# Lichens as Bioindicators

*Field Biology*

We have talked briefly about lichens and how they are important to the environment. They are the main source of food for many animals during the winter and a crucial part of the foodweb. Lichens are also good indicators of air quality. It has been found that they are sensitive to many common pollutants that are released into the air. These pollutants can be a result of natural sources such as volcanoes, but the main source is result of human activities. These include automobile exhaust, the burning of fossil fuels and industrial processes.

You have already collected data that indicates the abundance of each of several species of lichens. These species have different tolerances of pollution. Answer the following questions, using your data when appropriate.

1. As stated above lichens are indicators of air quality. Certain species are more sensitive to common pollutants than others. What do you think it means if you find only highly tolerant species on your sample?

2. What types of lichens do you think you will find on your sample - high tolerance lichens or low tolerance lichens? Why?

3. How many different types of lichens were on your branches? What do think influences the type and amount of lichens present? Why?

4. What two species of lichen on your branches had the largest coverage? What two species of lichen had the smallest coverage?

5. Working with a partner, come up with a detailed **methodology** for determining the air quality of Crescent Valley. Use your data and the tolerance information below to come up with your methods. This should take the form of a detailed, step-by-step system that combines your data with the tolerance information to come up with one overall rating for air quality. Your methodology should be specific enough that if you gave your data and your methodology to anyone else, they would come up with the exact same result as you would.

| Lichen Species | Tolerance Description | Tolerance Rating (1 = very tolerant; 5 = very sensitive) |
|---|---|---|
| *Ramalina farinacea* | High tolerance | 1 |
| *Ramalina menziesii* | Low tolerance | 4 |
| *Evernia prunastri* | High tolerance | 1 |
| *Parmelia sulcata* | High tolerance | 1 |
| *Usnea subfloridana* | Medium tolerance | 3 |
| *Hypgymnia tubulosa* | High tolerance | 1 |
| *Lobaria pulmonaria* | Low tolerance | 5 |

6. According to your data and your methodology, what is the air quality of Crescent Valley? Do think this is an accurate representation of the real air quality?

7. If you were to collect and analyze data using similar methods but in a very polluted location – for example, near a major freeway – what do you think you would see? Create a hypothetical data table showing the possible abundance of the species we have been studying.