

Study Questions #6 and Quiz Questions #5
The Fungal Kingdom -- Fall 2006

Responses are due and will be discussed on Wednesday 15 November during lecture / workshop.

Quiz Questions

1. Refer to the graphs on p 127 of *Lichen Biology* and answer the following questions in your own words using support from the graphs:
 - a) Which lichen had the highest N-fixation rate? Why?
 - b) What was the influence of thallus moisture content?
 - c) What were the influences of temperature and solar radiation?
 - d) Explain the overall trends in N-fixation and why they occurred in the observed pattern. (10 pt)

2. Whether you believe in common mycorrhizal networks (CMNs) or not, discussion of the issue would benefit from having more data. Select an aspect of CMNs that you feel is inadequately understood and outline an experiment that would provide data useful for increasing our understanding. Be sure to include:
 - A clearly stated hypothesis or question to be answered.
 - The rationale for your proposed experiment.
 - Your experimental design (conceptual level, be sure to include one or more suitable treatments and controls).
 - A description of the data that will be generated and how you will gather those data (your experimental methods).
 - Prediction of the outcome you would expect if your hypothesis is correct. (10 pt)

Study Questions

1. Lichens experience a wide variety of environmental conditions. What sort of physiological and morphological adaptations have they developed to thrive under these conditions? Outline how each adaptation serves the lichen.
2. You've been hired to determine the air pollution impact of a local coal-burning power plant using lichens. What pollutants might you look for? Briefly outline how you might conduct your study.
3. In previous programs, Dr. P.R. Przybylowicz has wowed the students by producing an elaborate version of the nitrogen cycle (a.k.a. "Paul's grand scheme"). The version presented to you in lecture is far less grand. To compensate for that, this question will give you the opportunity to construct your own grand scheme and allow you to appreciate more of the complexity of nitrogen cycling in the environment.
 - (a) Make a neatly labeled drawing (large enough to show everything clearly) of the nitrogen cycle, showing, at a minimum, the following:
 - Compartments (atmosphere, plants, soil)
 - Pools (N_2 , NH_4^+ , NO_2^- , NO_3^- , $-NH_2$ [biomass-N or soil organic N])
 - Processes (ammonification, de-nitrification, deposition/fallout, fixation, leaching, nitrification, soil retention/cation exchange)For the processes that are carried out by organisms, give the names of some of the specific ones involved (to genus level).
 - (b) Describe the roles that mycorrhizal fungi play in the nitrogen cycle, as you depicted it above.
4. Construct a dichotomous key to the following 15 mushroom species: *Hygrocybe conica* (= *Hygrophorus conicus*), *H. miniata*, *Hygrophorus bakerensis*, *H. eburneus*, *Hypholoma capnoides*, *Inocybe geophylla* var. *lilacina*, *Laccaria laccata*, *Lactarius deliciosus*, *L. rubrilacteus*, *Pleurocybella porrigens*, *Pleurotus ostreatus*, *Russula brevipes*, *R. emetica*, *R. rosacea/sanguinea*, *R. xerampelina*.