

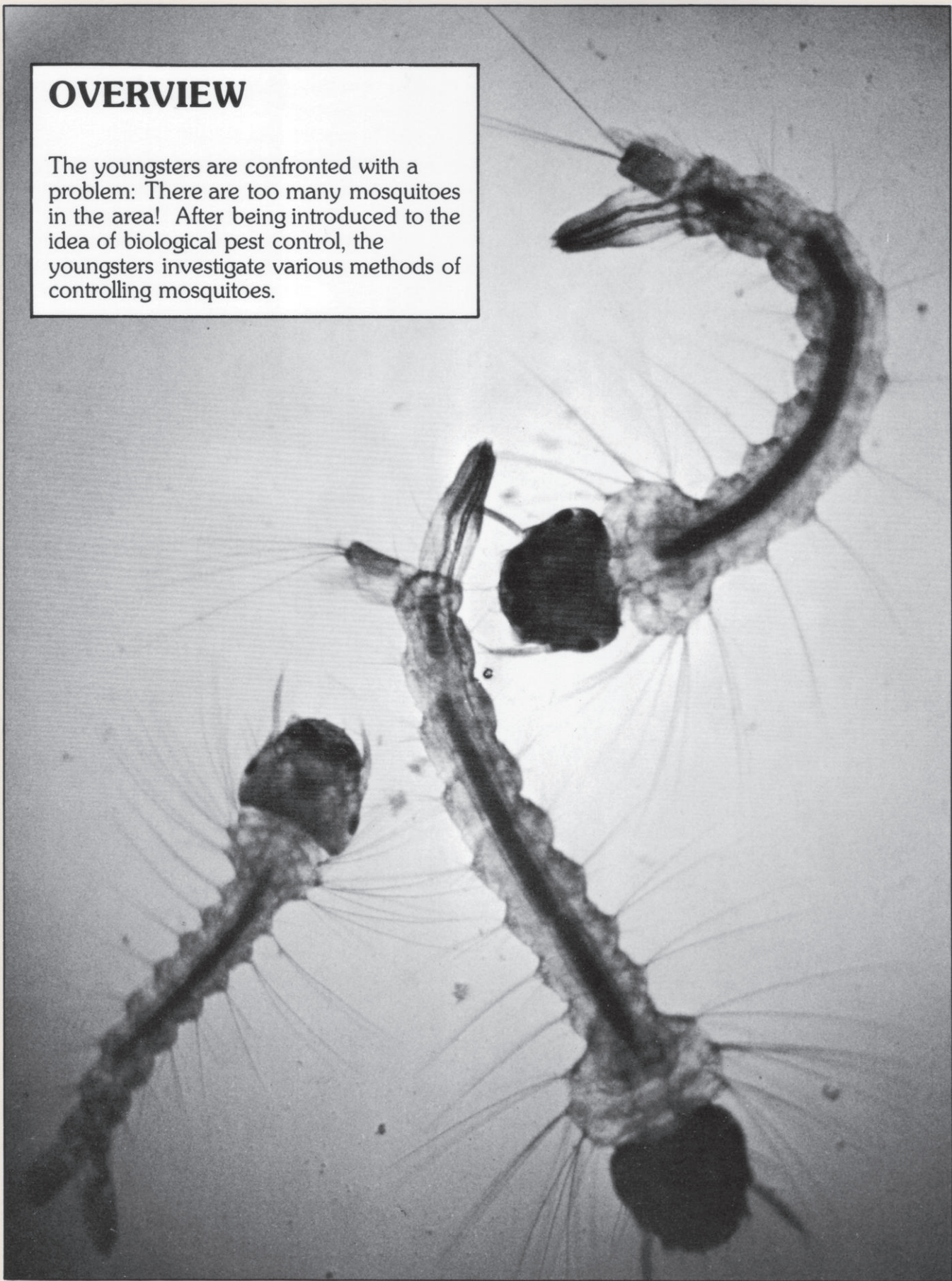
TOO MANY MOSQUITOES

**BIO
KEY**

Biological Control
Predator/Prey
Animal Investigation

OVERVIEW

The youngsters are confronted with a problem: There are too many mosquitoes in the area! After being introduced to the idea of biological pest control, the youngsters investigate various methods of controlling mosquitoes.



