

BLACK FLIES

Black flies, known also as "buffalo gnats" and "turkey gnats," are very small, robust flies that are annoying biting pests of wildlife, livestock, poultry, and humans. Their blood-sucking habits also raise concerns about possible transmission of disease agents. Black flies are true flies (Order Diptera) in the family Simuliidae, which includes more than 1,700 species worldwide.



Figure 1. Female black fly taking a blood meal (Photo credit: Oklahoma State University)

Are Black Flies a Public Health Risk?

Black flies can be annoying biting pests. *Onchocerca volvulus* causes a significant human disease known as onchocerciasis or "river blindness" in equatorial Africa and mountainous regions of northern South America and Central America.

The bites of black flies cause different reactions in humans, ranging from a small puncture wound where the original blood meal was taken to a swelling that can be the size of a golf ball. Reactions to black fly bites that collectively are known as "black fly fever" include headache, nausea, fever, and swollen lymph nodes in the neck.

Besides being a nuisance to humans, black flies can pose a threat to livestock. They are capable of transmitting a number of different disease agents to livestock, including protozoa and

nematode worms, none of which cause disease in humans. In addition to being vectors of disease agents, black flies pose other threats to livestock. For example, when numerous enough, black flies have caused suffocation by crawling into the nose and throat of pastured animals. Saliva injected by biting black flies can cause a condition known as "toxic shock" in livestock and poultry, which may result in death.

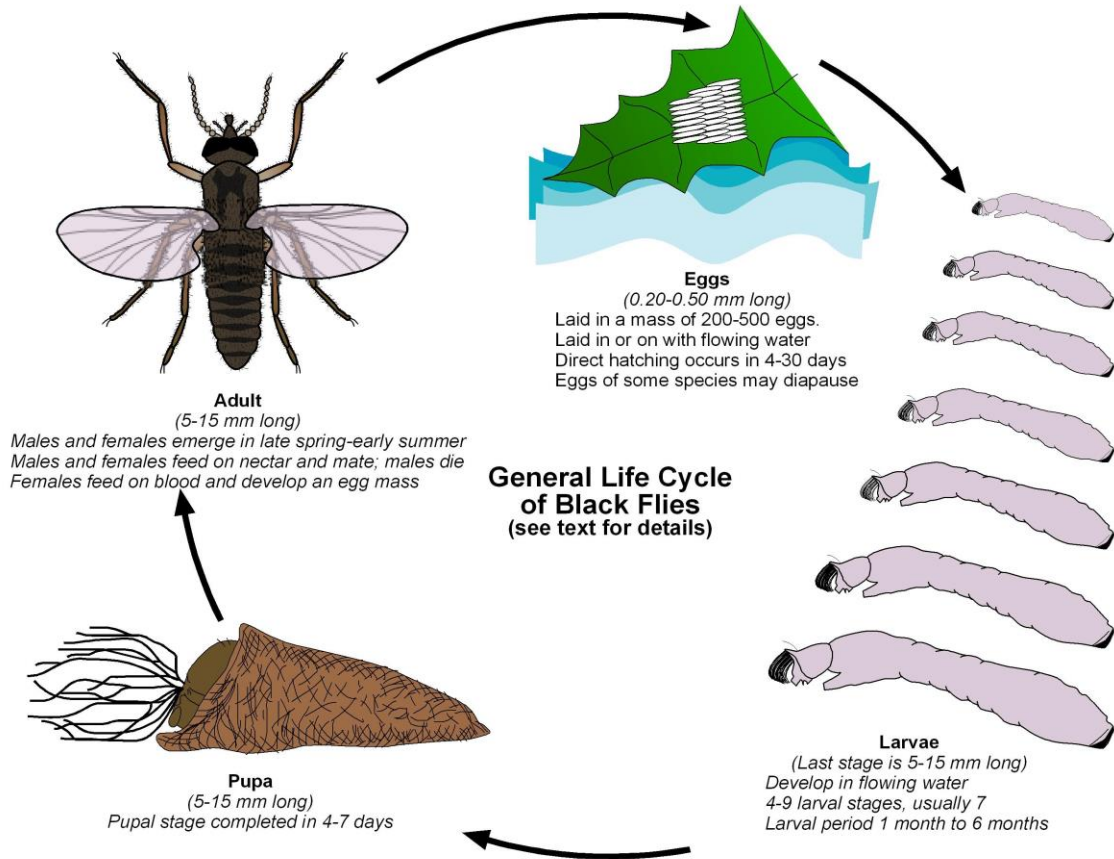
How Can I Recognize an Adult Black Fly?

