



Profiling Phytoplankton

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Summary

Students will build a water column that showcases the different types of phytoplankton found at different levels of the Southern Ocean. We will be using data collected from a 2014 Antarctic cruise on the Nathaniel B. Palmer by Dr. Hannah Joy-Warner as well as profile data collected from a GO-BGC float off the western coast of the Antarctic peninsula. Students will predict trends in phytoplankton distribution based on various changes in a marine environment.

[TAGS: phytoplankton, floats, Antarctica]

Key Concepts

- Photosynthesis
- Recycling of resources in an environment
- Biotic / abiotic factors

Objectives

- Develop a 3D model of phytoplankton distribution in the oceans
- Analyze their model by making a graph showing the relative distribution of plankton vs depth
- Predict plankton distribution based on a change in nutrients or light exposure in an environment and explain their prediction

Materials

- Class set of cards of  Phytoplankton Pictures for Intro Activity - Profiling Phytoplankton... (need to cut before class, can be laminated and reused each year)
- Copy of  Phytoplankton Cut-Outs - Profiling Phytoplankton for each group
- Blank white paper
- Tape or glue
- Scissors
- Meter sticks, rulers, or tape measures (metric)
- Copy of  Student Worksheet - Profiling Phytoplankton for each student
-  Teacher Slides - Profiling Phytoplankton

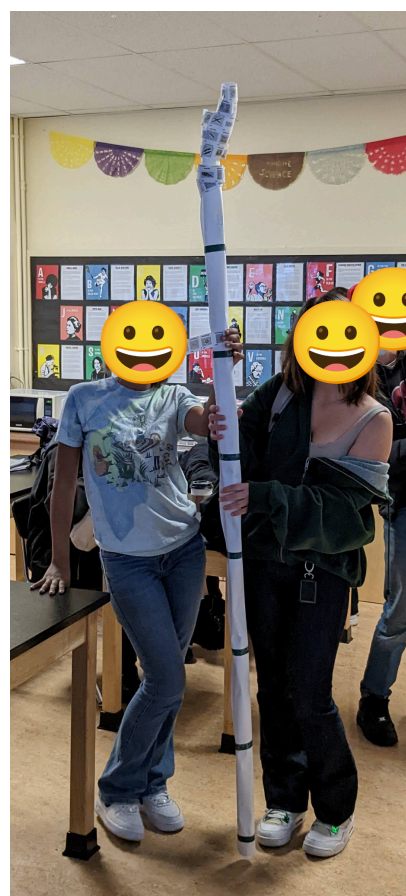
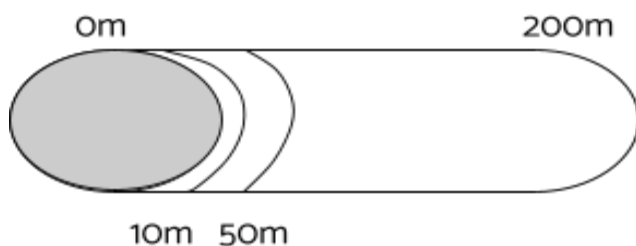
Extra Resource - [Pronunciation Guide to Phytoplankton Names](#)

Engage

1. Pass out one card from [Phytoplankton Pictures for Intro Activity - Profiling Phytop...](#) to each student. Give students one minute of quiet reflection to look at their photos and ask them. What do they notice about their picture? What do they wonder?
2. Have students stand in concentric circles or in two lines, facing each other. Give each pair of students 30-60 seconds to share their pictures and their answers to the questions. Then have one circle (or line) move one person to the right. Repeat this a few times, enough that students have a chance to see a few photos.
3. Alternatively, this can be done in table groups.
4. Have students share their favorite photo from the ones they saw.

Explore

1. Pass out one copy of [Phytoplankton Cut-Outs - Profiling Phytoplankton](#) to each group. Give groups of students 8 sheets of paper and have them create a long cylinder that is exactly 2 meters long. They can use tape or glue to assemble it. The top of the tube represents the surface of the ocean and the bottom of the tube is 200m deep. The tube represents a column of water in the Southern Ocean. Have students mark 10 m and 50 m at the appropriate distance on the tube. Each cm represents one m in depth. Teacher Note: 10 m should be 10cm from the top and 50m should be 50cm from the top.



2. Hand out printed copy of [Phytoplankton Cut-Outs - Profiling Phytoplankton](#) to each group. Students should cut out each phytoplankton and glue or tape it at the correct level on the tube. They can be placed right below the depth listed on each square.
3. Once students have finished their water column, give each student copy of [Student Worksheet - Profiling Phytoplankton](#). Students should write down observations and draw a trendline showing the distribution of phytoplankton in the ocean.

Students should also explore abiotic and biotic factors that impact plankton distribution.

Explain

1. Project the blank graph from  Teacher Slides - Profiling Phytoplankton onto a white board. A couple of student representatives from the group can come up and draw their lines on the white board. Then show the actual graph on Slide 5 and compare their data.
2. Ask students to share their answers about which factors might impact the distribution of plankton in the water column. Record their answers on the board.
3. Share the rest of the slides that explain the distribution of plankton in the water column.

Extend

1. At the end of the slide show, students have a chance to make predictions based on what would happen to the plankton distribution if there was less light in a particular area. They record their answers on their  Student Worksheet - Profiling Phytoplankton sheet.
2. They also make a prediction for more nitrates. It is important for the teacher to walk around during this time and help correct any misconceptions students have.

Evaluate

 Assessment - Profiling Phytoplankton

Assessment

- Formative Assessment:  Student Worksheet - Profiling Phytoplankton
- Summative Assessment:  Assessment - Profiling Phytoplankton

Extensions or adaptations

This can be connected to in-person phytoplankton labs. It also is a good lead in to talking about phytoplankton distribution worldwide, seasonal changes in phytoplankton, upwelling, and net primary productivity. Additional extensions include marine food webs and Antarctic food webs.

Prerequisite knowledge

Metric system and scaling, basic understanding of photosynthesis, ocean zonation might be helpful

Common Misconceptions

Phytoplankton are plants.

Gratitude

Much appreciation to Michelle Darguzas for coming up with the idea of using a water column. Many thanks to Dr. Hannah Joy-Warren for letting us use her data, answering questions, and checking to make sure the activity was a relatively accurate reflection of the science.