BACKGROUND



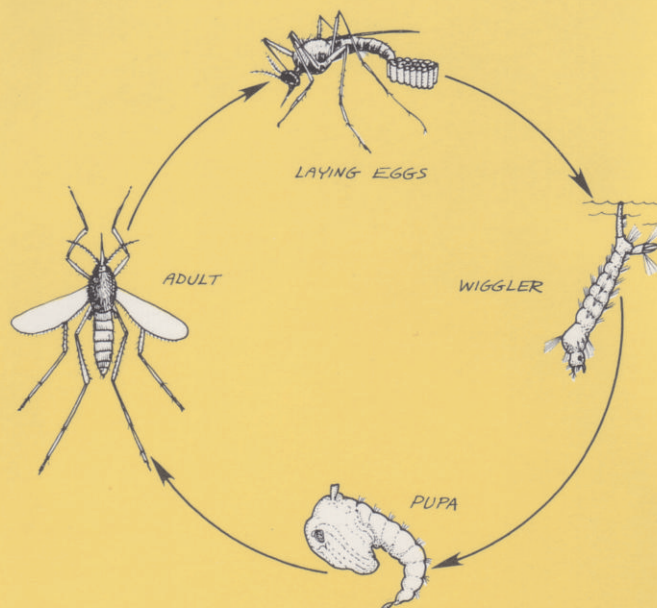
Mosquitoes are pests. The small amount of anticoagulating enzyme that they inject into their victim in the process of obtaining blood often produces a very bothersome itching and swelling. Add to this the fact that mosquitoes are the carriers of a number of the world's most debilitating diseases (malaria, yellow fever, and sleeping sickness, among others), it is no wonder that they are some of the least appreciated life forms on earth.

The female's habit of sucking blood is a vital link in the mosquito reproductive cycle. She must have blood for her eggs to develop. When the eggs are ripe, she deposits them on the surface of still water, often in clusters of up to 100 eggs (called *rafts*). After a few days, tiny larvae (known as *wigglers*) emerge from the eggs and live for the next several days in shallow water. After several days, the larvae metamorphose into the pupae (also known as *wigglers*), and soon after that the flying adults emerge from the water, ready to repeat the cycle.

In areas where reproductive habitat is extensive, populations of mosquitoes reach staggering proportions. Efforts to control this pest have often resulted in drained and destroyed bogs and swamps, or oil and poison spread widely over breeding areas. These efforts can destroy the mosquitoes' natural enemies, thus compounding the problem. In more recent years, there has been increasing interest in biological control mechanisms.

Biological control is the process of using natural controlling organisms to reduce the numbers of a pest organism. The agent of control can be a disease, a parasite, or a predator. Fish, for instance, consume huge quantities of mosquito

wigglers, and birds and predaceous aquatic insects consume large numbers also. Identifying controlling organisms and enhancing their populations in heavily infested mosquito areas are the practices of biological pest control.



CHALLENGE: DISCOVER AN ORGANISM THAT EATS MOSQUITO WIGGLERS, AND PLAN TO USE THAT ORGANISM TO REDUCE THE NUMBER OF MOSQUITOES IN THE AREA.

MATERIALS



For each buddy team:

- 1 long-handled dip net
- 1 observation tray*
- 1 plastic vial* or turkey baster*
- 1 stick, one or more meters long
- 1 clear plastic cup*
- 1 copy of the *OBIS Pond Guide**

For the group:

- 1 large container of mosquito wigglers
- 1 aquarium dip net*
- masking tape*



1 copy of the "Aquatic Observation Aids" Equipment Card*

* Available from Delta Education.

