

Lab Activity: Macroalgae Form-Functional Classification

Developed by: Dr. Elizabeth Lacey, Stockton University

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Learning Objectives

By the end of this activity, students should be able to identify the major form-functional groups as per Steneck & Dethier (1994) and use this information to evaluate the characteristics for different macroalgae to succeed under various biotic and abiotic stressors.

Assessment Method

Students should be able to describe any of the form-functional groups via matching and use information from varied scenarios to predict either which form-functional group could/should be found or where a sample of macroalgae most likely originated (under which stressors). Students should also be able to describe limitations of this classification method (e.g., what nuances might be lost via this classification model).

Instructor Notes

Materials or supplies required: Macroalgae samples from one to two sites (can be collected by students if time permits, or as homework for students to bring to lab) Plastic baggies for sample collection. Waders if appropriate.

Equipment required: Hand lenses and Dissecting microscopes

Techniques required (those which are not taught during the activity but students must already have a working knowledge): Microscopy skills

Time required: ~2 hours (depending on number of samples)

Anticipated audience: 1) intro majors course **2) upper level majors course** 3) nonmajors course **4) graduate course** 5) outreach

1. Discuss the research paper and answers to pre-lab questions. Pre-lab questions can be collected for grading.
2. Provide ample samples for students to look through on an initial familiarity with form-functional groupings.
3. Choose one sample and 'key it out' to illustrate to students how a sample would be categorized as a particular form-functional group.
4. Have students work on other samples following the lab procedure. All drawings should be completed into their lab notebook. Reconvene entire class to go over form-functional groups and ensure correct answers.

5. Working in teams, each team should select two macroalgae with different form-functional groups and describe an environment where they would expect to find each group. These descriptions should be written on separate slips of paper and exchanged with other teams. Circulate amongst the groups and check the environmental characteristics. Some teams may have descriptions that are too ambiguous, direct them to additional details but let some ambiguity slide through as this will help them understand that more than one form-functional group can form in each environment. Teams will exchange and check each other's answers.

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Pre-lab Assignments

Name: _____

1. Rate each concept using the following key:

- 1 = I have never heard of it.
- 2 = I have heard of it but do not understand it.
- 3 = I think I understand it partially.
- 4 = I know and understand it.
- 5 = I can explain it to a friend.

- a. Form-functional groups _____
- b. Cortex/Corticated _____
- c. Medullar region _____
- d. Polysiphonous _____
- e. Laminar _____
- f. Thallus _____
- g. Disturbance _____

2. There are multiple approaches for classification of algal-dominated communities. Steneck with Dethier further developed a model which utilized characteristics such as thallus type in order to estimate disturbances. Read: Steneck, R.S. and Dethier, M.N. 1994. A functional group approach to the structure of algal-dominated communities. *Oikos* 69: 476-498.

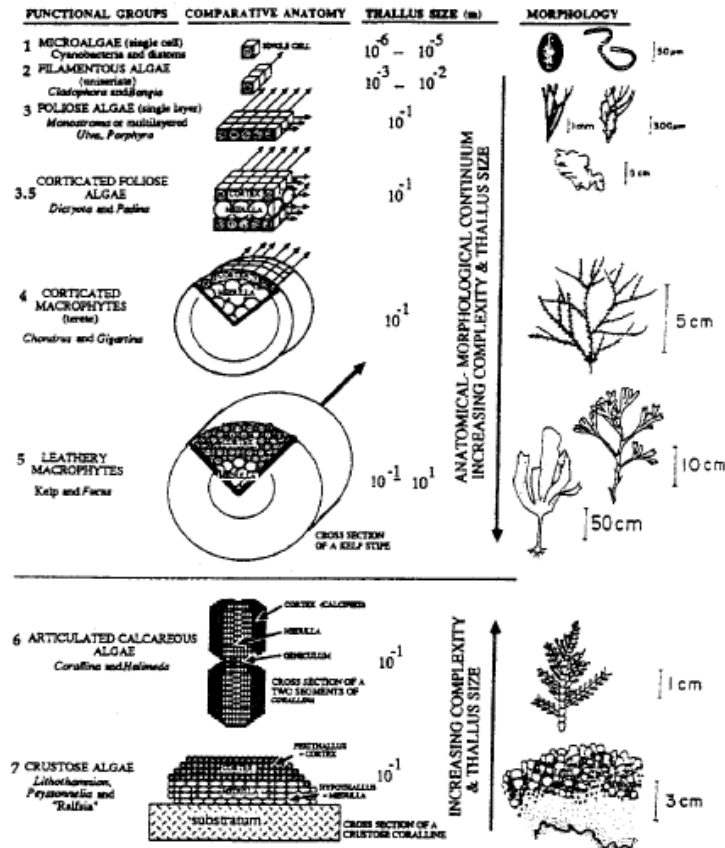
3. Answer the following questions after reading the paper:

- a. Which information is necessary about a macroalgae to determine the appropriate form-functional group?

- b. Describe potential disturbances that would impact form-functional group.
- c. Under which conditions might you expect to find leathery macrophyte form? Why?
- d. If a beach is sandy and there are not many hard attachment spots, what form of algae would you expect to find? Why?
- e. What are the limitations of this type of classification method? How could you improve this method?

Lab Procedure

We will be examining macroalgae samples in order to develop a regional form-functional model reflective of the Steneck and Dethier paper. By the end of this activity, you should be able to identify the major form-functional groups as per Steneck & Dethier and use this information to evaluate the characteristics necessary for different macroalgae to succeed under various biotic and abiotic stressors.



Steneck & Dethier (1984)

1. Based on the form-functional groups explained in Steneck & Dethier (1984), make a detailed drawing of each of the specimens collected by your instructor. Using the microscope and/or hand lens, examine and include details pertinent to the form-functional classification you have given the specimen. Cut cross sections of all samples and compare anatomy of samples, making drawings in your notebook.

2. Check your form-functional classification with your team and discuss any inconsistencies.

3. Your instructor will show you the general area from which the samples were collected on a map. Using the form-functional classifications and researching site characteristics for the area from which the samples were collected, describe the potential importance of abiotic and biotic stressors in forming this macroalgae community.

Consider the question of disturbance and productivity potential of each region.

Include information on distinct site characteristics that play a role in form-functional groups (e.g., canopy height, nearest neighbor, water depth, wave exposure, light, frost/freeze exposure, desiccation potential).

4. Working in teams, each team should select two macroalgae with different form-functional groups and describe an environment where they would expect to find each group. These descriptions should be written on separate slips of paper and exchanged with other teams. Each team will analyze the environment and determine which macroalgae they may expect to find. Teams will check each other's answers.

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Post-lab Activities

Name: _____

Answer the following questions:

1. How might the biota at a site change if there were high levels of herbivory? Describe and explain those predicted changes.

2. Which form-functional groups were not present today? Hypothesize why this was the case. Describe an experiment that would determine if one of the absence form-functional groups could exist if certain disturbance and productivity potentials were reached.

3. Describe an alternative method to classification by form-functional groups. What would be the advantages and disadvantages of this method?

4. Concept Check! Re-Rate each concept using the following key:

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a. Form-functional groups _____

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