Physical Sciences Department

School of Science and Mathematics

UPPER IOWA UNIVERSITY

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SOIL BIOTA: It's a Whole New World

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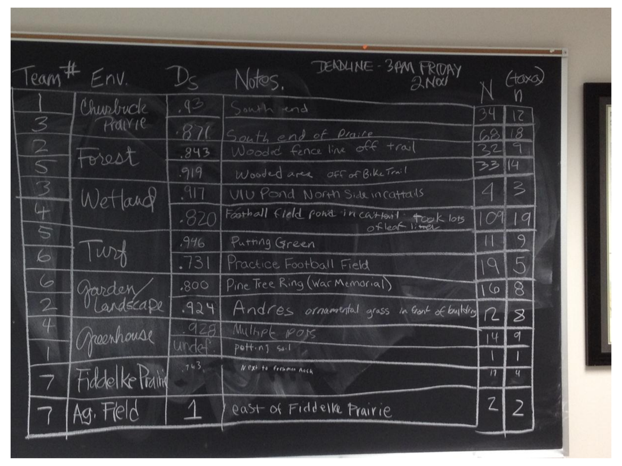
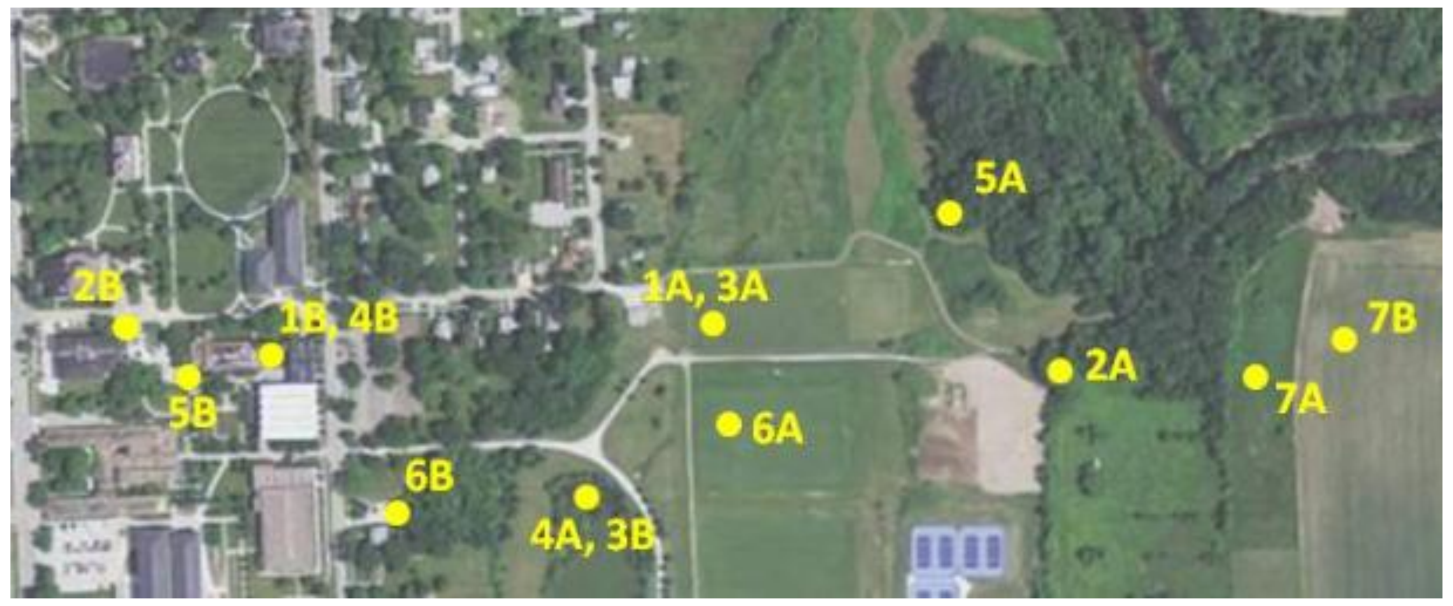


