



Build-A-Bug

Revised October 2011

PURPOSE: To introduce students to aquatic macroinvertebrates and their unique adaptations.

SUMMARY: By watching a presentation where one of their classmates is dressed up in a bug costume, students learn what adaptations macroinvertebrates have in order to live in an aquatic environment.

BACKGROUND: The small animals that live in water are called aquatic macroinvertebrates. These macroinvertebrates include many types of insects as well as other animals such as worms, mollusks, and crustaceans.

Most aquatic macroinvertebrates make their home in rocks, leaves, and the sediment of streambeds. These organisms have many special adaptations that allow them to live in demanding environments. Macroinvertebrates that live in riffles and fast-moving water may have features that help them hold on to rocky or hard substrates such as hooked feet or suction cups; or flat, streamlined bodies that can handle high water velocity. Macroinvertebrates that house themselves deep in muddy substrates may have different sets of adaptations for low oxygen environments, such as air tubes or oxygen trapping red hemoglobin in their tissue. See the “Adaptations” column on page #3 for more examples.

MATERIALS: Items contained in the “Items Representing Adaptations for Build A Bug” column on page #3. Use your imagination! Bright colors and silly items work well.

PROCEDURE:

1. Ask the students to brainstorm different adaptations a bug would need to live in an aquatic environment. (For younger students you may want to start with what an adaptation is.)
2. As students give you ideas, show pictures of invertebrates with these adaptations (see pages #4-6).
3. Choose a volunteer from the class. Explain that you will be preparing the student to live as an aquatic macroinvertebrate.
4. Ask the students to recall adaptations the volunteer needs in order to live in water.
5. As students give you ideas, dress the volunteer in the items from the table on page #3 that represent the adaptations.

NOTE: An individual macroinvertebrate may not have all of the adaptations listed on the table. Your volunteer “bug” will have features found on many different types of macroinvertebrates.

Suggested grade level:

K-6

Duration:

15 minutes

Setting:

Classroom or outdoors

Core Alignments

Click the links (or visit streamsidescience.usu.edu for grade-by-grade alignments.

Kindergarten:

Science ILOs

1st Grade:

Science ILOs

2nd Grade:

Science ILOs

3rd Grade:

Science ILOs

4th Grade:

Science ILOs

5th Grade:

Science ILOs

6th Grade:

Science ILOs



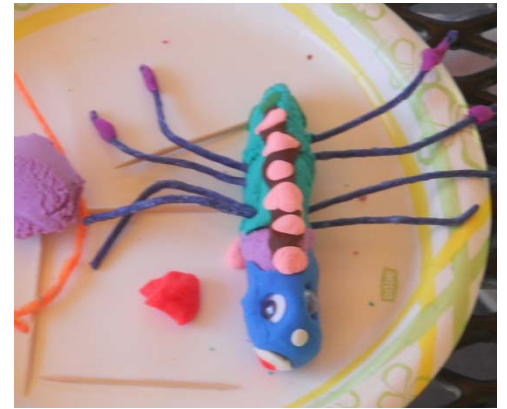


6. Discuss the adaptations as you go along. Why would a macroinvertebrate need them? How do they help the macroinvertebrate survive?
7. A good way to end this activity is with a photo. “Does our volunteer need anything else? I think he/she needs his/her picture taken!”

OPTIONAL ART ACTIVITY:

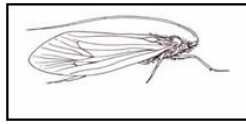
You can enhance this lesson with the following art activity (use the materials listed in the table on page #3).

1. Tell your students that they will be making an aquatic macroinvertebrate of their own.
2. Show the students the materials listed in the adaptations table on page #3, (or substitute other materials to represent adaptations as you see fit).
3. Ask them to recall adaptations they saw during the lesson and show them what materials might represent that adaptation (a feather might represent gills, bendaroos might represent legs and/or tails, etc.).
4. Have students use the materials to create their own macroinvertebrate
5. Have each student share his or her macroinvertebrate with the class and explain the adaptations.



CONTINUED LEARNING:

This lesson can be followed with Macroinvertebrate Simon Says to teach about specific feeding adaptations. You can also follow this lesson with Macroinvertebrate Mix and Match to teach the three parts of a bug.