Black flies range in size from 5 to 15 mm, and they are relatively robust, with an arched thoracic region. They have large compound eyes, short antennae, and a pair of large, fan-shaped wings. Most species have a black body, but yellow and even orange species exist.

What Is the Life Cycle of Black Flies?

Black flies undergo a type of development known as "complete metamorphosis". This means the last larval stage molts into a non-feeding pupal stage that eventually transforms into a winged adult. After taking a blood meal, females develop a single batch of 200-500 eggs. Most species lay their eggs in or on flowing water, but some attach them to wet surfaces such as blades of aquatic grasses.

The length of time it takes an egg to hatch varies greatly from species to species. Eggs of most species hatch in 4-30 days, but those of certain species may not hatch for a period of several months or longer. The number of larval stages ranges from 4-9, with 7 being the usual number. The duration of larval development ranges from 1-6 months, depending in part on water temperature and food supply. The life cycle stage that passes through winter is the last stage larva attached underwater to rocks, driftwood, and concrete surfaces such as dams and sides of man-made channels.



Black fly life cycle. (Illustration by: Scott Charlesworth, Purdue University, based in in part on Peterson, B.V., IN: IN: Manual of Nearctic Diptera, Volume 1)

The pupal stage is formed the following spring or summer, typically in the same site as the last stage larva, but may occur downstream following larval "drift" with the current. Adults emerge from the pupal stage in 4-7 days and can live for a few weeks. Adults of most species are active from mid-May to July. The number of generations completed in one year varies among species, with some having only one generation, but most species that are major pests complete several generations per year.

Black fly larvae and pupae develop in flowing water, typically non-polluted water with a high level of dissolved oxygen. Suitable aquatic habitats for black fly larval development vary greatly and include large rivers, icy mountain streams, trickling creeks, and waterfalls. Larvae of most species typically are found in only one of these habitats.

Larvae remain attached to stationary objects in flowing water, held on by silken threads extruded from glands located at the end of the bulbous abdomen. Depending on species, mature larvae range from 5-15 mm in length and may be brown, green, gray, or nearly black in color.

What Should We Know About the Feeding Habits of Adult Black Flies?

It is estimated that females of 90% of the black fly species require a blood meal for the development of eggs. Those of most species feed on mammals, while others feed on birds. Females of some black fly species feed on only one host, whereas others are known to feed on over 30 different host species. Male black flies are not attracted to humans, and their mouthparts are not capable of biting.

Females of most species of black flies feed during the day, usually biting on the upper body and head. Unlike certain species of mosquitoes and biting midges, black flies do not enter human structures to seek blood meals.

What Should We Know About Controlling Black Flies?

Control of black flies is difficult, typically aimed at the larval stages, and usually involves aerial applications of insecticides or physically altering the habitat of pest species. Control of black flies is difficult because of the number of potential breeding sites. However, satisfactory control has been attained in some states by treating streams with the natural product, *Bacillus thuringiensis* var. *israeliensis* (Bti). Black flies are small enough to pass through window screen or come indoors on or in the hair. They do, however, prefer to bite out of doors. Long sleeve shirts, long pants and fine screen netting over head help prevent feeding. Permethrin products designed specifically to repel ticks also work for black flies as a clothing treatment, but can only be applied to fabrics, such as hats and shirts, and not to skin. Because black flies feed only during the day, our best advice is to limit your exposure to black flies. If this is not possible, try the available repellents in the hope that one of them will be effective for you in protecting against the black flies' bites