

Suggested Extensions

Most communities have a local government agency that deals with vector control. They are divided into districts. Find the representative in your area and request educational materials or brochures on insect pests such as mosquitoes and black flies. Sometimes vector control workers can come right to your classroom and give a presentation.

Vocabulary

abdomen	halteres
antennae	larva, larvae
anticoagulant	pollinators
chromosomes	proboscis
complete metamorphosis	pupa, pupae
Diptera	species-specific
egg raft	thorax
exoskeleton	vector

Suggested Internet Resources

www.entsoc.org — This site includes links to just about any bug related site on the Web.

www.members.aol.com/YESedu/welcome.html — The Minibeast World of Insects and Spiders site is a treasure trove of information on insects, with ideas for both teachers and students.

www.mosquito.org — The American Mosquito Control Organization has detailed information about mosquitoes.

www.sasionline.org — The Sonoran Arthropod Studies Institute is a non-profit organization dedicated to arthropod research and education projects.

www.nhm.org — The Natural History Museum of Los Angeles County's web site includes pages devoted to the Insect Zoo

Suggested Reading for Educators

Spray, E., 1995. *Mosquitoes in the Classroom*.
University of Wisconsin, Madison, WI.

TEACHER'S GUIDE BY:

SARAH S. THOMPSON
Education Specialist — Insect Zoo
Natural History Museum of
Los Angeles County

ARTHUR V. EVANS, D.Sc.
Insect Zoo Director
Natural History Museum of
Los Angeles County

COMPLETE LIST OF TITLES

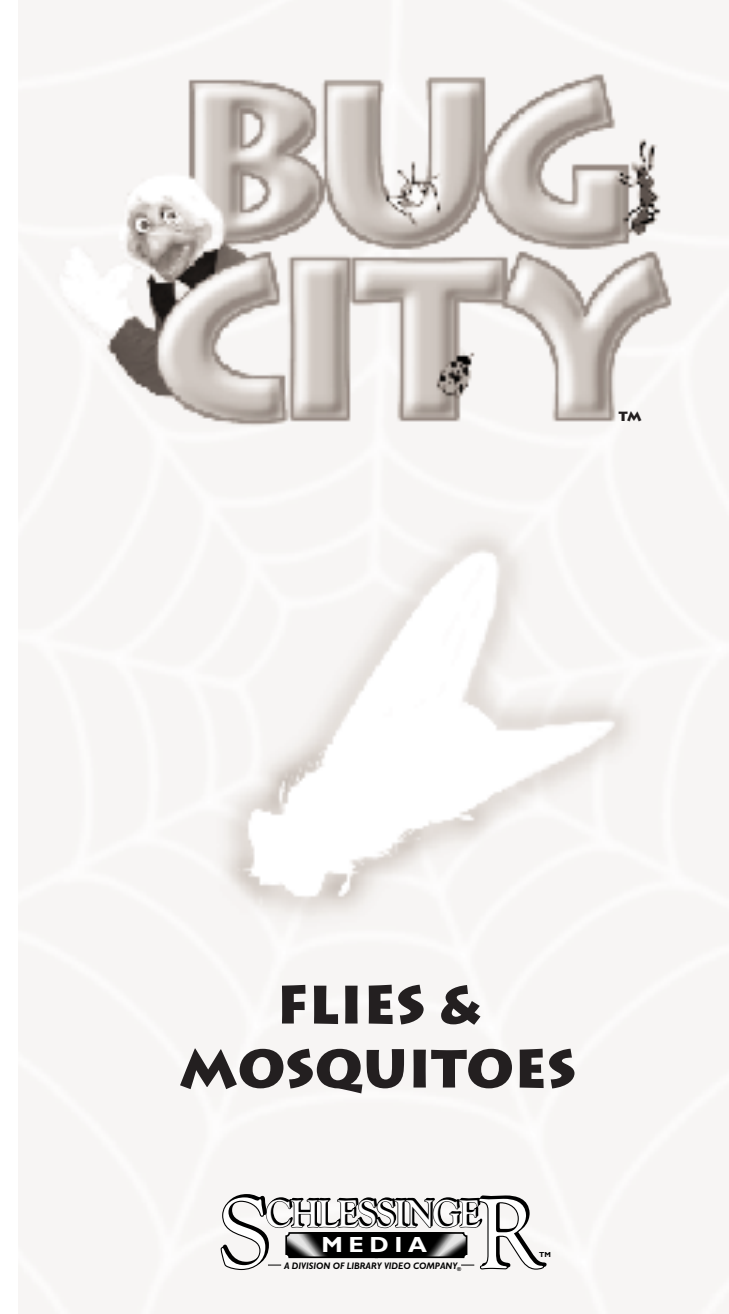
- ANTS
- AQUATIC INSECTS
- BEES
- BEETLES
- BUTTERFLIES & MOTHS
- CRICKETS, GRASSHOPPERS & FRIENDS
- FLIES & MOSQUITOES
- HOUSE & BACKYARD INSECTS
- LADYBUGS & FIREFLIES
- SPIDERS & SCORPIONS

