Regional Class Research Vessel

Oregon State University

The Secret Life of Plankton

Timeframe

1 Fifty minute class period

Target Audience

Grades 4th- 6th

Suggested Materials

- A tall clear container (or 2) filled with water
- Towels
- Plankton cards
- Pipe cleaners
- Washers, paper clips, fishing sinkers, etc.
- Beads, corks, Styrofoam peanuts, etc.

Contact:

SMILE Program

smileprogram@oregonstate.edu

http://smile.oregonstate.edu/

Description

Students learn about the diversity of plankton and are then challenged to design a planktonic organism. The best model of a planktonic organism will sink slowly or be neutrally buoyant representing the real-world planktonic organisms. Students will watch a video and be given pictures of planktonic organisms and then be provided with simple materials to build with. After designing with their team mates, students test and race their plankton in a simulated ocean.

Objectives

Students will:

- Learn about the diversity of plankton
- Learn about the adaptations that allow plankton to either sink slowly or be neutrally buoyant
- Take part in the engineering and design process

Essential Questions

What adaptations help plankton survive in their environment?

What role does plankton play in the marine food web?

Background Information

Plankton refers to the aquatic organisms that drift with water currents; either in freshwater environments such as ponds, lakes and rivers or in marine environments such as in the open ocean. There are two broad groups of plankton: phytoplankton (planktonic plant producers) and zooplankton (planktonic animal consumers), each has distinct characteristics to help them survive in an environment where shelter is rare and nutrition is sporadic.

The word phytoplankton can be loosely translated as “floating plant.” Like plants, phytoplankton harness the sun’s energy to convert water and carbon dioxide into carbohydrates and oxygen. This process, called photosynthesis, requires phytoplankton to stay relatively near the ocean surface: the deeper they go, the less sunlight is available. However, staying too close to the surface may expose these tiny

plant-like organisms to predators, as well as to harmful damage from the sun's ultraviolet (UV) rays. Although some phytoplankton are capable of weak locomotion, they are not great swimmers and usually just float with the current. Since they are relatively immobile, how do they remain in the right depth zone to maximize photosynthesis but prevent harmful damage? They have adaptations including: flat bodies, lateral spines, oil droplets, floats filled with gases, sheaths made of gel-like substances, and ion replacement.

Preparation

Fill the 1-2 tall containers with water. Set out materials for students.

Activity Introduction

Tell students that they are going to be learning about some exciting and important organisms that live in the ocean called plankton! Who has heard of plankton? What do you already know? Let students know that scientists collect and study plankton by going out on research vessels and using "plankton nets". Scientists use research vessels to go out and collect samples of plankton using nets.

Activity:

1. Have students watch video footage from "The Secret Life of Plankton" and record their observations for the first 2 minutes of video. Suggest that they look at the colors, shapes, spines, and the way they move. Guiding questions: What did you notice? What were they doing? What did you wonder? Ask students to record or draw observations.

2. For the second minute of the video allow students to continue watching but to talk with an elbow partner about what they observe(d). Observations might include: many are transparent; lots of legs or appendages; weird looking; spiny; weak swimmers; connected in chains; hair like structures.

3. Tell students that there are MANY different types of plankton. Some are plant plankton and some are animal plankton. Hand out plankton cards and ask students to work in pairs to group organisms based on the similarities and differences. Have students share how they sorted them. Similarities might include: spines, hairs, chains, color, etc. Differences might include: lots of different shapes; some are stationary; some look like worms; some look like jellyfish; some have long and some short spines.

4. Using a diagram of the ocean on the board, ask students to think about where plankton might be found in the ocean. Plant plankton need to be near the surface of the ocean so that they

Next Generation Science Standards

PERFORMANCE EXPECTATIONS:

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

DISCIPLINARY CORE IDEAS:

LS2.A.: Interdependent Relationships in Ecosystems
LS2.C.: Ecosystem Dynamics, Functioning and Resiliance

SCIENCE AND ENGINEERING PRACTICES:

