

## *The Right Body for the Job*

*(30 minute activity)*

### *Objectives*

Students will be able to:

- 1) List benthic macroinvertebrate functional feeding groups
- 2) Describe characteristics of each feeding group
- 3) Show connections between the vital role macroinvertebrates play and watershed ecology
- 4) Demonstrate that juvenile insects are well adapted to function in their niches

### *Background*

What happens to leaves and woody debris that fall into a stream? What about dead fish? How do they decompose? Aquatic insects have specialized adaptations for the aquatic environment and fit into functional feeding groups. Keep in mind that some fall into more than one category.

**SHREDDERS** use chewing mouthparts to bite into large pieces of organic material such as leaf litter and wood. They prefer food that has been softened and pre-conditioned by microorganisms (fungi and bacteria) and often leave veins and other finer material behind for the eating pleasure of their fellow macroinvertebrates! Some, like the caddisfly, make a home or case of what is eaten.

**COLLECTORS** dine on smaller organic particles, usually less than one millimeter in diameter. Sometimes fecal matter left from other organisms may be on the menu. They eat algae and fragments of animals and plants. When you pick up a rock, sometimes you feel mucous on it. You could be looking at a *filtering collector*, capturing particles by using a fan (black fly larvae) or spinning a net (free-living caddisfly) made of a sticky substance. Who will help decompose material on the stream bottom? *Gathering collectors* such as mayfly nymphs and beetle larvae are anatomically designed (mouths and appendages) to burrow and live in lower *substrate* and become part of the *hyporheic zone*.

**SCRAPERS** or grazers eat algae from rock and stream surfaces. They are not swept downstream in swift currents because some have suction disks on their abdomens and most are flat. Snails and some mayfly nymphs fall into this category. Scraper caddisflies construct homes from the stones they collect.

### *Background* *continued*

**PREDATORS** like crane fly larvae and dragonfly, damselfly, and stonefly nymphs, are perfectly adapted eating machines. Some capture other aquatic insects by grasping with forelegs and biting and chewing with strong opposable mouthparts. Others use tube-like mouthparts to suck body fluids from their prey (*piercers*) or just eat their meal whole (*engulfers*).

Aquatic insects are located in waterways according to what they eat. *Shredders* can be found in upper reaches of streams where there is abundant vegetation. *Scrapers* prefer open areas or after leaf fall, when sunlight can penetrate the stream and reach the larger substrate to photosynthesize algae. They are typically found in riffles with *filtering collectors*. *Gathering collectors* prefer slower areas where sediments are allowed to accumulate. *Predators* are on the prowl in all aquatic habitats.

### *Procedure*

1. Copy the mayfly anatomy graphics (Figures 6 & 6A) onto overhead transparencies. Show the immature insect anatomy picture where no body parts are labeled. Ask students how they think the parts function and what they should be called by looking at them. At first, relate functions to the human body. The legs have tibias and femurs, there are abdomens, and so on. Show the picture with the parts labeled and discuss how they function. Remember that insects are anatomically adapted according to their role in the environment, and have six legs, four wings (adults), and ten-segmented abdomens. By looking at its anatomy, in which functional feeding group does the mayfly fit? Using the *Key to Immature Aquatic Insects* (Figure 2), look at the other insects and predict what roles they might play in the stream based on physical features.
2. Food Processing in Streams (Figure 7) shows macroinvertebrates in the four feeding groups and where they are commonly located in a stream. Make an overhead transparency of the chart and ask students to list adaptations an insect's body would need to fit in one of the groups. Ask them to draw such a creature, labeling the body parts. Have them use their imagination. They must be able to explain how the insect's adaptations help it to survive in its habitat.

*Assessment*

Ask students to:

- Write a report about the “jobs” performed by macroinvertebrates in a stream’s ecosystem.
- Describe the physical characteristics an aquatic insect needs to be in a specific functional feeding group.

*Preparing for  
the Field Study  
Station*

- Familiarize students with station equipment listed in the Resource Specialist section
- Make copies of the following for each student. Use waterproof paper if available: *Aquatic Insect Survey*, the *River Continuum*, *Aquatic Insect Life Cycle Stages*, and the illustrations of *Aquatic Invertebrates Tolerant and Sensitive to Water Pollution*
- Students must save worksheets for post work!*

