



# Wandering Water Bugs

**Objective:** Students will collect and identify aquatic macroinvertebrates and describe the different stages of metamorphosis.

**Grade Level:**

4-12

**Subject Areas:**

Science, Reading, Visual Arts

**Setting:**

Classroom and outside at a wetland, lake, or stream

**Skills:**

Researching, classifying, collecting, observing, interpreting, comparing

**Prior Preparation:**

Explain to students that many creatures live in water bodies, and that the class will be collecting some of the smallest inhabitants - aquatic insects, also known as aquatic macroinvertebrates.

**Vocabulary:**

larva, pupa, metamorphosis, nymph, species, biological indicators, aquatic macroinvertebrate

**South Dakota Education Standards for 4<sup>th</sup> grade:**

*Reading*

4.R.1.1; 4.R.1.2; 4.R.5.1

*Visual Arts*

Standard 1

*Science*

Nature of Science, Indicator 2; 4.L.2.1

**Materials:**

Dip Nets

Petri Dishes

Hand-held Magnifying Lenses

Ice Cube Trays

Identification Charts to Pond and River Life

Insect Collection Guide

Biotic Index Calculation Sheets

**Background:**

Seven percent of the 71,000+ insects in North America are either aquatic or semi-aquatic. Being able to identify aquatic insects is both interesting and rewarding. A healthy water body provides habitat for a wide range of aquatic insects in all stages of life. Most aquatic insects are simply juvenile forms of land-dwelling adult insects. Before the juvenile form can leave the water it must go through several stages of change, or what we call metamorphosis. There are two types of metamorphosis: complete and incomplete. Complete metamorphosis involves three distinct stages: larva, pupa, and adult. Examples of aquatic insects with complete metamorphosis include the caddisfly, dobsonfly, beetles, and alderflies. Incomplete metamorphosis involves a gradual change from larva to adult. Larvae of insects with incomplete metamorphosis are called nymphs and they go through several growing stages called in-stars. Examples of aquatic insects that have incomplete metamorphosis include the dragonfly, mayflies, stoneflies, and water bugs. Additional information on metamorphosis and aquatic insects can be found in *Pond Life*.

Aquatic macroinvertebrates are one of the best indicators of overall water body ecosystem health. The presence or absence of various aquatic insects can indicate a great deal about the quality of their habitat. Not every water body will have the same kind of aquatic insects. When water resource biologists collect aquatic insects, they separate them based on their pollution tolerance and then use biotic index calculations to figure out the health status of the water body.

**Procedure:**

- Create an aquatic bug book using the illustrated Insect Sheets included in the notebook. For younger students, make copies of the laminated sheets and have students color. As students are completing their bug book, review the information on the back of each illustrated sheet to familiarize students with habitat, scientific name, etc.
- At the water body, divide the class into three groups. Each group should have a dip net, hand-held magnifying lenses, an ice cube tray, and their bug books.
- Have students carefully collect aquatic bug samples by using their dip nets, by sweeping through vegetation and looking under rocks. Have them separate their bugs using the ice cube trays filled with water from the water body. Use the petri

dishes to display a sample of each kind of aquatic insect. Have the students use their magnifying lenses to view each sample. Have students identify the aquatic insects by referencing to their bug books and the identification chart to pond and river life.

- Have each group do a Biotic Index Calculation, using the worksheets provided with the activity, to determine the biological health of the water body.

**Vocabulary Glossary:**

**Biological indicators:** Organisms inhabiting a particular ecosystem that are monitored to reveal something about the relative quality of that ecosystem, e.g., aquatic insects can suggest how much impact pollution has had on a wetland.

**Larva:** A worm-like developmental state in the life cycle of insects and some other animals. With respect to aquatic insects, the larval stage is often aquatic with a terrestrial, flying adult stage.

**Metamorphosis:** A series of developmental changes whereby some animals, particularly insects, transform from immature to an adult. The stages of complete metamorphosis are egg, larva, pupa and adult.

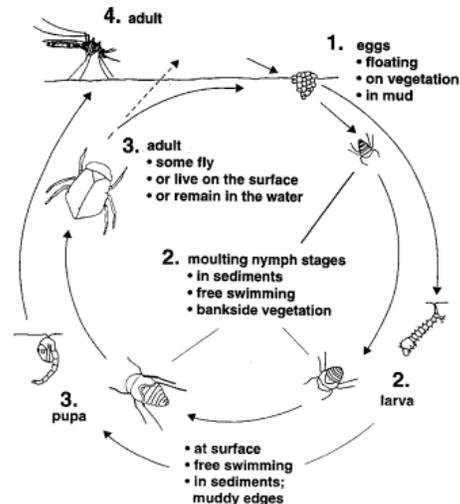
**Nymphs:** A developmental stage of insects exhibiting incomplete metamorphosis.

**Pupa:** An insect stage of transformation between the larva and adult.

**Species:** A group of individuals that can potentially interbreed and which do not breed with individuals of other groups.

**Extensions:**

- Hold a class spelling bee using key words related to aquatic insects and their habitats. Use the illustrated Insect Sheets to develop the “buggy” list. Take time to practice the words and talk about their meaning during class. Familiarize students with the concept of scientific vs. common names in species identification as part of this spelling activity. As part of your spelling bee, add bonus points to the activity by having students give the common name if a scientific name is the spelling word or vice versa.
- Have students make up their own dragonfly rap or use a rock and roll song as the basis for their composition. Encourage everyone to have fun, be creative and share their songs with other members of the class. You can also have students put together a class band to provide background music for one or more of the class’ favorite songs. Collect recycled cans and boxes for use as percussion instruments and use other noisemakers such as kazoos or horns to complete the band.



Activity source: *Integrated Environmental Curriculum, Wetlands*  
<http://www.makahsustainableresources.net/>

Complete & Incomplete Metamorphosis