

Name:

Date:

5.L.4, 6.L.4B.2, 6.L.5, 7.L.4

Read the following passage. Using your understanding and reading comprehension, answer the following questions at the end of the passage.

Adaptations of Algae

Adaptations are the behaviors and physical characteristics of species that allow them to live successfully in their environment. Both plants and animals have adaptations that increase the chances of their survival. It can be easy to identify adaptations of certain **species**. For example, stone crabs have claws that are good for protection and crushing the shells of the clams and oysters they eat. **Aquatic** turtles have webbed feet, helping them swim through water. Sea urchins have spines for self-defense. What are some adaptations that algae (seaweed) may have? It may not be as easily identifiable as say an animal's claws, shell, or spines.

Algae have a variety of adaptations that help them survive including body structures, defense mechanisms, as well as reproductive strategies. Some algae have **holdfasts** that attach to the sea floor and

anchor them down much like roots of a plant. Many algae, such as *Sargassum*, have gas-filled structures called **floats**. Floats help algae stay high enough in the water column so they can **photosynthesize** and absorb energy from the sun. *Gracilaria vermiculophylla* is a type of algae that can be seen drifting in the water. However, it can be found anchored on parts of the mudflat at Patriots Point. How is this possible for algae with no holdfasts? *Gracilaria* has formed a relationship with a tubeworm called *Diopatra*. This tubeworm grabs hold of these algae, adding it to its tubes. In return *Gracilaria* is anchored to the mudflat.

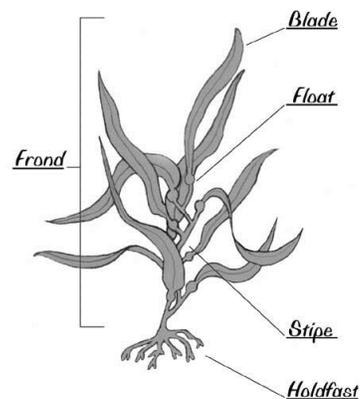


Figure 1:
Basic
structure of
seaweed.

Remember the periodic table of elements? Some algae contain elements such as carbon, nitrogen, and calcium. These elements affect the seaweed's **palatability**, or how tasty and nutritional it is. Who wants to eat something that tastes bad? Algae low in nitrogen (an important nutrient) may be less appealing to herbivores. The amount of calcium carbonate (the same material that makes up sea shells) can also affect algae palatability. Algae very high in calcium carbonate will be tough, almost rock like and unappealing for **herbivores** to bite into! Algae can also produce **chemical defenses** to protect themselves from **predators**. The green algae *Halimeda* have high concentrations of defense chemicals to prevent herbivores from eating it.

Algae reproduce or produce offspring in two ways: asexual reproduction and sexual reproduction. Both processes help algae survive in different environments. **Asexual reproduction** involves only one individual

and produces offspring that are identical to that individual. Algae reproduce asexually by releasing **spores** into the water column. These spores develop directly into new individuals. This reproductive strategy is beneficial if algae are isolated in an area. **Sexual reproduction** is a process that involves a male and female adult form. Algae can reproduce sexually when male and female reproductive cells called **gametes** fuse together. The fused gametes form **zygotes** which will grow into new individuals. Sexual reproduction passes genetic information called **DNA** to the offspring.

Different types of algae all have different adaptations depending on the environment they live in. Whether having different body structures, chemistry, or reproduction strategies, each kind of algae will use their adaptations to increase their chances of survival.

1. Why are adaptations important?
2. How can having holdfasts be beneficial to algae?
3. What might happen if algae did not have floats?
4. What does palatability mean? What are some elements that affect the palatability of algae?
5. What are two different reproductive strategies that algae use?

BONUS: Research the types of algae mentioned in the passage above and draw them to compare their structural differences.

Glossary

Adaptation: behaviors and physical characteristics of species that allow them to live successfully in their environment

Aquatic: living in water

Asexual reproduction: by which offspring arise from a single organism, and inherit the genes of that parent only

Chemical defenses: use of compounds (chemicals) by plants and animals to prevent herbivores from eating them

DNA: DNA stands for deoxyribonucleic acid. It holds the code for every cell in your body.

Floats: gas-filled structures that help algae float in the water

Gametes: a mature sexual reproduction cell, as a sperm and egg that unite in order to form a new individual

Herbivores: an organism that eats plants

Holdfast: the part of seaweed that attaches to a hard surface and anchors them down, much like roots of a plant

Photosynthesize: the act of photosynthesis, when plants turn water, sunlight, and carbon dioxide into water, oxygen and simple sugars

Palatability: how tasty and nutritional something is

Predators: an organism that hunts or preys to obtain food

Sexual Reproduction: production of new living organisms by combining genetic information from two individuals of different sexes (male and female).

Species: a group of individuals that have common characteristics and share a common name

Spores: a cell made by some algae that is like a seed and can produce a new plant

Zygotes: a fertilized egg, the first cell in a generation of plants and algae