Cuterebra* found in our area is $\frac{3}{4}$ - 1 inch long, black, with the sides of the thorax yellow (Fig. 27). The larva is a large spiny grub, also known as "warble," that develops under the skin forming a large cyst with a round opening at its center. The surrounding tissue is irritated by the larva's short spines, causing the secretion of lymph on which it feeds. The larva breathes

by keeping its dorsal spiracles close to the cyst opening. After one or two months, the mature larva exits the cyst and drops to the ground where it pupates. The puparium (Fig. 28) is hard and resistant to attack by most soil arthropods.



Figure 27. Bot fly, *Cuterebra* sp.



Figure 28. Bot fly, *Cuterebra* sp. puparium

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