

Lesson 3: Lichen Field Transect and Research Question*

This lesson will be conducted by groups of 3-4 students. It will require about 100 minutes to complete, not including establishing the belt transect (see separate protocol).

Objectives:

- *Students will be able to inventory lichen, moss and liverworts (cryptogams)*
- *Students will develop and investigate a research question*
- *Students will gather, analyze and present data*
- *Students will be able to identify common lichen*

Materials for each group:

- DBH or metric measuring tape
- Hand lens
- 2 Data sheets (double sided)
- Clipboard
- Pencil
- Pins with colored heads (or push pins)
- Compass
- 50m measuring tape
- Flagging
- Labels for 2 trees and 2 branches
- ID photos or guidebook
- Camera

Develop your research question:

While indoors, work with your group to develop a research question that you will investigate in the field. Examine the data that you will be collecting on your data sheet. What questions do you have about how these factors might affect the occurrence of lichen species? Brainstorm 3 possible questions here:

1)

2)

3)

Circle one question that you will investigate.

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Sample Field Procedure

(Note: Procedure may be altered by students who develop their own experiment.)

With your group of 3-4 students, sign out your materials. Each group will be assigned a belt transect 10-15 meters wide and 25-50 meters long. Within this area, you will monitor 2 trees of 10-30 cm DBH (see below) and 2 fallen branches of at least 3 cm in diameter. Select two different species of tree if possible. You will monitor the lichen (and moss or liverworts if desired) on your upper and lower tree transects.

1. Flag 2 trees that you want to monitor to answer your research question.
2. Using the diameter tape, measure the DBH, diameter at breast height, for the tree you are going to monitor and record on data sheet. DBH is measured at 1.37m (4.5 ft.) above ground level. (Note: diameter tape has one side that converts the circumference that you measure into diameter. If you do not have a diameter tape, measure the circumference and convert. (diameter = circumference/ π))
3. Upper Tree Transect. Continuing to hold the tape around the tree at DBH, wherever you see a lichen growing exactly at a cm mark along the tape, take a pin and carefully push one pin into the tree at that centimeter mark (0 cm, 1 cm, 2 cm etc.) around the upper edge of the diameter tape, until you have placed a pin at every cm interval with a cryptogam all the way around the tree.
4. On your data sheet, record the number of lichen/moss/liverwort “hits” for this tree transect. You have a hit if the pin is pushed into a lichen. Use your lichen identification photos to identify the species that are hit. Record the species names and the number of occurrences for a particular species on your data sheet.
5. Photograph the lichens that you hit if you cannot identify them in the field. Include in the photo the diameter tape and a small card with the tree number on it. You can refer to the photos and guidebooks indoors to assist you with difficult identifications.
6. Now you can remove the tape and pins. BE CAREFUL NOT TO DROP THE PINS!
7. Lower Tree Transect. Now, move the diameter tape down to a level that is .5m above ground level around the tree. Measure and record the DBH at this .5m level, but leave the tape in place, holding it snugly against the tree. Repeat steps 3-6 for the lower transect.
8. Repeat steps 3-6 for the next tree and 2 branches that you will monitor. For the branches, measure along the length of the branch instead of the diameter.
9. Record the other site information on your data sheet.
 - location
 - date
 - tree species
 - Investigators
 - tree or branch
 - distance from origin

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10. Using the 50m tape, measure and record the distance of your tree or branch from the start of the transect (origin) along the transect bearing.

11. Double check to make sure that you have completed your data sheet.

Back inside

12. Why might it be important to measure the location of the tree in the belt transect? Consider air pollution impacts, “edge effects or height effects.”

13. Confirm your identifications using the Hinds keys and resources in the classroom. How many different species did you identify?

_____ # of lichen sp. _____ # of moss sp. _____ # of liverwort species

14. Analyze your data. Do you notice any patterns in the species location or abundance (# of individual lichens belonging to a species)? For example, did you get more “hits” on the upper or lower tree transects. Were the species different? Were there differences between the trees and branches? Explain.

15. Refer back to the research question that you posed. Examine the data that you have collected relating to this question. Write up your findings in lab report format including your question or hypothesis, procedure, typed data table, graph of results, analysis and conclusion. Present your findings to the class.

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16. Summarize the findings of the other groups in your class:

Group 1

Group 2

Group 3

Group 4

Group 5

16. Reflection: What did you learn from this experience? What would you do differently next time?

*Sampling protocol adapted with permission from “Air pollution and epiphyte monitoring in Steward Park, Ithaca, NY” by Natalie Cleavitt, Cornell University.

Resource for Lichen Identification: Hinds, James W. and Hinds, Patricia L. The Macrolichens of New England, The New York Botanical Garden Press, 2007.

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