

Key for Quiz Questions #5
The Fungal Kingdom -- Fall 2006

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 (10 pt).

a) Which lichen had the highest N-fixation rate? Why? (3 pts)

Peltigera demonstrated the higher rate of N-fixation as shown in shaded bars in graph d where the rates of actylene reduction were significantly higher than Stereocaulon. The primary photobiont in Peltigera is a cyanobacteria, whereas the cyanobacteria in Stereocaulon are limited to cephalodia.

b) What was the influence of thallus moisture content? (2 pts)

Thallus moisture content was relatively constant throughout the experiment. Although it varied somewhat through the day and during the CO₂ assay, the moisture content was always high enough to permit photosynthesis. Thus, overall it did not have a significant effect (look at the MC for P. canina during the peak and second lowest level of ARA).

c) What were the influences of temperature and solar radiation? (2 pts)

The rates of both photosynthesis and N-fixation followed a diurnal pattern where both processes were highest when the available solar radiation (b) and temperatures (a) were highest.

d) Explain the overall trends in N-fixation and why they occurred in the observed pattern. (3 pts)

The rates of N-fixation were highest during the middle part of the days, when temperatures and available solar radiation were also highest. The correlation between N-fixation and photosynthesis would be expected since energy in the form of sugars is needed for N-fixation to occur. The correlation between N-fixation and temperature is stronger than the correlation with photosynthesis, since N-fixation, especially in Peltigera is occurring in the early morning hours when photosynthesis is at zero (especially 7/15-7/16) and during these times there is a strong correlation between temperature and N-fixation.

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: (2 pts each)

- 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.