To order other titles in this series, call

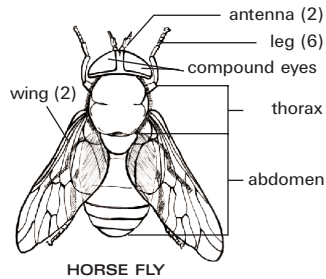
800-843-3620

SCHLESSINGER
MEDIA
— A DIVISION OF LIBRARY VIDEO COMPANY, —

Copyright 1998 by Schlessinger Media, a division of Library Video Company
P.O. Box 580, Wynnewood, PA 19096 • 800-843-3620
Produced and directed by David Yarnell Productions • Executive Producer, Andrew Schlessinger
All rights reserved



Imagine an expert flyer with a built-in gyroscope to keep it level while flying. This animal has sponge-like mouthparts for lapping up liquids, suction cups on its feet, and eyes with 4,000 facets. And, this animal probably just flew right by you! It is the common housefly, one of the acrobats of the air. Flies and their relatives, mosquitoes, are some of the most closely studied insects around because of their rapid life cycles and roles in the spread of some diseases.



Flies

Flies and mosquitoes are insects, and they have an exoskeleton, a hardened shell that protects their bodies. All insects have six legs as adults, one pair of antennae and three body sections. The head contains the mouth parts and the sensory organs; the thorax contains muscles needed to move the legs and wings; and the abdomen is where the internal organs needed for respiration, digestion and circulation are located.

Flies and mosquitoes are in the order of insects called *Diptera*, (“having two wings”). This order consists of insects with two wings, not four. The hind set of wings of flies has not disappeared entirely; they form a tiny pair of knobbed appendages called halteres. These halteres rotate while the fly is in flight, helping to keep the body steady. Flies can beat their wings at speeds of between 175 beats per second (an example is hover flies, which resemble bees) to a rate of 600 times per second for mosquitoes (male mosquitoes locate females by picking up the vibrations of their wing beats). Many species can fly forward, backward, sideways, and land upside down on ceilings. They also have superb vision through compound eyes that are able to detect motion almost instantly and help them avoid being swatted.

All flies and mosquitoes go through complete metamorphosis, with four distinct stages in their lives: egg, larva, pupa and adult. These stages are varied. The larva’s primary role is to eat; the pupal stage is when the dramatic transformation from grub-like larva to winged adult takes place; and the primary mission of adult flies is to reproduce. Flies, especially mosquitoes, can reproduce at a phenomenal rate. Most of the larvae do not live to reach adulthood because other insects consume them. Mosquito larvae are an integral part of an aquatic ecosystem and are eaten by mosquito fish, dragonfly larvae and backswimmers, to name a few.