Suggested props for macroinvertebrate adaptations

Adaptations	Use	Items Representing Adaptations for Build A Bug	Items Representing Adaptations for Make A Macroinvertebrate
Legs, claws, hooked feet, suction cups, hairs on legs	Holding on to rocks and hard substrate, scraping algae off rocks, attacking prey	Water noodle with hooks on the end	Bendaroos®, pipe cleaners
Tails	Swimming and maneuvering	Garland or rope	Bendaroos®, pipe cleaners
Compound Eyes	Help insect detect motion	Sunglasses with googly eyes glued on	Googly eyes (various sizes)
Hairs on head or body	Help detect movement or chemical changes in water	Wig or furry hat	Puff balls, feathers
Antennae	Sensing food, water, surroundings	Store bought or homemade antennae	Bendaroos®, pipe cleaners
Gills	Breathing dissolved oxygen in the water	Feather boa	Bendaroos®, feathers
Air bubble	Breathing oxygen from the surface air	Balloon	Plastic necklace pop-beads, bouncy ball, beads
Breathing tube	Breathing oxygen from the surface air	Straw	Straws
Specialized mouth parts	For scraping, piercing, shredding, etc. The mouth parts reflect food choices of the insect	Vampire teeth	Toothpicks
Device for catching food, i.e. net (made by the insect or part of their body structure) or special hairs	Catching food in the current	Fishing net	Fabric netting and toothpicks, feathers



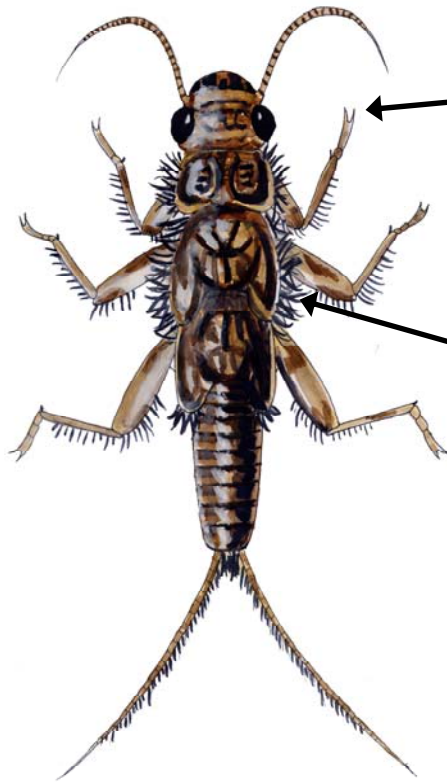
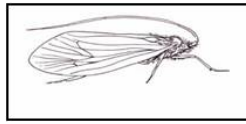
Examples of aquatic macroinvertebrate adaptations



The **Blackfly larva** has a net on its head for collecting food.



The **Cranefly larva** has tiny hairs and suction cups along its body so it can hold on to rocks and hard substrates in fast flowing water.

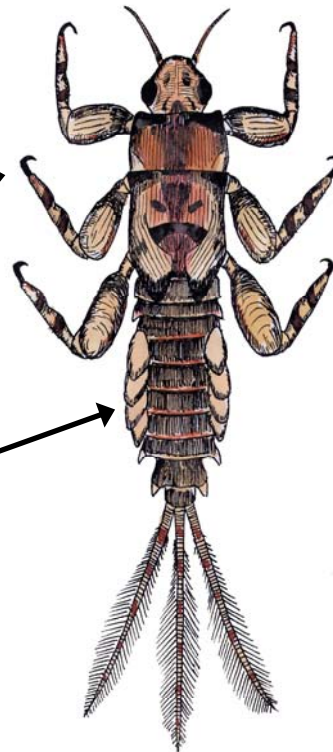


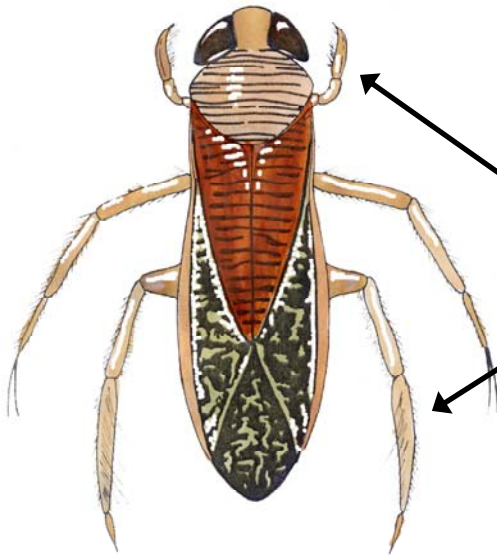
The **Stonefly** nymph has claws for capturing prey and holding on tight to rocky substrates.

The **Stonefly** nymph has gills in its “armpits” for breathing dissolved oxygen in fast flowing streams.

The **Mayfly** nymph has hooks for holding on tight to rocky substrates.

The **Mayfly** nymph has gills on its abdomen for breathing dissolved oxygen in fast flowing streams.





The **Water boatman** has paddle-like legs for swimming in slow moving water.

The **Dragonfly nymph** has claws on its legs for capturing prey and for climbing emergent vegetation.

