

LABORATORY 9: LICHEN DIVERSITY

Today's lab will allow you to explore photobiont diversity in lichens and see photomorphs!

Part 1. Photobionts

To familiarize yourself with photobionts, look at the two prepared slides on the lab bench on the side of the room. Both of these slides are cross sections through a lichen thallus.

A. *Physcia*. This is a genus we looked at last week in lab and has a single green algal symbiont in the genus *Trebouxia*. **This is review.**

B. *Peltigera aphthosa*. Some species in this genus contain cephalodia which are gall-like structures. This *Peltigera* contains two symbionts (e.g., a green algal and a cyanobacterium). Can you tell in what part of the lichen thallus you see green algae and which part you see cyanobacteria? Think about why the lichen might concentrate the cyanobacteria in a specialized structure on its thallus (i.e., what function might the cyanobacteria do that the green algae cannot? **Answer the questions and diagram a cephalodium below.**



Now let's have you start exploring lichens for their photobiont(s) and other traits by looking at fresh material. You do not need to explore these lichens in order. To look at the photobionts, make a cross section of the lichen thallus. If you don't make a very thin section, you can take your finger or a pencil eraser and squash the thallus between the slide and the coverslip and move it side-to-side. Start by looking at the organization of the thallus (i.e., where are the photobionts – top, bottom, in a specialized structure?) before you make a squash mount. All of the material available to section will be in the back of the room.

C. *Stereocaulon*. This genus is characterized by the presence of two photobionts, and external cephalodia near the base of the thallus. The green algal photobiont in this group should be *Asterochloris*, which is characterized by a star shaped chloroplast – which you may be able to see. What are the other black structures at the top of the pseudopodetia (stalks) and how can you confirm your hypothesis? Looking at this lichen, do you think it reproduces sexually, asexually, or both? **Answer the questions and sketch and describe the photobionts on the next page.**

Stereocaulon (cont.)



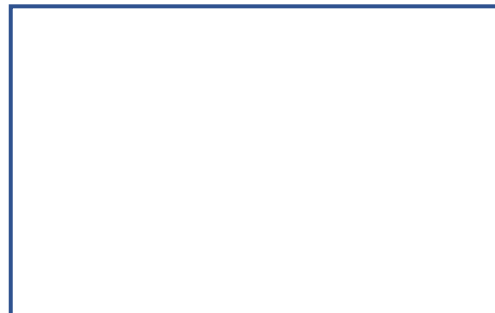
D. *Peltigera*. This genus can have a variety of different photobionts. It can have only green algae, it can have only cyanobacteria, or it can have both green algae and cyanobacteria. Which photobionts are in the lichen available to you? **Sketch and describe the photobiont below.** Do you see other structures (e.g., apothecia, hairs, rhizines?) on this lichen, if so where?



E. *Roccella* sp. This fungus associates with a single photobiont. Is this photobiont unicellular or multicellular? Is there anything unique about the color of this photobiont? What might be giving this alga this color? **Sketch and describe the photobiont below.** Next to *Roccella*, there are some local free-living *Trentepohlia* compare their morphology to the photobionts in *Roccella*.



F. *Ricasolia virens*. This species is primarily lichenized with one photobiont and forms shrubby outgrowth with another. The latter association starts out as an internal cluster (cephalodia) and then becomes erumpent! **DEMO ONLY**



G. *Sticta ainoae*. Here you can see a photomorph. Looking at this specimen, what do you think a photomorph is? **DEMO ONLY**



Part 2. Fieldtrip

Dr. Goffinet and Zach will take you on a brief walk around campus to the goal will be to collect some local lichens that you can explore in greater detail in future labs. You will have hand lenses which you should use to look at lichens.
