

# UC Santa Barbara

## Educational Materials

### Title

Marine Algae Lesson

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# Coal Oil Point Reserve: Marine Algae (Seaweed)

## Next Generation Science Standards

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

## Lesson Plan: Marine Algae (a.k.a seaweed)

### Cognitive Learning Objectives:

To introduce students to the study of algae (Phycology).

- a. Students will learn that algae are classified into three categories: Red, Green, and Brown algae.
- b. Students will be able to differentiate between the different types of algae.
- c. Students will be able to understand the role algae plays in marine eco-systems.

### Affective learning objectives:

Students will feel connected to the local environment and understand the importance of this key component of the marine ecosystem.

**Materials:** picture of six kingdom classification systems, samples of algae including the holdfast, red algae, brown algae, and green algae that can be collected from the beach beforehand, blanket to sit on sand, products that contain carrageenan and alginate such as ranch dressing and toothpaste

**Location:** Coal Oil Point Reserve

Preparation: Find samples of red, green, and brown algae and locate a location to do the lesson near some beach wrack

**Time:** ½ hour-1 hour

**Engage:** Sit in a circle. Ask the students if they know what algae is, and if they can see any around them. At COPR there's usually lots of beach **wrack**, natural material that is washed up on the beach. Let them know that it is largely washed up marine algae. Take out the samples of red, green, and brown algae. Ask the students to use their senses to describe what they see. Ask them to smell and touch the algae. Kelp is even edible, just rinse it off. Ask the students if they know what algae is.

**Explore:** Explain that marine algae belongs to a large and diverse group of organisms called algae, which includes algae, protozoans and slime molds. The classification of algae is difficult and scientists do not always agree. There are three types of algae; red, green and brown. It is sometimes hard to differentiate only by color since the sun can bleach the algae.

**Explain:** Ask students if they think that algae is a type of plant. Explain to students that Algae is not actually a plant. Algae are organisms capable of producing oxygen through **photosynthesis** but are actually NOT a plant (**algae do not have roots, stems, or leaves; algae take in nutrients straight from the water**).

Show the students the picture of the six kingdom classification system, some scientists place algae in the **Protist** group and some in the **Plant** group. Still other scientists believe that algae should be placed in a new group.

Ask students if they can guess, based on the names, the difference between macroalgae and microalgae. Macroalgae are large aquatic photosynthetic plants that can be seen without the aid of a microscope. Microalgae are small microscopic aquatic photosynthetic plants that require the aid of a microscope to be seen.

**Elaborate:** Ask students if anyone has used seaweed already that day. Most students should say that they haven't. Ask if anyone brushed their teeth that morning. Let the students know that if they brushed their teeth, they most likely used a product made with extracts from algae. Take out the samples of products that have alginate and carrageenan and let students look at the labels to find these ingredients. Explain that lots of products, like ranch, ice cream, hand creams and toothpaste contain algae products. These can be used to enrich, thicken, or color the products.

Ask students other reasons why seaweed might be important to humans and the ecosystem. Some reasons include:

- Marine producers such as plants, algae, and bacteria contribute between 70 and 80 percent of the oxygen in the atmosphere.
- Seaweeds such as kelp are important habitats for marine life
- On the beach, algae serve as food and shelter for animals such as invertebrates. *An invertebrate is an animal species that does not have a spine – snails, insects, worms, clams, crabs, octopus and starfish.* To demonstrate this, move a pile of beach wrack and see all the little invertebrates underneath it that use it as food and shelter.

