Materials:

- Water noodles w/ pipe cleaner “hairs” along them & “hooks” on the end = legs
- Garland or rope = tails
- Sunglasses w/ googly eyes glued on = compound eyes
- Wig or furry hat = hairs on head or body
- Antennae
- Feather Boa = gills
- Beach ball or balloon = air bubble
- Straw = breathing tube
- Vampire Teeth = specialized mouth parts
- Bug net = specialized food-catching device

Activity:

Introduction

- Start by asking if students have heard of a macroinvertebrate before. Break down the name into “macro,” meaning we can see it with our naked eyes (without a microscope), and “invertebrate,” meaning it doesn’t have an internal backbone—instead it has an exoskeleton.
- Aquatic macroinvertebrates include many types of insects as well as worms, mollusks, and crustaceans that all live in aquatic habitats.
- These macroinvertebrates can be found in pretty much any aquatic habitat, and the diversity of them can indicate ecosystem health.
Most aquatic macroinvertebrates make their homes in rocks, leaves, and streambed sediment. These creatures have lots of adaptations to help them live in a challenging environment.

- Macroinvertebrates that live in riffles and fast moving water may have features that help them to hang on to rocks such as hooked feet or suction cups, as well as flat, streamlined bodies.
- Macroinvertebrates that live in mud may have different adaptations for the low oxygen levels, including air tubes or air sacs.

Ask if students can define an “adaptation.” Adaptations can be either physical or behavioral. Adaptations are ways an animal looks (physical) or acts (behavioral) that help it to more successfully survive in its habitat.

- Ask students “what adaptations do you think aquatic macroinvertebrates might have to help them survive in an aquatic ecosystem?”
- Show them examples of invertebrates with physical adaptations (at end of this lesson plan)

**Building the Bug**

- Select one student volunteer to become the “bug” aka aquatic macroinvertebrate, and explain that you’ll be transforming them into a macroinvertebrate with tons of great adaptations to live in the water.
- Introduce/review these following adaptations as you dress up the student.
- Discuss the adaptations as you go along. Why would a macroinvertebrate need them? How do they help the macroinvertebrate survive?
- Don’t forget to conclude with a photo! You can also review the adaptations once more as you remove them from the volunteer.
<table>
<thead>
<tr>
<th>Adaptation</th>
<th>Use</th>
<th>Item to dress up with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legs with claws, hooked feet, suction cups, or hairs on legs</td>
<td>Holding on to rocks and hard substrate, scraping algae off rocks, attacking prey</td>
<td>Water noodle with pipe-cleaner hooks on the end</td>
</tr>
<tr>
<td>Tails</td>
<td>Swimming and maneuvering</td>
<td>Garland or rope</td>
</tr>
<tr>
<td>Compound Eyes</td>
<td>Helps to detect motion</td>
<td>Sunglasses with googly eyes attached</td>
</tr>
<tr>
<td>Hairs on head and body</td>
<td>Help detect movement or chemical changes in the water</td>
<td>Wig or furry hat</td>
</tr>
<tr>
<td>Antennae</td>
<td>Sensing food, water, &amp; surroundings</td>
<td>Homemade or store-bought antennae on a headband</td>
</tr>
<tr>
<td>Gills</td>
<td>Breathing dissolved oxygen from the water</td>
<td>Feather boa</td>
</tr>
<tr>
<td>Air bubble</td>
<td>Breathing oxygen from the surface air</td>
<td>Beach ball or balloon</td>
</tr>
<tr>
<td>Breathing tube</td>
<td>Breathing oxygen from the surface air</td>
<td>straws</td>
</tr>
<tr>
<td>Specialized mouth parts</td>
<td>Scaping, piercing, shredding etc. (the mouth parts reflect the food eaten by the insect)</td>
<td>Vampire teeth</td>
</tr>
<tr>
<td>Device for catching food (either part of their body or made by the invertebrate)</td>
<td>Catching food in the current</td>
<td>Butterfly net</td>
</tr>
</tbody>
</table>

*Modified from a lesson by the Utah State University Water Quality Extension*

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*Updated October, 2017*
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.