1.5.1 Macroalgae (Seaweed)

Overview

It has a stalk and leaves and is anchored to the ground, but it is not a plant. What is it? It is a form of algae called seaweed! The general shape of seaweed adds to the confusion. Upon a closer look, it becomes clear that seaweed is different from plants. First, plants have differentiated cells and seaweed has cells with little or no differentiation. Second, seaweed has no vascular system, like plants, that brings water and nutrients from the roots to the leaves. Finally, seaweed does not have branching roots that get progressively smaller. The holdfasts anchor the seaweed to the ocean floor, but they do not play a role in transporting nutrients.

Learning Objectives

- Seaweed has parts that are different from those of plants, even though they appear to be somewhat similar.
- Seaweed is an example of macroalgae, which are multicellular algal organisms, in contrast to micro-algae, which are unicellular organisms.

Student Activity: Macroalgae (Seaweed)

Materials

Samples of red, brown, and green seaweed collected from the ocean or purchased at a pet store in the aquarium department
¼ teaspoon of powdered seaweed (alginate) in a paper cup
1 Tablespoon of water in a paper cup
Plastic spoon or other stirrer
Access to the Internet

Advance Preparation

Read Section 1.5: Life in the Ocean: Plants and Algae
Divide into lab groups of 3 to 4 students

Process and Procedures

1. Gather one of each sample of seaweed. Examine the samples. What similarities can you find? What differences do you notice? Color? Texture? Size?

2. How many distinct parts of seaweed can you see? Do all samples have all the parts?

3. In the space below, make a general drawing of a seaweed organism. Add a blank label pointing to each of the parts you identified in Step 2, but do not fill them in.

4. Using valid and credible Internet resources, find out how scientists divide the seaweed structure into parts and what they call each of the parts. Label the parts of your drawing with the correct terms and adjust your drawing if your divisions did not match that of the scientists.

5. Examine the dried seaweed powder in the paper cup. How does its texture, smell, and color compare to the samples of seaweed you observed in Step 1?

6. Add the powder to the cup with water in it. Stir it with the spoon. Observe the results.

7. Discuss with your team the answers to the following questions:
    - What happened to the water in the cup?
    - Under what circumstances would the result of mixing water and powdered seaweed be a desirable outcome?
    - What products would benefit from the addition of some seaweed powder?

Assessment

Alginate, the powdered extract of brown seaweed, is used in many foods. Find out which ones and how alginate helps make the foods more desirable. Then, make a poster to inform people of the connection of the ocean to their food through seaweed (beyond sushi!).

Expected Outcomes

What's the take-away? All living things are made up of parts. Algae have parts that are very similar to, but not identical, to plants. Scientists describe and classify parts based on the function the part performs for the organism. For example, holdfasts differ from roots in that they do not perform all the same functions that true roots do.

What does the student work product look like?

Work product #1: Diagram Seaweed Samples

Students should each produce a diagram of each of the seaweed samples that were observed (red, brown, green). Each diagram should be labeled with the parts of the seaweed.

Look for student discussions to describe what happened when dried seaweed was mixed with water. (A gel-like substance should form.) Students should speculate about scenarios where a product with properties like this would be helpful or useful.

Assessment

Students should each do independent research to produce a poster that informs. Look for students to creatively display with words and graphics the information they found during their research. For example, that alginate is used in breads and pastas to improve taste and texture.