Name:_____

Lab: Lichens & Air Quality

Background: Lichens are unusual creatures. Lichen is not a single organism the way most other living things are, but rather it is a combination of two organisms that live together intimately. Most of the lichen is composed of fungal filaments, but living among the filaments are algal cells, usually from a green alga or a cyanobacterium. In many cases the fungus and the alga which together make the lichen may each be found living in nature without its partner, but many other lichens include a fungus which cannot survive on its own -- it has become dependent on its algal partner for survival. In all cases though, the appearance of the fungus in the lichen is quite different from its morphology as a separately growing individual. The true identity of lichens as symbiotic associations of two different organisms was first proposed by Beatrix Potter, who is best remembered for her children's books about Peter Rabbit. In addition to her books, she spent time studying and drawing lichens. Her illustrations are still appreciated for their detailed and accurate portrayal of these bizarre organisms. In combination, the lichen symbionts produce a growth form that is unlike either fungi or algae growing alone. Three growth forms are easy to recognize:



Crustose (above left): crust-like, adhering tightly to the substrate by their entire lower surface.
Foliose (above center): leaf-like with a distinct upper and lower surface.
Fruticose (above right): shrub-like, pendulous strands or hollow stalks called podetia.

Lichen are very sensitive to air quality, and even slightly increased levels of ozone and sulfur dioxides will reduce their metabolic activity. In fact, each of the three major types of lichen listed above is sensitive to differing concentrations of air pollutants. Type 3, fruticose, is the most sensitive to air quality. In the cases of highly polluted air or air regularly exposed to pollutants, the fruticose will NOT be present. Likewise, crustose is the most resistant to pollutants. It can often be found in areas with elevated levels of pollutants. Finally, foliose is moderately tolerant of air pollutants. Presence of each of these lichen in varying numbers and concentrations will provide substantial relative indicators of air quality.

Prelab Questions:

1. What is a lichen?

2. What type of symbiotic relationship does a lichen demonstrate?

3. Identify two pollutants that lichens are sensitive to.

4. Relate lichens to air quality.

Procedure:
Identify four trees in the GH wetland forest and determine the lichen coverage. Different colors of lichen indicate different species. Use this information to make assumptions about the air quality in the area.

Data:

	Tree Species	1.	2.	3.	4.
Crustose	**% coverage**				
	# species				
Foliose	**% coverage**				
	# species				
Fruticose	**% coverage**				
	# species				

Analysis:
5. What species of tree usually has more lichen growing on them?

6. What species did you notice had little to no lichen growing on them?

7. Why do you think lichen grows on some species more than others?

8. Calculate the average percent coverage for each lichen type on the trees you observed.

9. Based on your data, how would you assess the air quality at the GH?

10. Identify two potential sources of air pollution at GH.