

Name: _____

Date: _____ Class: _____

An Introduction to Plankton

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Essential Questions:

1. What are plankton?
2. Which plankton are found in our freshwater ecosystem (retention pond)?
3. How do plankton participate in the carbon, nitrogen, and phosphorus cycles?
4. How do plankton contribute to eutrophication?

Objectives:

1. Identify phytoplankton and zooplankton among pond water microorganisms.
2. Classify phytoplankton and zooplankton as producers or consumers.

Warm-Up: TEDEd Video, "The Secret Life of Plankton" (<http://ed.ted.com/lessons/the-secret-life-of-plankton>)

1. The term "plankton" comes from the Greek word planktos, which means
 - A. Wandering
 - B. Floating
 - C. Innumerable
 - D. Transparent
2. What distinguishes phytoplankton from other kinds of plankton?
3. Why are phytoplankton important?
4. How abundant are plankton?
 - A. The weight of all the plankton in Lake Erie would equal the weight of the Empire State Building
 - B. If you lined up all the Earth's plankton end-to-end, they would stretch to the moon
 - C. They account for about half of all the biomass on the planet
 - D. There can be more than a million in a teaspoon of water
5. Describe some of the structural and behavioral adaptations that zooplankton use to get food.
6. Based on what you learned from the video, which of the following can you identify as a misconception about plankton?
 - A. Plankton are colonial organisms.
 - B. Plankton are saltwater organisms.
 - C. All plankton are microscopic
 - D. Most plankton are larval forms of larger, free-swimming organisms like crustaceans, cephalopods and fish.
 - E. C and D

Pre-Lab: Reading, "Plankton" (<http://www.biologyreference.com/Ph-Po/Plankton.html>)

Read the passage, "Plankton" and answer the following questions.

1. What are plankton? Where does the name 'plankton' originate?
2. How do plankton move through the water?

3. What are phytoplankton?
4. How do phytoplankton get their food?
5. What are zooplankton?
6. How do zooplankton get their food?
7. Why are plankton important to other aquatic organisms? To humans?
8. How do plankton contribute to the carbon cycle?

Lab: Observing, Identifying, and Classifying Pond Plankton

The teacher will place a drop of pond water on your microscope slide. Examine the slide under low power (40x). Use the microscope’s coarse adjustment (big knob) to locate organisms. Then focus with the fine adjustment (little knob). If you need greater magnification after you find some organisms, switch to medium (100x) or high (400x) magnification. Then re-focus with the fine adjustment.

Microscope Tips:

- Use low power (4x) for locating organisms and estimating the ratio of producers to consumers. Use higher powers (10x and 40x) for viewing more detail and drawing specimens.
 - Under both low and high power, move the slide around to observe the largest variety of organisms and get a better idea of what is a representative sample.
1. Use low power to take a wider view of the different samples. Based on the number of number of producers and consumers in the field of view, about what percentage of organisms are producers? _____ Consumers? _____
 2. Identify 10 different microorganisms, filling in the chart below. Use the Identification Guide to determine the identity of the microorganisms.

Sketch	Characteristics	Type of Plankton (phyto- or zoo-)	Producer or consumer	Identity (Name)

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Analysis Questions:

1. What is the overall estimated percentage of producers in your sample? In the entire class' overall sample?
2. Why do producers have larger populations than consumers?
3. How do the producers in the pond community get food? What specialized cell structures do they have to help them obtain food?
4. How do the consumers in the pond community get food? What anatomical features do they have to help them obtain food?
5. This sample of water was taken from the edge of the pond. How do you think the populations of phytoplankton and zooplankton might differ at different depths of the pond? Why might this be so? (Hint: when you are standing at the edge of the pond, can you see all the way to the bottom?)
6. How is the relationship between microscopic producers and consumers similar to that found among larger organisms?
7. Similar relationships exist among the larger organisms to those found among microscopic ones. When trying to learn about these relationships, what is the advantage of studying microscopic communities rather than communities of larger organisms?

Application: Reading, "Marine plankton put nitrogen in a fix"

(<https://www.sciencenews.org/article/marine-plankton-put-nitrogen-fix>)

1. Paragraph 1 – What significant finding does the new data suggest?
2. Paragraph 2 – what is "one of the ocean's biggest biogeochemical puzzles?"
3. Paragraph 3 – What did scientists discover? How did they discover it?
4. Paragraph 4 – Explain the "vital trick" of nitrogen fixing.
5. Paragraph 5 – Why are scientists searching for "the missing microbial alchemists?"
6. Paragraph 6 – What did the scientists look for? Why?
7. Paragraph 7 – what did the scientists find?

8. Paragraph 9 – why can scientists conclude that “if you find these genes, you can be pretty sure the cells are using them?”
9. Paragraph 11 – what additional findings have other scientists discovered that may also be significant?
10. In ONE sentence, explain the MAIN idea of this text.

Extension

1. Read, “Ocean Food Pyramid” extension reading.
2. Use the “Ocean Food Pyramid” Chart to construct a food pyramid, using the organisms listed in the chart.
3. If the food pyramid begins with 150,250 grams of phytoplankton, calculate how many grams of food energy are passed on to each of the successive levels.

