

Algae and Algae pressing

Background information on Algae:

Although they do photosynthesis to gain energy, algae are not true plants. Most plants have roots, stems, and some form of vascular tissue (think of the veins in the leaves), algae do not. There are many different kinds of algae, but the large species we think of as “seaweeds” are divided into three major groups largely based on the colors of the pigments in their cells that help them photosynthesize. These three groups are the Chlorophyta (Green), Phaeophyta (Brown), and Rhodophyta (Red). The Chlorophytes are usually bright grass green and we believe them to be the ancestors to the majority of land plants present today since they share many characteristics including the same set of pigments. The Chlorophyta includes *Ulva*, or sea lettuce, and calcified *Halimeda*, which produces fine sand when the alga dies and the calcified parts are left behind. The Phaeophytes are brown because in addition to some chlorophyll, they contain brown fucoxanthin pigments. These algae include the famous giant kelps of cold waters. Finally, the Rhodophytes contain some chlorophyll and also reddish phycobilin pigments. If an alga has any pink to red hue it is most likely red algae. The red algae are the most diverse group; most seaweeds found around the world are reds. They include species like *Porphyra*, the well-known nori found wrapped around sushi.

Problems with Identification:

Although the color of the algae often indicates of its group, there are many exceptions. This is especially true of the diverse red (Rhodophyta) group. For instance some species of like *Gracilaria*, a red alga, are predominately olive green. One way to help distinguish red algae from brown or green algae is to see if the algae is the same color throughout or if the color of the algae grows lighter or darker from it's base to it's tip. A color change may indicate you have a red alga.

When identifying algae species from books and identification cards, remember that the color and morphology of one species of seaweed can vary widely. Algae may change growth patterns from upright and bushy to low-growing and encrusting based on wave patterns. The same species of algae growing in full sunlight will probably look different than algae growing in a shaded area. Algae may also look different depending on how much it is being eaten. Being aware of this natural variation will help your students identify species correctly. Thus, algae cannot always be correctly identified just by looking at pictures, encouraging your students to read the captions and text accompanying the pictures in books and on the ID cards will lead to more accurate identifications.

Algae as Food:

Algae are not only important as food and habitat for animals, and as oxygen producers, but are also a very important human food resource. Humans consume algae in fresh or dried forms, and in other foods where they are used to help thicken and smooth foods.

Products like alginate, carrageenan, and agar commonly seen as ingredients in many processed foods and in many cosmetics products. A fun homework assignment is to have your students visit a supermarket or corner store, and see how many products they can find that contain some form of algae. They may be very surprised by what they find out.

Pressing Algae:

Algae pressing is very similar to the techniques used to press flowers, and is used widely by scientists as a means of preserving algal specimens and observing their features. When first monitoring or surveying a site it can be useful to take and press one representative of each seaweed species you find. It can also be a fun art project to make a seaweed collage or picture by pressing different species together. Special apparatuses called plant presses can be used to press algae, but a stack of heavy books or concrete blocks piled on a flat surface will also work.

When you collect specimens, make sure to take an algae sample large enough to allow for easy identification. It is important to not take the portion of the algae that attaches to the ocean floor, the holdfast. Leaving the holdfast will allow the algae to re-grow, like when you cut grass. Practicing this collection technique is a way to both study and conserve the ecosystem.

How to Press Algae

1. Obtain a seaweed specimen, and blot mostly dry.
2. On heavy paper (e.g. cardstock, archival paper, watercolor paper, or half of a manila folder) carefully lay out your specimen, spreading out the parts carefully so that they are visible and flat.
 - a. Choose a specimen that is large enough to easily identify, but thin enough that when compressed into a two-dimensional shape it does not become a shapeless blob. Thus “bush-like” algae should be thinned (analogous to pruning) to one branch layer thick before pressing.
 - b. With delicate finely branched seaweeds you might first float the sample in a little water over your paper and then gently lift it out of the water or gently tilt the paper so the water runs off and sample stays behind. This technique helps to prevent the branches from crumpling together. You can also separate branches with a paintbrush or toothpick.
3. Label the paper with your name, the date, the identity of the seaweed, and the location and habitat where it was collected.
4. Place a sheet of waxed paper over the seaweed (crumpling the wax paper and then smoothing it out over the seaweed can prevent sticking of the two).
5. Place your prepared specimen on top of some newspaper on a flat surface, or within a plant press. Cover the specimen with more newspaper, and enclose in the press or pile flat, heavy objects on top.
6. You can press multiple specimens within a press; just layer them between layers of newspaper or blotter paper.

7. Check your specimen every other day until it is pressed and dry. It may be necessary to change the newspaper if it gets very wet to prevent mold growth.
8. Remove the pressed specimen from the press and carefully peel off the waxed paper. If the specimen comes loose from the paper you pressed it onto, you can secure it with a small drop of glue.

Seaweed Parts:

While pressing your seaweed you may have noticed that it has parts similar to those of a plant. Because seaweeds are different from plants, their parts have different names. The leafy parts of seaweeds are called **blades**. They are not leaves because they do not have veins like the leaves of true plants. Most seaweeds do not have plant roots that enter the substrate and absorb water and nutrients. They gain what they need directly from the surrounding water. Many seaweeds have a structure that acts like roots, allowing them to remain fastened to the bottom. This structure is called a **holdfast**. Some seaweeds have a stem-like structure connecting the holdfast to the blades. This is not a true stem because it does not have any vascular tissue in it, and is called a **stipe**. The entire body of the seaweed is called the **thallus**. You can label the parts of the seaweed on your pressed specimen.