

## Lesson 11

# Water Creatures

How do insects survive under water?  
How are insects indicators of the health of a stream?

**GOAL** To understand that aquatic macroinvertebrates have special adaptations that allow them to survive in stream waters and determine the health of the stream.

**OBJECTIVES** Students will:

- ✓ identify special features or adaptations of aquatic insects
- ✓ act out an adaptation
- ✓ create a creature based on an adaptation
- ✓ draw an insect

**MATERIALS** pictures of insects on CD, adaptation cards, construction paper, water colors, markers, black permanent marker, materials such as clay, plastic, Styrofoam, paper towel rolls and other re-used materials

### CORE CURRICULUM CONTENT STANDARDS

- Language Arts 1(12), 2(2,5)
- Science 3(1-3), 4(1,2), 5(1,4,6), 6(1,8)
- Arts 3(1,2), 5(1)

**VOCABULARY** macroinvertebrate, adaptations, metamorphosis, larva, nymph, pupa

### PROCEDURES

1. Benthic macroinvertebrates are animals that live on the bottoms of streams, rivers, or ponds. The term refers to organisms that spend part of their life in a body of water. A macroinvertebrate does not have a backbone and are large enough to be seen without a microscope. Such insects are sensitive to conditions of the water and indicate water quality of the water bodies.
2. Explain to students that they will become water scientists throughout the next two lessons. Their task is to study the water and insects that live there.
3. Lead a discussion on adaptations or special features that help aquatic insects survive in the stream habitat. For example, mayflies, stoneflies and caddisflies have particular features that allow them to live in a river's current. They may flatten their body, have hooks that allow them to grasp onto rocks and/or may encase themselves in houses made of sticks, stones or vegetation.
4. Have students view pictures of different insects (Macroinvertebrate1.pdf, Macroinvertebrate2.pdf and Macroinvertebrate3.pdf). Key to Macroinvertebrate Life in the River available on CD - Macroinvertebrate Chart.gif. Inquire whether students have any

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- type of insect. Ask students where (*flying, ground, soil, water*).
5. Explain that insects have similar features, such as six legs, wings, head, thorax and abdomen. Have students draw different parts of insects on board to demonstrate.
  6. Explain that some insects are born in the water and live the first part of their lives there.
  7. Explain the process of metamorphosis. Some of the insects undergo complete metamorphosis and others undergo incomplete metamorphosis. Complete metamorphosis is when the insect is transformed from the beginning stages to adult. The insect life cycles through the following four stages: egg, larva or nymph, pupa and adult. Incomplete is when the young stage of the insect's life resembles the adult stage. The insect is smaller than the adult, but is not completely transformed or changed. Refer to metamorphosis diagram on CD - Insect Lifestyle.pdf
  8. Pair or group students and distribute two aquatic creature adaptations. Explain that the adaptations pertain to the larva or nymph stage of the insect's life. Its special adaptations apply to water habitats.
  9. Adaptations may include how the insect moves, breathes, swims, or eats. Examples of adaptations include a flat body, constructs its own house, sticks to rocks with special hooks, has three tails, fills up with water and expels out of abdomen and propels itself through water, breathes through gills, etc. (*Adaptations are listed on a separate sheet for teachers to copy and cut out for students. As you learn more, you may wish to make your own*).
  10. Have students act out their adaptations, while the rest of the class tries to guess the adaptation. List adaptations on the board.
  11. Once students have an understanding of the term "adaptations", have them create a creature based on these adaptations. Have students draw and color with markers or crayons or build a three-dimensional creature with Styrofoam, clay, cardboard, plastic, construction paper, etc.
  12. After making their insect, have students name and write a paragraph about their creature. Have them include their special feature and how it allows it to live in the stream or other type of body of water.
  13. Have students think about which insects indicate healthy water habitat. (*caddisflies, mayflies, stoneflies*)

## **EXTENSIONS**

1. Instruct students to imagine they are sitting on the bottom of a clear, cool stream. The water is flowing rapidly. There are fish, aquatic insects, plants and many other living creatures in this clean water. Draw or describe in writing what it is like at the bottom of the stream. Have them think about where they are sitting and the type of aquatic life there.
2. Now instruct students to imagine they are sitting in the same stream. The water is murky because a tree has fallen and the soil has eroded away from the side of the banks. Ask what it look like and how it feels. Have them draw a picture and write about their feelings or reflections.

## **RESOURCES**

Edelstein, Karen, *Pond and Stream Safari: A guide to the Ecology of Aquatic Invertebrates*, 1993, Cornell Cooperative Extension.

<http://www.bellmuseum.org/mnideals/macroinv3.gif>, Key to Macroinvertebrate Life in the River

<http://www.kidfish.bc.ca/frames.html>, Caddis Life Style and Cases

**GLOSSARY**

**adaptations** - special features that allow an organism to survive in its environment

**larva** - the newly hatched, wingless, often wormlike form of many insects before metamorphosis

**macroinvertebrate** - an invertebrate animal (animal without a backbone) large enough to be seen without magnification

**metamorphosis** - a change in the form and often habits of an animal during normal development after the embryonic stage

**nymph** - the larval form of certain insects, such as silverfish and grasshoppers, usually resembling the adult form but smaller and lacking fully developed wings

**pupa** - the intermediate stage of a metamorphic insect



## Macroinvertebrate Insect Adaptation Cards

**MOVES BY EXPELLING  
WATER**

Dragonfly nymph

**LIVES IN A PROTECTIVE  
HOUSE**

Caddisfly larva

**HAS BREATHING GILLS**

Damselfly nymph, Mayfly nymph

**HAS A FLAT SHAPE**

Mayfly nymph, water penny

**HAS A BIG APPETITE**

Dragonfly nymph

**AVOIDS BRIGHT LIGHTS**

Stonefly nymph, Caddisfly larva

**USES ITS BIG JAWS TO EAT**

Dragonfly nymph, Dobsonfly larva  
Damselfly nymph

**NEEDS A LOT OF OXYGEN  
IN WATER TO LIVE**

Mayfly nymph, Stonefly nymph,  
Caddisfly larva

**HAS BREATHING GILLS**

Damselfly nymph, Mayfly nymph

**WALKS ON WATER**

Water Strider

**INJECTS CHEMICALS TO  
CAPTURE PREY**

Water strider

**IS CAMOUFLAGED**

Stonefly, Mayfly,  
Dragonfly nymphs