



## Water Quality and Macroinvertebrates Activity Guide Environmental Science Camp

### What you need

- Play-Doh or modeling clay
- Construction paper
- Popsicle stick
- One plastic bag filled with paint
- Activity Guide Worksheet, included in the final pages of this Activity Guide
- Scissors

### Preparation

Follow the instructions to model the use of chewing mouthparts of larvae and nymphs of several aquatic macroinvertebrates: predators, shredders, and grazers.

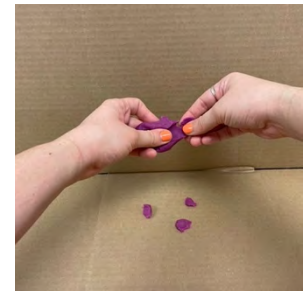
#### Predator



Dobsonfly larvae are predators. They use their chewing mouthparts to eat their prey, including tadpoles! Image from National Park Service.



**Step 1.** Gather the necessary material: Play-Doh or modeling clay.



**Step 2.** Imagine your hands are chewing mouthparts and rip apart the Play-Doh, which represents the prey of dobsonfly larva.

#### Shredder



Many stonefly nymphs are shredders. They use their chewing mouthparts to shred plant matter like leaves. Image from Joe Giersch, USGS.



**Step 1.** Gather the necessary material: construction paper.



**Step 2.** Imagine your hands are chewing mouthparts and rip apart the paper, which represents plant matter.



## Grazer



Water pennies are beetles. Water penny larvae live in water and are grazers. They use their chewing mouthparts to scrape food like algae off rocks. Image from Cliff White, courtesy Missouri Department of Conservation.



**Step 1.** Gather the necessary materials: a popsicle stick and a plastic bag filled with paint. The plastic bag can be any size, and paint can be replaced with other materials including shaving cream or any other material that can easily be moved and show said movement.



**Step 2.** Imagine the popsicle stick is a chewing mouthpart. Push the popsicle stick across the outside of the plastic bag containing paint. Notice how the paint inside the bag moves.

## What to do

Use the Activity Guide Worksheet to explore aquatic macroinvertebrates!

## What is happening?

Aquatic macroinvertebrates are animals without backbones that live in freshwater creeks and streams and can be seen without the use of a microscope or magnifying glass. Aquatic macroinvertebrates live either some or all of their life cycles in the water. Some have a three-stage life cycle called incomplete metamorphosis. The three stages of incomplete metamorphosis are egg, nymph, and adult. Others have a four-stage life cycle called complete metamorphosis. The four stages of complete metamorphosis are egg, larval, pupal, and adult.

Many aquatic macroinvertebrates have chewing mouthparts that are used for eating solid food. The larvae and nymphs of aquatic macroinvertebrates use their mouthparts to feed using various methods, including predation, shredding, and grazing.

Some aquatic macroinvertebrates can live in polluted streams, while others cannot. Those that can survive in polluted streams are not sensitive to pollution. They are tolerant. Those that cannot survive in polluted streams are sensitive to pollution. They are intolerant. Some aquatic macroinvertebrates prefer non-polluted streams but can survive in polluted streams, too. They are facultative.



Larvae and nymphs of various aquatic macroinvertebrates. Image from Kelly Maloney, USGS.



**Water Quality and Macroinvertebrates Activity Guide Worksheet**  
**Environmental Science Camp**

Using scissors, cut along the dashed lines and cut out the pieces containing images and information about aquatic macroinvertebrate larvae and nymphs on page 1. Then, place each piece that describes a macroinvertebrate on the appropriate term on either page 2, 3, or 4 that describes that macroinvertebrate's ability to survive in polluted streams.



Dragonfly Nymph

Prefers non-polluted streams, but can survive in polluted streams, too.  
Image from USGS.



Caddisfly Larvae

Cannot survive in polluted streams.  
Image from Terry Maret, USGS.



Damselfly Nymph

Prefers non-polluted streams, but can survive in polluted streams, too.  
Image from USGS.



Stonefly Nymph

Cannot survive in polluted streams.  
Image from Joe Giersch, USGS.



Mayfly Nymph

Cannot survive in polluted streams.  
Image from Marie-Noëlle Croteau, USGS.



Midge

Can survive in polluted streams.  
Image from Cliff White, courtesy Missouri Department of Conservation.



# Tolerant



# Intolerant



# Facultative