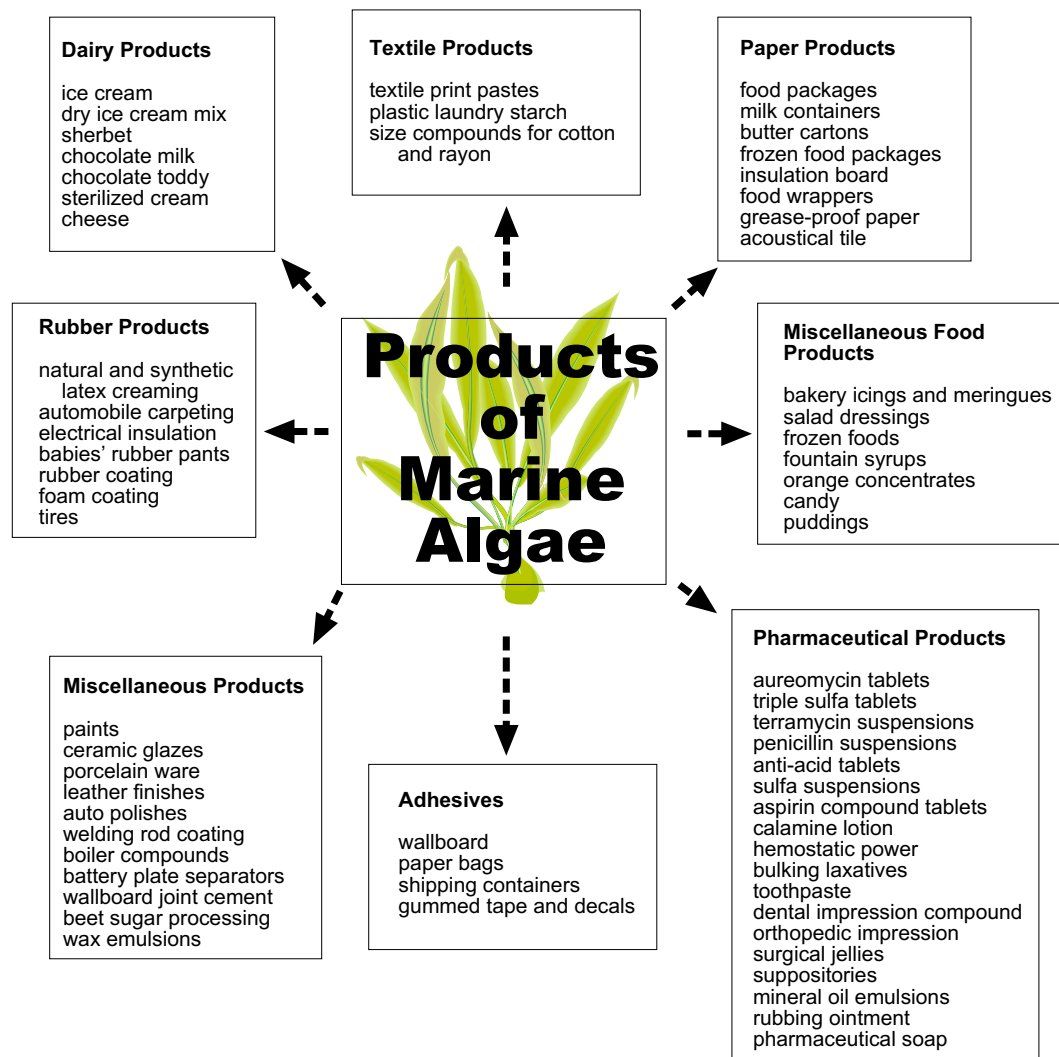




Uses of Seaweeds: From Foods to Fertilizer

For centuries, people of the Far East have nurtured and harvested seaweeds in their **mariculture**, or farming of the sea or ocean. As early as the 17th century, people processed brown seaweed into soda ash for use by glass and pottery makers. Potash, a fertilizer, is derived from burned or dried seaweed. Iodine can also be derived from seaweeds. Today many types of seaweeds are prized as specialty foods because they are rich in minerals and vitamins.



Currently, brown seaweeds or kelps are harvested by the use of a *mower*. The mower cuts off the top four or five feet and pulls it up onto a barge. The kelp is then dried and used to produce **algin**, **agar**, and **carrageenan**. The kelp left in the sea grows back in several weeks to be harvested again.



Algin is a powdery extract that absorbs large quantities of water. Algin is added to ice cream to prevent ice crystals from forming. It keeps frostings and gels from sticking to packaging. Algin is also used to suspend antibiotics in solution and pigment in paints. *Agar*, the gel that is extracted from seaweeds by boiling, is used as a medium for growing bacteria in microbiological studies. The agar gel is nontoxic and is widely used in canning meat and fish and in the glue of postage stamps. Many products use another seaweed extract called *carrageenan*. Carrageenan helps to keep substances suspended in solution. It is commonly used in chocolate milk, toothpaste, and cosmetics. Most people have eaten or used seaweed and never known it.