PREPARATION

Group Size. This activity is suitable for any size group.

Time. Plan on forty to fifty minutes for this activity, during the spring and summer, which is the most active breeding season for mosquitoes. One or more follow-up sessions of ten to twenty minutes on subsequent days enhance this activity.

Site. Find a shallow lake or pond where the kids will be able to catch a number of aquatic insects and where minnows are abundant. Use a dip net to make sure the site contains lots of mosquito-wiggler predators (diving beetles, giant water bugs, dragonfly and damselfly nymphs, minnows).

Mosquito Wigglers. This activity requires a substantial supply of wigglers (12 or more per team). If you live where mosquitoes breed naturally, catch some wigglers as part of the activity. Otherwise, you can culture some in most localities in two to three weeks. Use the following procedure:

1. Fill a bucket or similar container with water and place it outdoors in the sun.
2. Add a teaspoon of lawn fertilizer (no pesticide, please!) to stimulate algae growth.
3. Watch for egg rafts, and later, the wigglers. (Keep the water level up by periodically adding water that has been sitting in an open container for a day.)

Safety. When working around the water, use the buddy system. (See the "Safety" section of the *Leader's Survival Kit* folio.)

ACTION

You can make this activity more interesting by casting the youngsters as investigative biologists hired by the local Chamber of Commerce to solve the community's mosquito problem. Chemical sprays must be avoided because of their possible dangerous side effects. The teams are given one clue: The pond they are studying contains animals that eat mosquito wigglers. The problem to solve: Identify these wiggler predators!

1. Introduce the activity, using the "Chamber of Commerce" idea if you wish.
2. Show the youngsters some mosquito wigglers. If the group is small, gather around the bucket and observe together. For larger groups, distribute a number of clear cups, each containing a dozen wigglers. Describe the mosquito life cycle while the kids observe the wigglers. Show the illustrated life cycle in the folio.
3. State the challenge, and describe these two ways that the youngsters can approach the problem:
 - Go to the pond and capture aquatic insects and fish that might be mosquito predators. Place them in an observation tray and put the tray in the shade. After a period of time (the longer the better), introduce some wigglers and observe what happens.
 - At sites with clear water, locate a potential predator, introduce some wigglers *into the water* near that



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animal, and observe. The youngsters can use a baster for this procedure. If the youngsters need to reach further into the water, instruct them to tape a vial to a stick and carefully pour a few wigglers near potential predators. This method works particularly well with minnows.

4. Point out boundaries for the activity area, and help the youngsters form buddy teams. Distribute the materials and about a dozen wigglers to each team. Ask the teams to start their investigations.
5. After fifteen to thirty minutes, call the group back and discuss results. Ask successful teams to recommend a predator to control mosquitoes, and to explain how they arrived at their conclusions.
6. Return all organisms to the water unless you plan to do one of the "Branching Out" activities.

SWAT DO YOU THINK?



1. Tell the group that the use of one organism to control another is called **biological control**. Ask the kids for suggestions of biological controls for common household and garden pests, such as aphids, houseflies, adult mosquitoes, snails, slugs, or ants.
2. Tell the group that mosquitoes can fly two miles. Ask the teams what would happen if one town used control measures but the neighboring town (one mile away) did not. Would the pest problems be solved?

BRANCHING OUT



1. Often a mosquito predator taken from its natural habitat and placed in an observation tray will not eat wigglers for a

while. If possible, bring some suspected predators home and maintain them in an aquarium. When they are settled in, introduce the wigglers again.

2. Mosquito abatement agencies in your county will probably be able to supply you with a few "mosquito fish" (Gambusias) free of charge. Compare the effectiveness of these little fish to the predators you found for controlling mosquitoes.
3. Construct a two-chambered habitat in order to observe the life cycle of mosquitoes. Basically, you need a small jar of wigglers in a larger ventilated jar. Adult mosquitoes will emerge and fly around in the larger jar.

Two-Chambered Jar