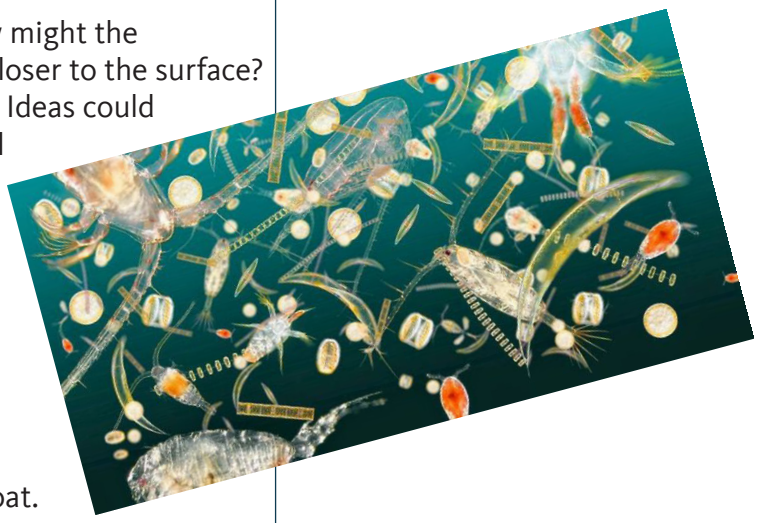
Developing and Using Models
Analyzing and Interpreting Data

CROSSCUTTING CONCEPTS:

Structure and Function
Systems and Systems Models
Energy and Matter

are close to the sun where they get their food. Where do you think that animal plankton might get their food? Discuss that all plankton are weak swimmers and move with the currents. They need to be able to float close to the surface but not on the surface (predators!).

5. Have students look at their pictures again, how might the structures on the plankton help them to float closer to the surface? Discuss ideas with partner and then share out. Ideas could include: flattened bodies, gas or oil floats, small bodies, chains.



6. Let students know that they now get the chance to try out their ideas as they design and build a plankton! The goal is to create a plankton that neither sinks nor floats out of given materials. Show students the materials that are available to build with and have them hypothesize about which ones would sink or float.

7. Students will work in teams to design and build their plankton. Talk about the engineering and design process Give them five minutes to draw two plankton designs that they think will be the most successful. Students can discuss design ideas with other students before drawing. When they are done and before they get materials have them share. Ask: why do you think your design will be successful?

8. Have students collect their materials and start building. They can test their plankton in the "ocean" to see if it floats or sinks and modify their plankton until satisfied.

9. Once students are done bring up two teams at a time for the "great plankton race". Have them first share about your plankton and the adaptations that they think will help it sink slowly. Race guidelines: If a plankton floats on the surface, it is disqualified (eaten by a seagull)). The slowest plankton wins the race!

10. Discuss:
    - What parts of your plankton made it successful?
    - What could you change to make your plankton more successful?

Wrap Up

Ask: why should we care about and study plankton in the ocean?

- They produce 50% of the worlds oxygen (like trees!)
- Phytoplankton is the base of the food chain in the ocean which means that they provide food for everyone else!
- There is a lot that they can learn by studying plankton: dead

zones, red tides, animal die-off's, climate change.

- Watch Thank you plankton!

Ask students to brainstorm how plankton are studied? Talk to students about plankton tows done off of research boats. Ask: if you were able to go out on a research vessel to study one of the organisms in the ocean that depend on plankton to survive, what would you study? Have students share with each other.

Extension

Have students use what they learned to write a story from the perspective of a plankton or an organism that depends on plankton in the ocean. Discuss what it means to see something from another perspective. Share an example of a perspective story and a guiding template they can use to generate ideas. Have them think about:

- What is it like to be your organism?
- Who are the predators and prey of your animal?
- Use what you observe in the video to tell your story (if you choose a plankton). Describe the plankton in relation to others. Is it fast, slow, big, small, pointy, round, etc.

When students are finished with their story discuss:

- Why did you choose this organism?
- What role does this organism play in the ocean ecosystem?
- Who in the ocean ecosystem would be affected if this animal were no longer there?

This project is supported by the Regional Class Research Vessel Program in the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University.

Resources

Adapted from The Great Plankton Race: http://www.cosee.net/best_activities/activity/The_Great_Plankton_Race.pdf

Make a Microbe: http://cmore.soest.hawaii.edu/index.htm


PLANKTON!
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