Summary

The ocean contains many plants and plantlike organisms. These are producers that make their own food through the process of *photosynthesis*. The producers in the ocean are divided into two major groups: plants and *protists*. Plants are complex organisms whose cells are specialized for different jobs. Protists are simpler organisms. They may have one cell or many cells, but protist cells are all alike, with the same structure.

Marine plants may be either *emergent* or *submergent*. Emergent plants raise their stems and leaves out of the water. Submergent plants are totally covered with water. Plants do many important jobs. They stabilize shoreline sediments and help to prevent erosion. They also provide food and shelter to marine animals.

Marine protists include single-celled *phytoplankton* and multicelled marine *algae*. Marine algae is also known as *seaweed*. Seaweed often has plantlike parts and air sacs that help it float. By floating, seaweed can stay close to sunlight. There are green seaweeds, *Chlorophyta*, brown seaweeds, *Phaeophyta*, and red seaweeds, *Rhodophyta*. Seaweeds have been used both as food and fertilizer. Substances removed from seaweed are also used in many products, including glue and cosmetics.



Emergent plants raise their stems and leaves out of the water.



Practice

Use the list above each section to complete the statements in that section.

| | |
|--------------------|-------------------|
| blade | producers |
| brown | protists |
| holdfast | Rhodophyta |
| mariculture | submergent |

1. Plants and plantlike organisms are all _____ — they make their own food.
2. The red seaweeds, or _____, are used to make soups and seasonings.
3. The Phaeophyta, the largest seaweeds, are _____ in color.
4. Seaweeds are grown through _____, or aquaculture, for food and industry.
5. The _____ is the leaflike part of an algae that is responsible for photosynthesis.
6. The rootlike part of seaweed that is used for attachment is the _____.
7. Seagrasses are examples of _____ plants that have adapted to life under water.
8. Marine algae such as seaweeds are _____ with very simple, unspecialized cells.



algin
chlorophyll
erosion
flowering

kelp
photosynthesis
pioneer

salt-tolerant
sargassum
stipe

9. The green pigment _____ is found in plants and marine algae to help in photosynthesis.
10. The most complex group of ocean plants is known as _____ plants.
11. The stemlike part of a seaweed where the blade attaches is the _____ .
12. _____ , a powdery seaweed extract, is added to ice cream and frostings to absorb large amounts of water.
13. The process by which plants and algae produce their own food with the help of pigments is called _____ .
14. The common brown seaweed that is found washed up on Florida beaches is _____ .
15. _____ , a brown seaweed, is dried and used to produce the extracts algin, agar, and carrageenan.
16. Emergent plants such as mangroves help prevent _____ on the beaches.
17. Emergent plants are _____ , and many have adaptations to prevent water loss.
18. _____ plants such as sea oats are the first to colonize.



Lab Activity: Identify Products with Seaweed



Investigate:

- Identify products that have seaweed-based ingredients.

Materials:

- products such as canned food with labels indicating ingredients from the sea

Procedure:

Locate and collect packaged food or other products that have algin, agar, carrageenan, xanthan, gum, alginates, etc., listed as ingredients. (See chart on page 313 of the student book.)

Analysis:

1. What types of products contain agar? _____

2. What types of products contain algin? _____

3. What types of products contain carrageenan? _____



4. Do you think that advertisers would be wise to promote seaweed as an ingredient in their products? _____

Why or why not? _____

5. What other names could these seaweed extracts be listed under?

6. In what way are seaweeds important economically? _____

7. Use the Internet and find three places where seaweeds are harvested and processed. _____



Practice

Use the list below to write the correct term for each definition on the line provided.

| | |
|--------------------|-------------------|
| algae | protists |
| blade | seaweeds |
| chlorophyll | stipe |
| emergent | submergent |
| holdfast | |

- _____ 1. stemlike part of a seaweed that holds its blades near the surface of the water
- _____ 2. leaflike area of a seaweed
- _____ 3. thickened, rootlike structure that attaches some seaweeds to the bottom
- _____ 4. rising up out of the water
- _____ 5. growing while covered with water
- _____ 6. primitive plants without roots, stems, and leaves; usually found in aquatic environments
- _____ 7. simple organisms whose cells are not specialized for different functions
- _____ 8. the group of marine algae large enough to be harvested for use as food and in industrial products
- _____ 9. green pigment found in plants that helps in photosynthesis



Practice

Match each definition with the correct term. Write the letter on the line provided.

- | | | |
|-------|--|----------------|
| _____ | 1. gelatinlike substance covering some seaweeds; used as a medium to grow bacteria and in canning meats | A. agar |
| _____ | 2. farming of the sea or ocean (also called <i>aquaculture</i>) | B. algin |
| _____ | 3. group of red algae | C. carrageenan |
| _____ | 4. group of brown algae | D. Chlorophyta |
| _____ | 5. seaweed extract used to keep substances suspended in solution; used in chocolate milk, toothpaste, and other products | E. mariculture |
| _____ | 6. seaweed extract that helps in absorbing large quantities of water; used in ice cream, frostings, and paints | F. Phaeophyta |
| _____ | 7. group of green algae | G. Rhodophyta |