**MARINE ALGAE LAB**

Marine algae vary in size from giant kelps (macroalgae) to unicellular microscopic forms (microalgae, also known as phytoplankton). In this lab you will examine and observe examples from the major groups of macroalgae, or seaweeds.

**Objectives:**
- To learn how to classify some photosynthetic organisms of the sea (macroalgae)
- To understand photosynthesis and the pigments that marine organisms use to capture light
- To understand the relationship between morphology (shape and characteristics) and lifestyle
- To do a good drawing of a specimen with labels!

**Station 1: Seaweed diversity**

*(Your text, lecture notes, ID guides, and instructor will be helpful for these questions)*

1. For each of the following types of algae name the kingdom and phylum, and list two characteristics (one should be the types of pigments found in the group).

<table>
<thead>
<tr>
<th>Algae Type</th>
<th>Kingdom</th>
<th>Phylum</th>
<th>Photosynthetic pigments used</th>
<th>One other major characteristic</th>
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<tbody>
<tr>
<td><strong>Green Algae</strong></td>
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<td><strong>Brown Algae</strong></td>
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<tr>
<td><strong>Red Algae</strong></td>
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On a separate piece of paper:
2. Choose two specimens of green algae (if possible) and draw them carefully, paying attention to detail. Key them out using the dichotomous key, and the identification books available. Key them to Phylum and to genus/species if possible (using the books). Label your drawing and point out AT LEAST 2 important structures (holdfast, stipe, blade, pneumatocyst). What type(s) of pigments would you find in this specimen? Don't forget to add a scale bar to your drawing! Write some natural history notes for these organisms: where do they live (depth/range), what is one natural history note you have learned about it?

3. Draw TWO specimens of brown algae, and draw them carefully, paying attention to detail. Key them out using the dichotomous key, and the identification books available. Key them to Phylum and to genus/species if possible (using the books). Label your drawings with the correct phylum name and label all of the structures that you can identify (holdfast, stipe, blade, pneumatocyst). Remember: Not every specimen will have all of the thallus structures. What pigment(s) would you find in these algae? Don't forget those scale bars! Write some natural history notes for these organisms: where do they live (depth/range), what is one natural history note you have learned about it?

4. Draw TWO specimens of red algae and draw them carefully, paying attention to detail. Key them out using the dichotomous key, and the identification books available. Key them to Phylum and to genus/species if possible (using the books). Label your drawings with the correct phylum name and label all of the structures that you can identify (holdfast, stipe, blade, pneumatocyst). Remember: Not every specimen will have all of the thallus structures. What pigment(s) would you find in these algae? Don't forget those scale bars! Write some natural history notes for these organisms: where do they live (depth/range), what is one natural history note you have learned about it?

Station 2: Form and function
At this station you will find both live and pressed specimens of local seaweeds and samples of pure cultures of microscopic algae. The pressed specimens are rather fragile, so please handle them carefully.

1. On a separate piece of paper, draw two seaweeds that have different morphologies, or shapes. Concentrate on parts of the thallus—stipe, blade, holdfast, pneumatocyst—that you can identify in your specimens. Note that not all seaweeds have all these thallus parts. Make sure that each of your drawings is labeled with either the seaweed's scientific or common name, a scale bar, and where in the intertidal (low, mid, high) the alga lives.

2. Now, compare the morphologies of your two specimens. What structures do they share? What is different? Can you determine how a common structure is modified to look different in each of your specimens? How do you think these differences in thallus shape and size affect where the organisms live? Does a particular thallus look robust or delicate? What does the color of each specimen tell you about where it lives?
Station 3: Living in the sea

At this station you will observe the response of living cells of a red alga, *Polysiphonia*, to changes in salinity. Question to think about: How does cell shape change when salinity changes? Think back to the material we covered on osmosis and salt regulation.

Do this on a separate paper

1. **Hypothesis:** state what you think will happen when the cells are exposed to
   a) saltier water and
   b) less salty water

2. Make and explain **three drawings:** Look through the microscopes at the back of the room. Draw what you see for each of the preparations: ‘normal’, distilled (fresh) water, and hyper-saline water, focusing on the individual cells (the rectangular shaped boxes). You should see the reddish brownish chloroplasts inside the cells. How do the shapes of the cells differ? Color? Arrangements of the chloroplasts?

Station 4: Economic importance

At this station you will find a variety of common consumer products that contain various seaweed derivatives.

1. Choose one of the products and identify the particular algal extract it contains. What do you think this algal extract adds to the product?
   Product:
   Algal derivative:
   Why do you think it is added to this product?

2. Examine the edible seaweeds that are available.
   (A) Which, if any, seaweeds have you eaten?
   (B) Did you like them?
   (C) Seaweeds are highly nutritious and low in fat and calories. Would you consider adding seaweeds to your diet? Why or why not?

3. Speculate on possible drawbacks to human uses of seaweeds.
   (A) How would other organisms be affected if we remove too much seaweed from the marine environment?
   (B) Can you think of any way(s) to mitigate damage to the marine environment while continuing to use seaweeds?