Aquatic Animals with a Mission

Benthic macroinvertebrates are small animals (but not microscopic) that do not have bones and that live in streams, rivers, lakes, and ponds. You've most likely encountered one in the form of a dragonfly, mayfly, worm, snail or even a crayfish.

These tiny creatures play an important role in freshwater ecosystems. Many are highly sensitive to water pollution, making them excellent organisms to study the biology of local streams and rivers.

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Ways to Learn More

Watch SRBC scientists collect macroinvertebrates at https://www.youtube.com/watch?v=KVMCPXDohgA&t=7s.

SRBC scientists who study bioindicators are called Aquatic Biologists. You can learn more about the projects that SRBC's Aquatic Biologists and other Environmental Scientists are doing at https://www.srbc.gov/our-work/programs/monitoring-protection.

Check out the Alliance for Aquatic Resource Monitoring (ALLARM) website. You can join the volunteer network and learn how to monitor your local streams.

https://www.dickinson.edu/info/20173/alliance_for_aquatic_resource_monitoring_allarm/2911/volunteer_monitoring/2

NOTES

Cover photo: Josh Adkins

Clockwise from top left: Stonefly, Caddisfly, Mayfly, and Dragonfly Larva.

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Benthic Macroinvertebrates: Stream Messengers

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Special Critters

Benthic macroinvertebrates can tell scientists a lot about a stream's health. Scientists use these small water-loving organisms as "bioindicators" for many reasons.

1. They can be collected relatively easily.
2. They spend all or most of their life cycles in the stream.
3. They don't move far from where they call home in a stream.
4. They have different sensitivities and tolerances to pollution.
5. Each kind prefers certain stream temperatures and types of stream bottoms.

A scientist places a special net against the stream bottom to collect macroinvertebrates. She disturbs the area upstream with her feet, and the macroinvertebrates float downstream into the net.

Streams with a lot of different kinds of benthic macroinvertebrates are usually very healthy. Unhealthy streams will have only a few benthic macroinvertebrates or a lot of only a few kinds.

Benthic macroinvertebrates are an important part of a food web in and out of the stream. Some eat bacteria, algae, or plants, while some eat other animals. They help break down wood and leaves in the streams into smaller pieces, which float downstream for other animals to eat. Macroinvertebrates are also eaten by other animals such as fish, amphibians, and birds.

Meet Some Macroinvertebrates

Streams are home to many benthic macroinvertebrate groups, including insect larvae, mussels, clams, snails, leeches, worms, and crayfish. Each of these groups has a general tolerance or sensitivity to pollution, and it is this sensitivity that makes benthic macroinvertebrates so useful to scientists.

Here are some examples of macroinvertebrates you might find by flipping over rocks in streams:

Stoneflies, Mayflies, and Caddisflies

The larva of these insects live in streams before hatching into the adults we see around us. Stoneflies are generally sensitive to pollution. Many mayfly and caddisfly species are also sensitive to pollution, but there are some mayfly and caddisfly species that are tolerant of pollution. Scientists know that a stream is healthy if it has a lot of all three of these macroinvertebrates. Fish like trout love to eat these animals, especially when they hatch.

Dragonflies and Damselflies

The larva of these insects are predators who eat other insects and small fish. Dragonflies tend to be more sensitive to pollution than damselflies, and depending upon the species, can be found in all kinds of streams and rivers.

Hellgrammites

These scary-looking larva can live for several years in a stream before hatching and flying away as an adult. Hellgrammites are very sensitive to pollution and are predators of other stream animals.

Mussels and Clams

These animals filter their food from the stream water, cleaning the water along the way. Mussels are more sensitive to pollution than clams and can live to be up to 100 years old. Many mussels in the nation's streams are endangered or have gone extinct, including in the Susquehanna River. Mussels also rely on certain fish species to complete their life cycles, so if pollution or dams prevent fish from being in the stream, the mussels die off. Mussels and clams are eaten by other animals like fish, raccoons, otters, muskrats, herons, and egrets.

Worms and Leeches

Worms and leeches are found in all streams and can be very tolerant of pollution and low levels of oxygen. While they are not very attractive, worms have an important role in breaking down organic matter sitting on the bottom of streams. Depending on the species, leeches are either parasites or predators.

Crayfish

These animals are among the easiest to see in a stream. Many species of crayfish are sensitive to pollution. Other species are able to tolerate harsher stream conditions. Crayfish are omnivorous, which means they eat plants and small animals they find in streams.

To see more pictures of these benthic macroinvertebrates and others, visit www.macroinvertebrates.org.