

More Than A Bug

(30 minute activity)

Objective

Students will be able to:

- 1) Provide examples of complete vs. incomplete metamorphosis

Materials

- Transparency of metamorphosis
- Overhead projector
- Screen
- Pen
- Scissors

Background



Have you ever seen a molted shell of an aquatic insect on a stream-side rock? That insect just went through another *instar*. The insect life cycle is full of *metamorphosis*, and some species change over 20 times. Each change is called an instar. Most *benthic macroinvertebrates* fall into the category of either *complete* or *incomplete metamorphosis*. Mayflies and stoneflies undergo the more primitive incomplete (or simple) metamorphosis with three distinct stages: egg, *nymph*, and adult. The caddisfly is an example of complete metamorphosis: egg, larva, pupa, and adult. When students investigate the stream, they will notice the larval form does not look like the adult. However, the nymph does exhibit signs of what's to come later in life. In the adult form, other interesting differences between species are found. Some live two or more weeks and others just for hours. Time is so short they do not need any body parts for eating!

The following is a list of common northwest aquatic insects:

Incomplete Metamorphosis

Mayflies (Ephemeroptera)
 Stoneflies (Plecoptera)
 Dragonflies and Damselflies (Odonata)
 Water Boatmen, Backswimmers

Complete Metamorphosis

Caddisflies (Trichoptera)
 Alder flies & Dobsonflies (Megaloptera)
 Beetles (Coleoptera)
 True Flies (Diptera)

Procedure

1. Ask students about the visual changes animals exhibit as they mature. Give examples of the life cycle of other animals. Which juveniles look similar to the adult form and which do not? Compare birds, fish, and fur bearing animals.

Procedure
continued

2. Find the *Aquatic Insect Life Cycle Stages* sheet (Figure 1), that demonstrates complete and incomplete metamorphosis. Cut up the sheet to separate the stages and distribute, one per student. Ask them to find other students that have the same insect. Tell them there should be four per group, each showing a different instar. Ask them to put together the growth changes in order on a piece of 8.5 x 11 paper. Display each group's insect in front of the class and ask students to look critically at everyone's work. Are they in correct order? What insects are they? Look at the *Key to Immature Aquatic Insects* (Figure 2) for the answer.
3. Make an overhead transparency of the *Aquatic Insect Life Cycle Stages* sheet so students can view the insect names and the correct arrangement of the life cycle.
4. Go for the details. Using the *Immature Aquatic Insects Key*, explore the classification (Kingdom, Phylum, Class, Order, Family, Genus, Species) to which each insect belongs. How many instars do they go through, what are the habitat requirements, and where do they live as adults?

Assessment

Ask students to:

- Describe the life cycle differences between insects that undergo complete vs. incomplete metamorphosis.
- Illustrate and label the instars.

Extensions

- Research macroinvertebrates from the list provided in the *Background* information. Note life cycle and habitat differences and similarities between species. Go in-depth and discover what animals prey upon them at various times in their lives.
- Order a dissection kit containing insects, collect your own, or call your state or federal entomologist for assistance. Try to get samples of various instars to compare growth changes with the help of a microscope.