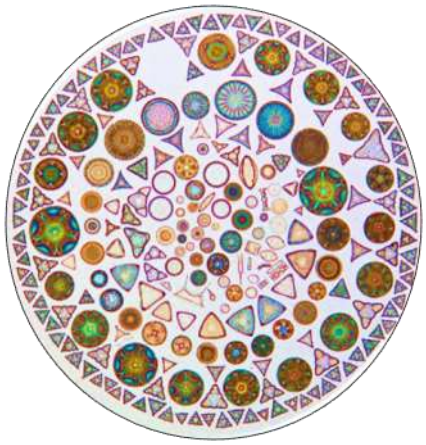
Lesson: Water's Living Things: Microorganism Discovery



Environmental Literacy Question: How have humans affected the Chesapeake Bay and

Topic/Essential Question: What is the human impact on the interactions of organisms in Maryland's habitats?

Unit/Lesson Sequence: This is a school choice lesson for quarter 1.

Content Standards:

- **Environmental Literacy Quarter 1**
  4.A.1.b. Explain and demonstrate food webs for a particular environment.
  5.A.1. Analyze the effects on human activities on earth's natural processes.
  6.A.1. Identify and describe natural changes in the environment that may affect the health of human populations and individuals.
  8.F.1.b. Identify actions that can be taken as individuals and those that require the involvement of other people, organizations and government.
- **Science**
  3.4.F.1.a. Identify and describe the interactions of organisms present in a habitat.
  6.4.B.1. Recognize and describe that people in Maryland depend on, change, and are affected by the environment.
- **Common Core Standards for English Language Arts Standards-Speaking and Listening-4th Grade**
  Comprehension and Collaboration
  - CCSS.ELA-Literacy.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

Length of Lesson: 35 minutes.

Student Outcome: The student will discover the important role microorganisms play in a healthy aquatic food web, and gain technical skills in operating a microscope and plankton tow.

Knowledge of the Learner:

- Prerequisite knowledge, skills, and processes: Some classroom experience using a microscope. An understanding of the idea that there are living things too small to see without the aid of a microscope.
- Student needs, interests, previous learning: These will be determined during the pre-assessment.
- Conceptual difficulties: Understanding that plankton, which are so small that we can't see them without a microscope, have an enormous impact on every aquatic ecosystem.

- Differentiated: The lesson reaches multiple types of learners. Logical/mathematical and visual learners will benefit from the food web poster activity. Kinesthetic and naturalist learners should do well with the hands-on collection of plankton and using the microscopes.

Knowledge of Content:

- Content knowledge for instructor:

Vocabulary:

Microorganism	Phytoplankton	Zooplankton	Food web
Acid rain	Carbon	Plankton tow	

Resources:

Plankton word cards	Plankton identification sheets
Food web poster	Sheldon Plankton – from Sponge Bob
Copepod Plush Toy	Plankton tows
Sample jars (3 large, 6 small)	Toothbrush
Squirt bottle	Prism microscopes
Plastic slides	Pipettes
Flashlights	Prepared slides

Supplements:

- A: Discussion Points and Questions
- B: Background Check Information
- C: Microorganism Sampling Procedures
- D: Proper Use of Prism Microscopes

Lesson setup:

Gather materials from shed at the end of the pier and bring them to the picnic tables by the pier. Pick up one PFD per instructor from the boathouse. Set up the microscopes on one picnic table. (One microscope per student) Place a blank plastic slide on each microscope. Place two prepared slides on extra microscopes. Collect sample from oyster bed.

Instructional Delivery

Module Introduction: All students and instructors will meet on the Dining Hall patio (outside the dining hall on the right side) for a water safety talk from an Arlington Echo staff member. At this time, everyone will receive PFDs they must keep on for the duration of all activities.

Pre-Assessment:

1. Welcome the students to the activity and introduce yourself.
2. Ask the students if they can tell you anything about microorganisms (see Supplement A).
3. Ask them what they know about plankton. At this point show them Sheldon Plankton, the plush toy from Sponge Bob.
4. Use the plankton word cards as visual aids to help students guess characteristics of the two categories of plankton: phytoplankton and zooplankton. (See Supplement A: Discussion Points and Questions and Supplement B: Background Information)

Motivation/Warm-up

Tell the students that they are going to explore the world of microscopic organisms and discover why they are important to the food web in the Chesapeake Bay.

Procedure

1. Hang up food web poster on the line. Handout the picture cards with organisms and the cards with definitions to some of the students.
2. Have students randomly read their definition cards and place them next to the appropriate level on the food web. Students with organism pictures should add theirs. (**Supplement B).**
3. Discuss other observations they can make about the diagram.
4. Divide students into pairs. Lead students near floating dock along the shoreline and demonstrate proper plankton tow sampling technique (**Supplement C**)
5. Hand out supplies so each pair has one plankton tow. Each pair of students will collect one sample with the plankton tow (dragging the tow ten times per student) and pour it into the large sampling jar.
6. Bring the group to the end of the pier to haul up the crate which models an oyster bed. Explain that real oysters make a great habitat for zooplankton. Demonstrate how to take a sample from one or two oyster shells. (**See Supplement C**). Add the oyster sample to a large sampling jar. (Note: This large sample jar is usually kept and added to throughout the day)
7. Instruct the students to return to their seats at the picnic tables. Use the pipettes to put a sample from the jar onto the slides (1-2 drops).
8. Explain how to use the prism microscopes. Ask chaperones to help students focus their microscopes. (See Supplement D: Proper use of Prism Microscopes)
9. Have students use the plankton identification sheets to identify different types of phytoplankton and zooplankton. If a slide doesn't appear to have any plankton, student can be given a fresh sample. Instructor can also use prepared slides to supplement. Just inform students that the samples have been colored to highlight the specimen, they really are not pink/blue. Students can also take a sample from the oyster sample.

Assessment:

1. Ask students why plankton is crucial to the health of the river and the Chesapeake Bay as a whole. (See Supplement A)
2. Ask the students what causes food webs to become out of balance. (**See Supplement A**).
3. As they mention that pollution can kill phytoplankton, take the picture of phytoplankton off the poster. Ask what happens to the zooplankton if the phytoplankton dies. Take off the picture of the zooplankton. Continue doing this until the entire poster is empty - symbolizing the death of the river. Go further and ask which land animals depend on the water – humans, seagulls, eagles, bears, etc.

Notes for Clean up

Please clean, organize and return the lesson materials to their proper locations at the end of the day. Remember to inform the Arlington Echo Staff if you need assistance or if any materials are damaged or missing.

Notes for Inclement Weather:
Arlington Echo encourages keeping our outdoor activities outdoors—even in the rain—but in the case of severe weather (thunder, extreme cold, etc.), the rain location for this activity will be in the upper Resource Lab; the microscopes here have electric lights rather than prisms. Collect water samples whenever there is a break in the weather. Students should be on the 10x magnification (red lens).