

Activity Title: Plankton Races

Learning Objectives

Students learn about buoyancy, density and surface area. Students also learn about biodiversity and the relationship between the structure and function of organisms.

Ocean Literacy Principles

#5 -- The ocean supports a great diversity of life and ecosystems.

Supplies and Materials

- Various sizes of washer (representing heavy parts of the cell)
- Cloth
- Pipe cleaners
- Styrofoam shapes
- Beads
- Felt
- Straws
- Toothpicks
- Screens or meshes of various sizes
- Tape
- Large container of water (5 gallon bottled water with tapered top cut off works well)
- Any other materials can be used

Background

There are many wonderful shapes, colors, and sizes of marine phytoplankton and zooplankton. The biodiversity of plankton is quite high, but there is a strong connection between structure and function. Phytoplankton must remain in the photic (sunlit) zone in order to photosynthesize, grow, and reproduce, so if they sink too fast they will die.

Many of the building blocks of phytoplankton are more dense than seawater (protein, nucleus, chloroplasts). In this activity, dense reproductive body parts are represented by metal washers. To keep plankton afloat, phytoplankton have developed elaborate systems to slow sinking rates or make the overall plankton of a similar density to seawater. However, if the plankton is too buoyant, it will rise to the surface of the ocean and become easy prey to birds or other surface feeders.

Duration

45-90 minutes depending on the detail during construction and the focus on competitive races. The

activity can be broken into 2 class periods of 45 minutes, or presented at a science night.

Audience

Grades 4-8

Procedure

This activity engages students in two activities with simple instructions.

First, students are to use their creativity and imagination as well as some basic principles of buoyancy, density, and surface area to create their own phytoplankton. They may use the materials provided or materials that they have brought in. The only rules are that their plankton must fit in the container of water and must contain some reproductive parts (washers).

Second, two students place their plankton in two matching water containers to see which one sinks the slowest. If the plankton floats, it will be eaten by birds or surface feeders and is eliminated from the competition. The plankton that sinks the slowest wins and proceeds to the next round. If two plankton sink at the same rate, the one with the most reproductive parts (washers) wins. This continues until you have a single winner for the class. Students may keep their original artwork.

Students are engaged creatively in designing their own plankton and engaged competitively in “racing” their plankton. There are many variations of this activity that could include design challenges (using the same exact materials), art projects (students vote on the best looking or most original plankton), or graphing the sinking rates.

Step-by-step Procedure:

- 1.) Lay out all materials
- 2.) Students create a plankter with the materials
- 3.) The goal of the “contest” or “race” is to see who can make a plankter with the most washers and that can sink the slowest.
- 4.) Students test their plankton in the “ocean” to see if it floats or sinks.
- 5.) Students continually modify their plankter until they are satisfied.
- 6.) 2 students “race” their plankton to see who sinks the slowest. (If a plankter floats on the surface, it is disqualified (eaten by a seagull)).
- 7.) A “winner” is determined, and all students keep their creation.

Additional Resources and Extensions:

Students may explore books, the Phytopia CD (Bigelow Laboratories, www.bigelow.org), the internet, or the SeaSoup Teacher’s Guide (Betsy Stevens, Tilbury House, 1999) to compare their strategy for remaining afloat to those of real plankton.

Students can discuss how they designed their plankter (increased surface area, balance of dense materials with buoyant materials, etc).

Assessment

- Students may be asked pre- and post-activity whether various object will float or sink or which one will sink the fastest.
- Students may be asked to draw a plankter after having read about it or heard about it before

and after creating their own buoyant plankter.

Acknowledgements

This lesson was developed and tested by Bob Chen, COSEE OCEAN.

This lesson plan was provided by COSEE OCEAN. For more information, please contact Bob Chen at bob.chen@umb.edu.