There are about 120,000 species of flies. Many flies are members of the FBI (Fungus, Bacteria and Insects) and are crucial to the planetary recycling system. Their primary job is to consume decaying plant and animal matter, breaking it down into smaller pieces so that the nutrients can be used by other plants and animals. Although their activities may seem distasteful, fly larvae (or maggots) are responsible for consuming most of the rotting carcasses and animal dung on the earth. If they were not here to perform this vital function, we would be up to our necks in the accumulated waste of millions of years.

Some flies are important pollinators for the plant world, carrying pollen grains from flower to flower as they seek nectar. If you look carefully at the flying insects near flowers, some are bees and some look like bees but are actually flies that hover like bees and have striped abdomens to mimic bees. Predators that have been stung by bees learn to avoid anything that looks like them, including relatively harmless flies.

Mosquitoes

Mosquitoes are among the most hated of the flies, because of the itchy welt that develops after their bite. Among the 3,000 species of mosquitoes, there are only a few that are known to be vectors, or carriers of disease. Vectors carry diseases such as encephalitis, malaria and yellow fever. More people have died from mosquito-borne infections than as casualties of both World Wars combined. Some mosquitoes are species-specific; there are mosquitoes that will only bite reptiles, while others prefer birds or humans. Male mosquitoes do not bite; they simply sip nectar from flowers, possibly assisting in the pollination of plants. Females that have fertilized eggs in their bodies need a protein-rich blood meal for their eggs to develop properly.

A female mosquito’s mouth parts are specially designed for piercing and sucking. Her mouthpart, called the proboscis, functions like a syringe. After mating, a female mosquito flies off in search of a host by honing in on exhaled carbon dioxide. As she bites, she injects an anticoagulant to keep the blood flowing and then sucks up the blood. The human body has an allergic reaction to the anticoagulant saliva, causing the welt. The female then flies to a water source and lays her eggs on top of the water in a mass called an egg raft. Keeping your yard free of any standing water (bird baths, old flower pots, old tires) that might attract egg-laying mosquitoes is the easiest way to ensure that they don’t breed in your yard and turn you into their next meal.

Fruit Flies

Most of our recent knowledge and scientific advances in the study of genetics were made possible by a tiny little fly, the fruit fly. Their rapid life cycle has made it possible to track genetic mutations through many generations of flies in a short period of time. The chromosomes, or genetic material, in the salivary glands of larval fruit flies are large and easy to study. A new strain of wingless fruit fly is one of the many mutations that has been created in the lab by scientists.

Observing the Mosquito Life Cycle

Materials

- A bucket
- Standing water from a pond or puddle
- Aquatic dip net
- Several large gallon glass jars with nylon or cheesecloth stretched over the mouths of the jars
- Distilled water

Find a pool of stagnant water in a pond or a puddle. Look for mosquito larvae, sometimes called “wigglers.” They will be at the surface of the water, then dart down several inches when you try to net them. Look for black clumps of eggs called egg rafts. Collect larvae and eggs; chances are you will net some pupae as well. Transport them back to the classroom in a bucket, and put the mosquito larvae in several glass jars in the classroom with fresh distilled water. If you use tap water, let it stand for at least 24 hours to let the chlorine evaporate. Make sure the jars are covered so that adults emerging from pupae do not escape.

Your class can easily observe the various stages of complete metamorphosis in a glass jar full of mosquito larvae and water. Have students draw the four stages: eggs, larvae, pupae and adults. The larvae have a siphon, or breathing tube, at the end of their abdomens for breathing at the water’s surface; they are filter feeders, straining microscopic bits of algae from the water. The pupae of mosquitoes look like little commas and they are able to swim but they do not feed. Have students tap the jar and observe the behavior of the larvae (they will all swim towards the bottom of the jar). How does this help the larvae survive? Have students brainstorm a food web involving the larvae. What do the larvae eat (algae)? What animal eats them? Who eats that animal?