**LAB**: Nonvascular Plants (Bryophytes) & Charophytes

►**Overview**

The alga-like plant *Spirogyra* (**Phylum Charophyta**) was once lumped in a supergroup known as **green algae**, along with the Chlorophytes (*Ulva, Volvox, Chlamydomonas*, etc.,). However, recent molecular data show that Charophytes are more closely related to land plants.

* **Charophytes are not LAND PLANTS**

**Bryophytes** include the familiar **mosses** (*Phylum Bryophyta*) plus two other phyla: the **liverworts** (*P. Hepatophyta*) and **hornworts** (*P. Anthocerophyta*).

* These plants lack any clearly differentiated tissues to transport water, nutrients and metabolites around the plant body. Although this severely limits their size, **nonvascular plants** still dominate some habitats, particularly moist temperate or cold environments. Root-like **rhizoids** provide anchorage but do not conduct water. Mosses absorb water like sponges, but can also dry out and become dormant.

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| *Marchantia* (mar-KANT-ia) is a representative genus in phylum ***Hepatophyta*** (liverworts). It grows by producing a horizontal **thallus** (flattened body). Umbrella-shaped antheridia and palm tree-like archegonia are borne on stalks. | *marchantia.jpg* |
| *Sphagnum*, in phylum Bryophyta, is an ecologically important wetland moss. It grows in peat bogs, which are very acidic, so organic matter decays slowly. *Sphagnum* phyllids contain both photosynthetic cells and water storage cells; the latter retain their water storage capacity even when dead. | *moss.jpg* |

1 Four traits shared by Charophytes and land plants are

1. **Phragmoplasts** (vesicles involved in forming new cell walls between recently divided cells)
2. **photorespiratory enzymes** in organelles called **peroxisomes**,
3. Similar structure in flagellated sperm and
4. Circular arrays of proteins in their plasma membranes.

**Pre Lab:**

**Define**

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| **Rhizoids**: Similar to: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in other plants**Phyllids**Similar to: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in other plants**Seta** Similar to: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in other plants**Sporangium capsule**. Similar to: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in other plants |

**Question**: Why can we not just call them roots, leaves, and stems?

**Lab:**

►Station 1: Draw a single piece of moss

 1. Obtain a clump of moss, isolate a single individual from the clump using forceps, and examine it under the dissecting scope.

2. Carefully draw the plant, labeling the following structures: **rhizoids**, **phyllids**, **seta** and **sporangium capsule**.

* Draw at 1X

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►Station 2: Water storage in Sphagnum, a moss



► Station 3: Phylum Charophyta

1. The filamentous green alga *Spirogyra* probably evolved from a unicellular organism. Filaments consist of many cells. Asexual reproduction in *Spirogyra* is by **mitosis**. Sexual reproduction is achieved through **conjugation,** in which nuclei fuse to form a zygote after nuclei are exchanged between cells of adjacent filaments connected by a tube. Observe fresh material of *Spirogyra* under the compound microscope at 40X, 100X and 400X. Draw a specimen undergoing conjugation. Marvel at its beauty!
2. Draw at 400X

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► Post Lab Questions

**Charophyta**:

What are the name and function of the green structures inside the cells?

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| --- | --- |
| **Name** | **Function** |
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Why is the genus named *Spirogyra*?

Why aren’t charophytes considered “true plants”?

What does it mean to be an ancestral plant?

How can they get away with not being vascular?

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| --- | --- |
| **Where they live** | **Shape** |
|  |  |

**Bryophyta**:

What are these commonly known as?

Where do they live?

How can they get away with not being vascular?

|  |  |
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| **Where they live** | **Shape** |
|  |  |

How do they hold water?

How do they reproduce?