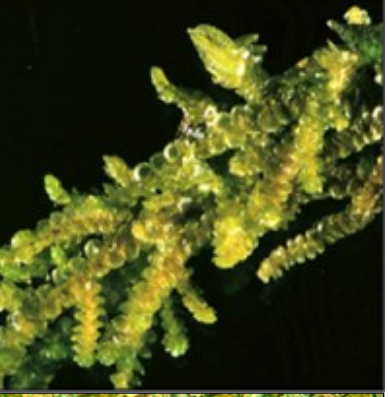

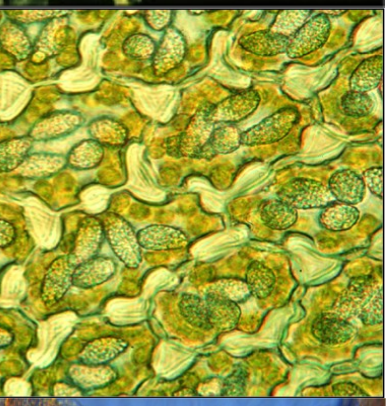

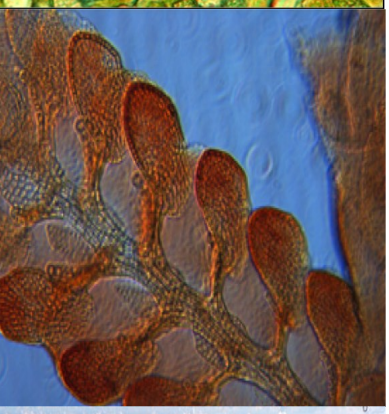

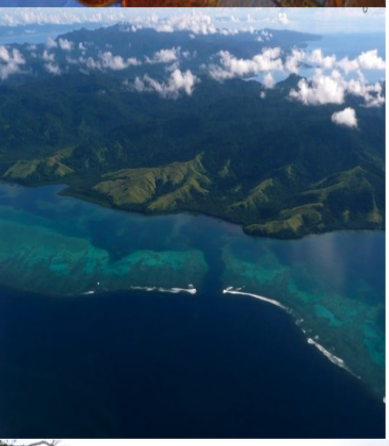

Moss & Liverwort Terrarium

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Moss and Liverwort Terrarium

One of the simplest ways of getting students interested and involved in horticulture (gardening, agriculture, cultivation, etc.) is to have them create their own project and do all of the work themselves. Making mini greenhouses, or terrariums, is simple and fun because there is no right or wrong way to build one as long as you follow a few simple rules. This gives students a sense of ownership over a project and the responsibility of caring for a live organism on a daily basis.

Mosses, liverworts, and hornworts are collectively known as bryophytes and often referred to as miniature forests because of their small size and various growth patterns. Despite their small size, bryophytes have a strong influence on species diversity and ecosystem processes. In fact, because bryophytes are so small they respond rapidly to environmental change. Large plants and animals can withstand, to a certain degree, environmental change. Bryophytes can acquire great biomass under the canopy of forests, help regulate soil moisture, sequester nutrients, and provide a habitat for small invertebrates and fungi.

Mosses and liverworts can be grown together or separately. As long as they are in a closed humid environment, near a window or under fluorescent light, your moss should grow well with little maintenance. Liverworts, on the other hand, grow very slowly and require some work. Begin by choosing a container to construct your mini greenhouse. There are a number of containers you can choose from, such as a plastic soda bottle cut in half (one half will function as the lid, while the other will form the pot or base), you may also use small plastic cups and cover them with a Petri plate, or use two cups (one as the pot and the other as the lid). If you prefer not to use plastic, then you may use any jar with a lid, a Mason jar, or an Erlenmeyer flask. Below is an image of an Erlenmeyer flask, on its side, used as a terrarium.

