Macroinvertebrate Graphing Activity - Bugs Don't Bug Me

Summary

Students will learn about water quality indicators through the use of candy representing a "macroinvertebrate sample." Sorting the candy and evaluating what is found will tell the students about the quality of the water.

Time Frame

1 class periods of 45 minutes each

Materials

- Small coated candies (i.e. Skittles or M&M's)
- Small plastic bags (1 per group of students)
- Graph paper (See Appendix D (pdf))
- Colored pencils
- Pictures of macroinvertebrates (see Appendix D (pdf))

Background for Teachers

PURPOSE:
To describe and identify the quality of a stream site by analyzing the aquatic macroinvertebrates that live there.
BACKGROUND:
Sometimes it is easy to tell if a stream is polluted. Strange colors and dead fish are often indicators of poor water quality, but biologists need to know about water quality problems long before they reach this point. Some of their most effective partners in detecting declining trends in water quality are aquatic macroinvertebrates because they respond rapidly to changes in water quality.
To evaluate the health and productivity of a stream, biologists look at the types of macroinvertebrate species who live there. Different species have different tolerance levels to pollution. If many pollution-intolerant organisms, such as stonefly or caddisfly nymphs, are present, the water quality is probably good. Although the presence of certain species indicates good water quality, the absence of these species does not necessarily indicate bad water quality. Other factors besides pollution may account for their absence.
Sensitive or Intolerant Species:
Organisms easily killed, impaired, or driven off by bad water quality; includes many types of stonefly, dobsonfly, and mayfly nymphs and caddisfly larvae.
Somewhat Tolerant Species:
Organisms with the ability to live under varying conditions may be found in good or poor quality water; includes amphipods, scuds, beetle and cranefly larvae, crayfish, and dragonfly nymphs.
Tolerant Species:
Organisms capable of withstanding poor water quality; includes most leeches, aquatic worms, midge larvae, and sow bugs.

Instructional Procedures

PROCEDURE:

- Divide the candy into the bags. You may have one bag per student, or one bag per group of students. You should have about 30 pieces of candy per bag. Each bag represents aquatic macroinvertebrates collected from a study site.
- Have the class assign an aquatic macroinvertebrate to each color of candy (or do this

beforehand if you have visual displays). For example, red = stonefly nymphs, yellow = cranefly larvae, green = leeches. See chart below for an example.
Distribute graph paper to each student (or group). Have students set up a bar graph for the aquatic macroinvertebrate sample. Label the x-axis with the names of the candy colors that correlate to the macroinvertebrates. Label the y-axis with the number of macroinvertebrates. You can also make copies of the graph below to hand out to the students.
Give each student or group a bag of candy. Have the students separate and count the number of candies they have in each color group and graph them on the paper. Use the colored pencils or crayons to fill in the bars. Have the students try to determine the quality of the water in their sample.

COLOR	MACROINVERTEBRATE (and tolerance to pollution)
Red	Stonefly Nymph (Intolerant)
Orange	Caddisfly Larva (Intolerant)
Dark Brown	Beetle (Somewhat Tolerant)
Blue	Cranefly Larva (Somewhat Tolerant)
Yellow	Midge Larva (Tolerant)
Green	Leeche (Tolerant)

Extensions

Discuss how each sample site is different. While some sites may indicate poor water quality there may be other factors involved. Have the students hypothesize possible pollutants. Follow this lesson with Pollution Graphing and Macroinvertebrate Research
For older students, have them do research at the library or on the internet on different pollutants and macroinvertebrates to help them determine the water quality of their sample. They can also research what other factors might lead to no pollution in the water.

Bibliography

This lesson plan was developed by the Utah State University Water Quality Extension.
* This activity is adapted from Activity S-2: Use Your Head, Protect Your Watershed! By Dr. Kitt Farrell -- Poe, with information also taken from the Utah Stream Team Manual by USU Extension.

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