Lesson 15

Microscopic Organisms

How are microscopic organisms beneficial to a food chain and/or food web?
What are special adaptations that allow organisms to survive in a stream?

GOAL To understand that microscopic organisms have special adaptations that enable them to survive.

OBJECTIVES

Students will:

- ✓ examine microscopic organisms with a magnifying lenses or pocket microscope.
- ✓ identify adaptations of organisms
- ✓ construct a food chain and a food web

MATERIALS **two gallon tanks, petri dishes, pocket microscopes or magnifying lenses, eyedroppers, paper, pencils**

CORE CURRICULUM CONTENT STANDARDS

- **Science 1(1,6), 3(3), 5(1-3), 7(5), 8(2,3)**
- **Social Studies 9(1-4), 10(1,3,4),11(5)**

VOCABULARY **microscopic, food chain, food web, producer, primary consumer, secondary consumer, tertiary consumer, herbivore, carnivore**

PROCEDURES

1. Have students collect samples of stream water, one or two gallons.
2. Explain that they will be examining microscopic plants and animals that live in the water and are essential to the food chain and food web.
3. Have students work in groups. Distribute equipment.
4. With an eyedropper, have students place a small amount of water in a petri dish.
5. Instruct students to examine a water droplet under hand lenses and pocket microscopes.
6. Tell them they can create sketches of the animals they observe. They may note how the animals look, move, and interact.
7. Explain that some of the microscopic plants include diatoms and can be food to tiny creatures such as mites, rotifers, protozoans, worms, and water bears. They may feed off of mosses, liverworts and other aquatic plants.
8. Have students try to identify some of the creatures seen under the microscopes. Have them determine its role in the food chain. Is it a predator, prey or both?
9. Return water to stream when finished with observations.

10. Discuss with students that animals and plants that inhabit the stream have certain adaptations that help it survive. Many begin their life cycle in the water and end in the air and land, such as dragonflies, mayflies and stoneflies. Discuss the following adaptations with the students.
    a. Snails scrape algae off rocks with tongue-like organs called radulae.
    b. Some of the insects have suction-cup feet that attach to rocks, especially adapted to fast, flowing streams (black fly larva).
    c. Some of the larva or nymphs are streamlined and can swim upstream more easily (mayfly nymph, water penny larva, black fly larva).
    d. Some of the larva drink in the water and filter out detritus or decaying plant material (caddisfly larva, crayfish, aquatic sowbug).
    e. Some insects feed on other insects or other animals (dragon fly nymph, dobsonfly larva, water strider, giant water bug).
    f. Some have big jaws to capture prey (dragonfly nymph, damselfly nymph, dodsonfly nymph).
    g. Some of the insects fill up with water and expel it to swim across the water (dragonfly nymph).
    h. Some make their houses out of sticks and rocks to weigh them down in the stream and to ward off predators (caddisfly nymph).
11. Have students create a list of adaptations and aquatic insects. Include the microscopic plants and animals. Have student groups create and draw a food chain and food web based on their adaptations. Have them determine which animals are plant eaters (herbivores or primary consumers), and which ones are meat eaters (carnivores or secondary consumers), and which one are at the top of the food chain (tertiary consumers).

EXTENSIONS

1. Have students design a predator/prey activity.

RESOURCES

Edelstein, Karen, *Pond and Stream Safari: A Guide to the Ecology of Aquatic Invertebrates*, 1993, Cornell University Media Services.

Samples, Bob, Project Wild Aquatic: Education Activity Guide, 1992, Council for Environmental Edcuation, Gaithersburg, Maryland 20878.

GLOSSARY

carnivore - any various predatory, flesh eating organism; a predator
food chain - a succession of organisms in an ecological community that constitutes a continuation of food energy from one organism to another as each consumes a lower member and in turn is preyed upon by a higher member
food web - a complex of interrelated food chains in an ecological community
herbivore - an animal that feeds chiefly on plants
microscopic - too small to be seen by the unaided eye but large enough to be studied under a microscope
primary consumer - an animal that eats grass and other green plants in a food chain; an herbivore
producer - a photosynthetic green plant or chemosynthetic bacterium, constituting the first trophic level in a food chain
secondary consumer - an animal that feeds on smaller plant-eating animals in a food chain
tertiary consumer - third in place, order, degree or rank