Erlenmeyer Flask or Jar Greenhouse

Materials

- 1,000mL – 3,000mL Erlenmeyer flask with accompanying bung
- Fish tank filter charcoal
- Potting soil
- Small rocks or pebbles
- Moss
- Distilled water
- Chemistry spoon or spatula

Setup

Fill the bottom of your chosen terrarium with rocks or pebbles until a layer is formed that is approximately 1 -2 cm thick. A layer of charcoal, approximately 1cm thick, should then be added onto the rock layer. This will help reduce mold and odor. Use a chemistry spoon or spatula to form a 1-2 cm layer of soil atop the charcoal. Fish tank filter charcoal can be purchased at any pet supply store or department store that carries products and accessories for fresh water aquariums. Feel free to create hills and add colorful stones to make your terrarium truly your own creation. At this point you can add your moss. You can find moss growing in moist areas or purchase moss at a biological supply store, a local nursery, or online from a moss nursery (e.g. mountainmoss.com). Lightly water the moss with distilled water only. Be cautious not to flood the moss or create areas of standing water above the pebbles. When you are finished, seal the flask with the bung and display your terrarium in a shady area. Re-water your terrarium sparingly every couple of weeks.

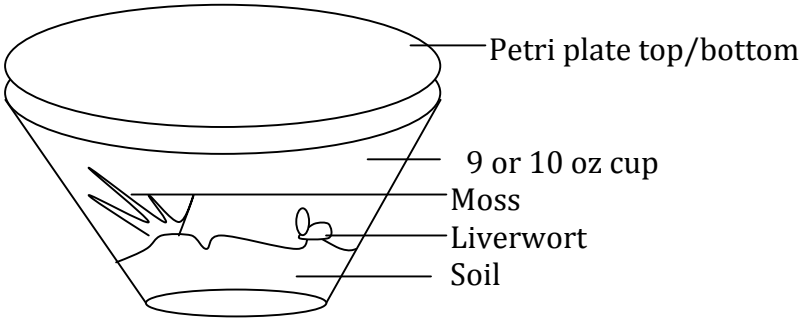
Plastic Bottle or Cup Greenhouse

Materials

- Potting soil with a high content of sphagnum or peat moss
- 9 oz clear plastic cup without rolled rim
- 10 oz clear plastic cup with or without rolled rim
- 1 Petri dish (top to be used as the lid for the 9 oz cup and bottom can be used as the lid for the 10 oz cup, or double up on cups)
- Living moss and liverwort

Setup

Fill your plastic cup with approximately 3.5 cm of moistened potting soil. Do not pack the soil to the bottom of your container, but rather leave it loose and let it settle to the bottom naturally. Place a 1 cm x 1 cm piece of liverwort thallus on one side of the cup and about an equal size of moss on the opposite side of the cup giving each plant plenty of space to flourish. The internal environment should be moist, but not soggy, and it should not require frequent watering.



Experimental Methods

Following the setup methods described above for each type of greenhouse, create 3 terrariums using the same type of moss and liverwort. Water one terrarium with distilled water, the second terrarium with tap water, and a third terrarium with nutrient enriched tap water. Be sure all other factors are the same. Observe the differences in the plant response to the stimuli. Feel free to experiment with other stimuli such as light amount, light intensity, water amount, soil type (rock, wood, glass etc.), or whatever neat factors you can think of that would make this activity more challenging for students. You can wrap each terrarium in different colors of cellophane and observe changes in plant growth. Chlorophyll best absorbs red and blue light, so these wavelengths will stimulate plant growth.

Discussion

- Compare the similarities and differences between the terrariums you've built.
- Which do you think would work better and why? Do you notice any differences in the time it takes each specimen to grow?
- Differences can be explained by a number of factors. How would you explain these noticeable differences?
- Think about how climate change might introduce some similar stimuli into the habitats where these plants grow.
- What are the observable differences in the plants?
- How did colony density change?
- What about color?
- When changing the amount of added water did you notice any difference in the presence of sporophytes?

Content developed by Charlie DeLavoi and Justyna Drag with additional resources provided by Matthew von Konrat.