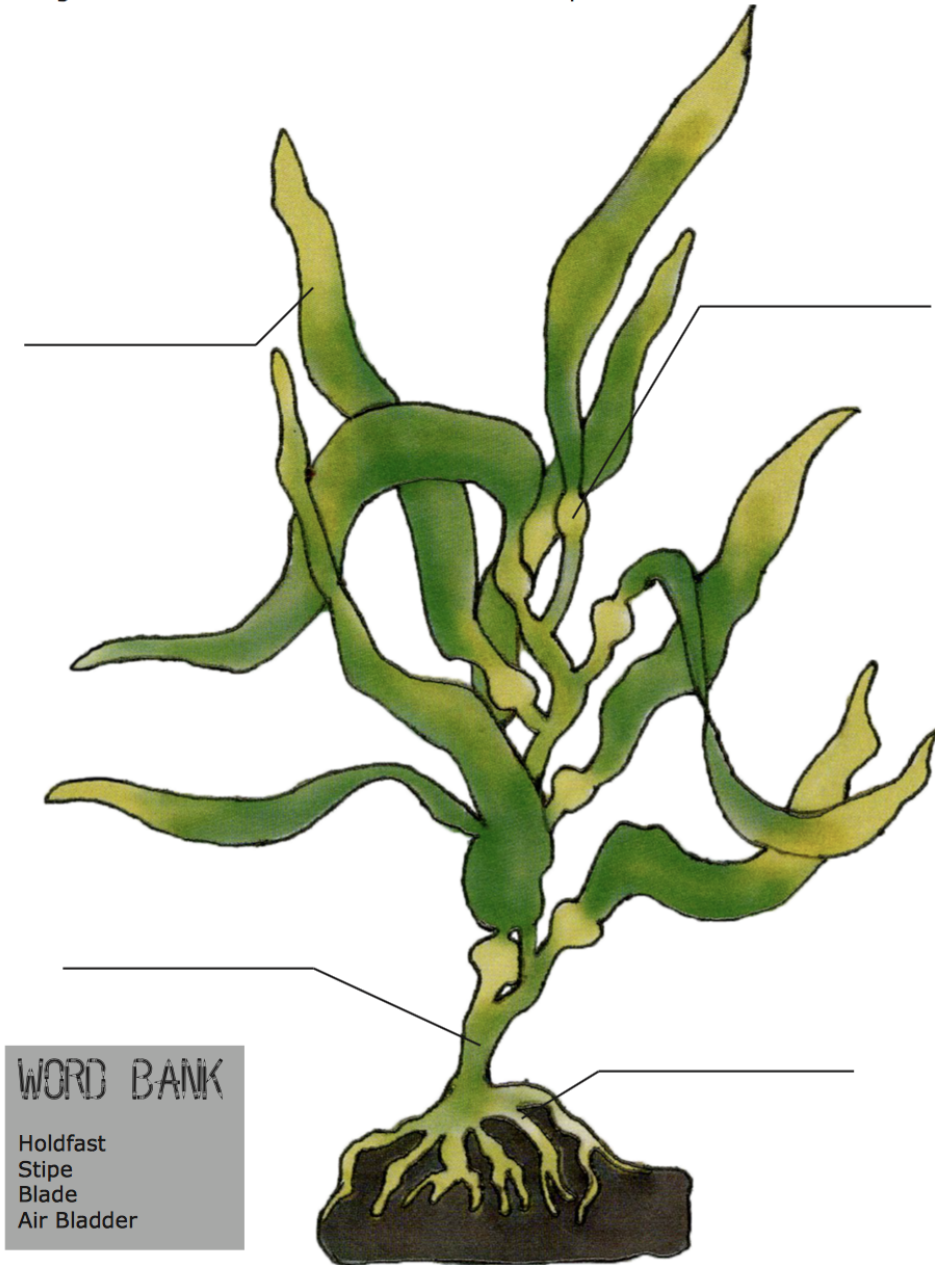
One important type of algae is kelp. Kelp forests act as underwater nurseries for many marine animals, such as fish and snails. The lush blades form a dense forest canopy where invertebrates, fishes, birds, otters, and whales can find lots of tasty food and or sometimes a good home. Beautiful sea slugs and kelp crabs can be seen on the blades and stipes of the seaweeds, while other small marine animals like worms find their homes in the holdfasts. Kelp forests are a huge food source for sea urchins.

**Evaluate:** Have students go in pairs and see if they can find one type of each algae- red, green, and brown.

Regroup and share any observations. Discuss the best way to sort the algae into groups – color, texture, size....what is the best way to categorize marine algae? Describe all the parts of marine algae (page 54 in your KIN Journal). Using kelp as an example, ask if students can correctly identify the different parts including the stipe, holdfast, blade, and air bladder (diagram below).

