BI 271 Lab: Evolutionary Ecology and Field Sampling Techniques at the Colby-Marston Bog

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Introduction

Evolutionary Ecology approaches the study of ecology by considering the evolutionary pressures on an organism created by abiotic and biotic interactions. Through the study of evolutionary ecology, we are able to learn about how the environment and interactions with other species have shaped the the natural history characteristics of a species. Specifically, today we will talk about adaptations that many plant species have developed in response to hostile growing conditions that are present in locations like Kettlehole Bogs. Your instructor will introduce the structure and features of the Colby-Marston Bog and then lead a tour of the bog, highlighting many interesting plant species that are adapted to live in the bog.

After an introduction to the study system, we will discuss how to approach a basic characterization of species composition. You will complete a short assignment related to this discussion.

Objectives

- Learn about natural history of a unique local community type
- Identification of plant species and their evolutionary adaptations to the bog environment
- Introduce study design and replication
- Introduce common plant sampling methods and highlight repercussions of different sampling strategies

Common names for some of the species you may be learning about in today's lab:

Black Spruce
Bladderwort
Bog Laurel
Bog Rosemary
Dwarf Mistletoe
Labrador Tea
Large-leaf Cranberry
Leatherleaf
Old Man's Beard
Pitcher Plant
Sheep Laurel
Small-leaf Cranberry
Sphagnum Moss
Sundew
Tamarack
Virginia Chain Fern

Bog pH in context; pH refresher

The bog is a highly acidic system because *Sphagnum* moss performs an ion exchange with the bog water. As *Sphagnum* grows, it removes cations (calcium, potassium, magnesium, etc.) from the water and releases hydrogen ions. Remember that pH is a measure of the concentration of H+ and OH- ions; acidic systems have lots of free H+ ions, and basic systems have lots of free OH- ions. As the *Sphagnum* releases hydrogen ions, it makes the water increasingly acidic. This low-nutrient, high-acidity environment is inhospitable to most other plants. Other plants are only able to live in the bog because they: 1. Can use water very efficiently, reducing their need to process the harsh, acidic water, and/or 2. Can obtain nutrients from other sources (carnivory, parasitism, nitrogen-fixation).

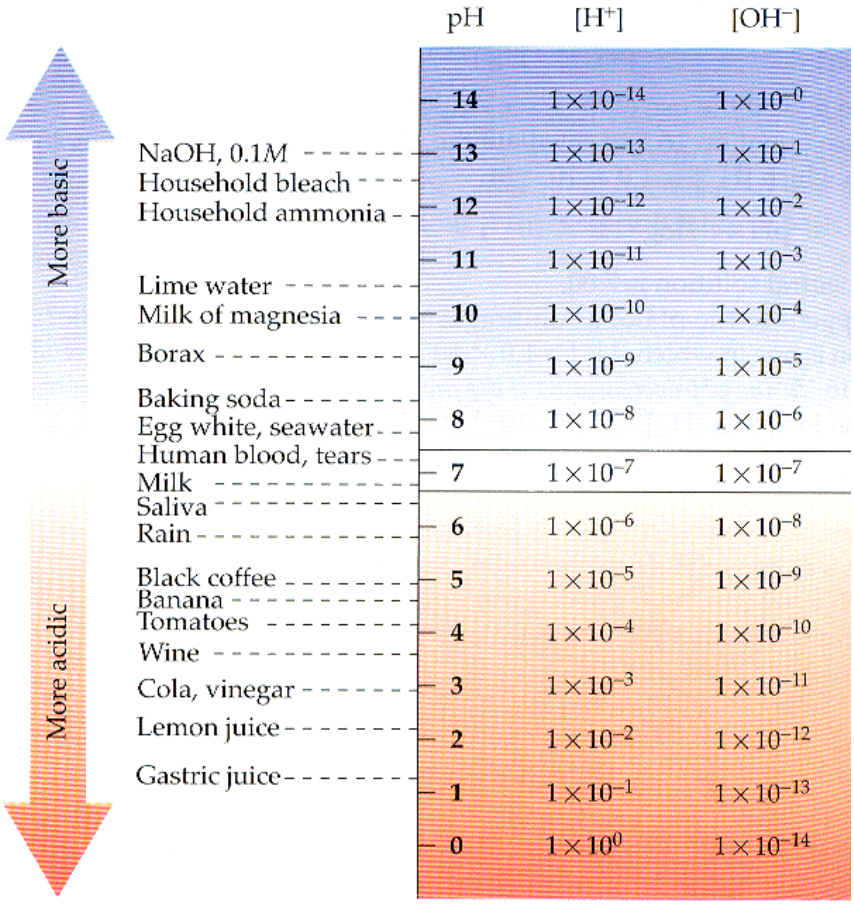

Figure 1. Reference pH values (Source: http://bouman.chem.georgetown.edu)

Look at the figure above. How does the pH of the bog compare to household items? Remember that pH is measured on a logarithmic scale.

Assignment

Based on today's discussion, describe an effective sampling strategy for characterizing the plant species composition of the bog. Be sure to describe the general methods (transects? quadrats?), how you will choose your sample sites, and how many replicate samples you will conduct. You may include figures (drawings, diagrams) to help explain your methods. Your assignment should be about one page and should either be uploaded to Moodle prior to lab next week or a hard copy can be passed in at the start of lab next week.