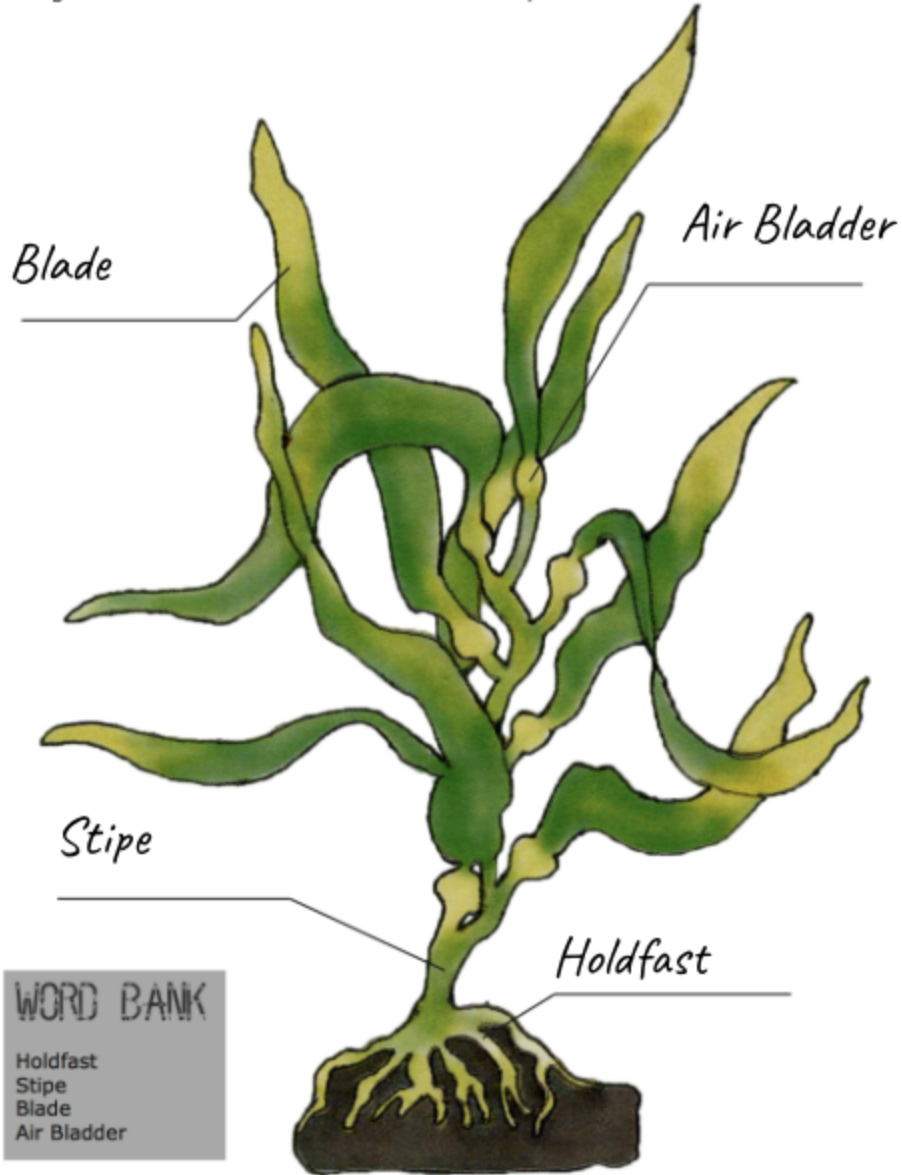
# ALGAE STRUCTURE

Using the word bank below. Label the different parts of the seaweed.



# ALGAE STRUCTURE

Using the word bank below. Label the different parts of the seaweed.



# The Six Kingdoms of Life



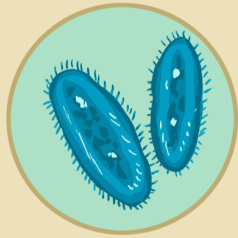
Animalia



Plantae



Fungi



Protista



Eubacteria



Archaeobacteria