INTRODUCTION

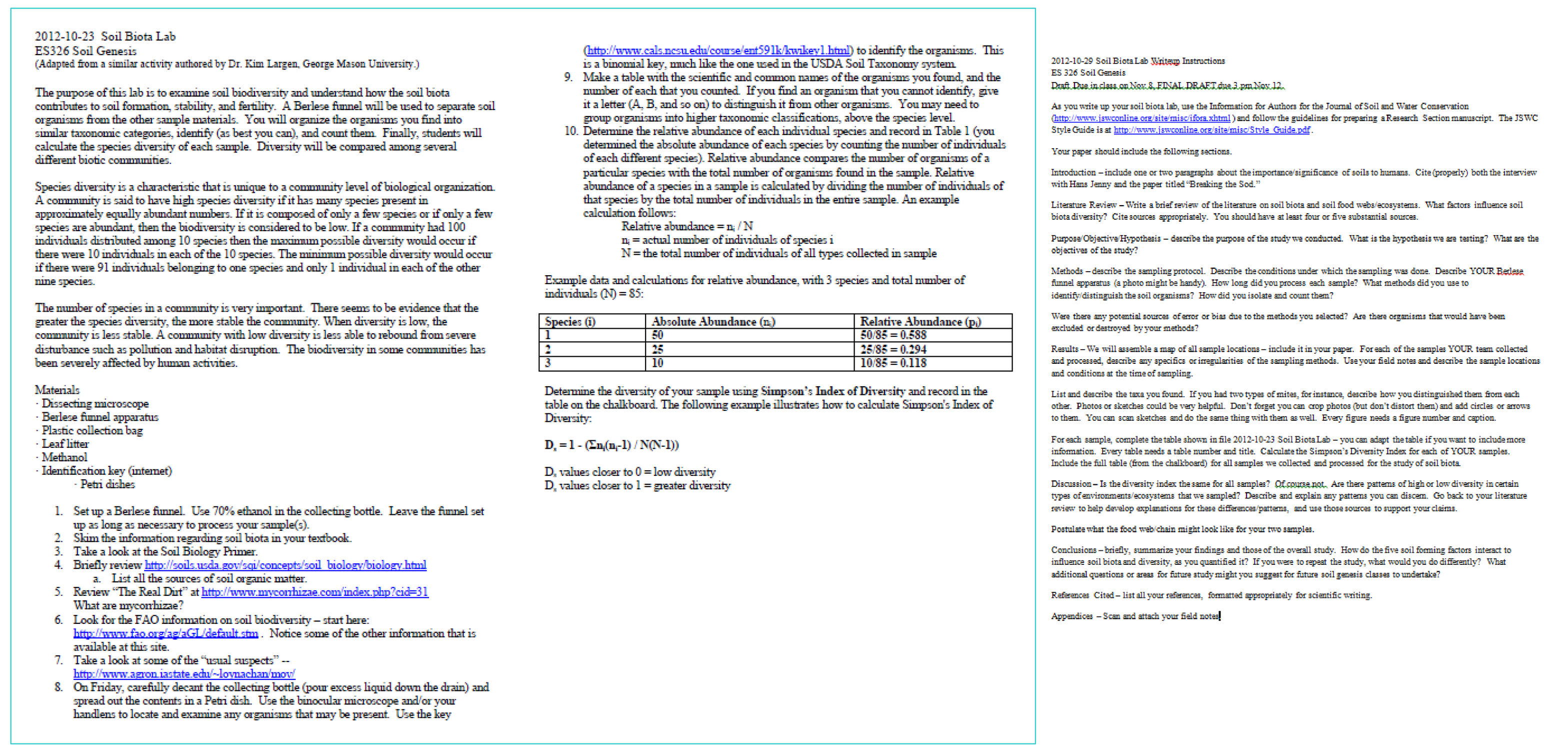
Encountering soil biota is an engaging and exciting activity for undergraduate students, most of whom have little or no experience with this topic. In general, I find that students have neither thought about nor encountered soil biota. They are universally surprised by the diversity and abundance of soil animals. We often find new organisms that permit modeling of curiosity and the research process.

In my upper division soil genesis class, I conduct a fairly extensive activity involving soil biota. The activity takes place over about a week, and requires two class or lab periods of 1.5 hours each. Student teams work independently during the time between those two class meetings. This class provides an opportunity to integrate students' knowledge of scientific methods, experimental design, biology and ecology. They also learn new skills or gain practice in sampling, taking microphotographs, and using dichotomous keys. In the textbook, soil biota is not addressed until Chapter 9. However, because I teach this class during an eight-week term beginning in mid-October and running through mid-December, we study soil biota early in the term.

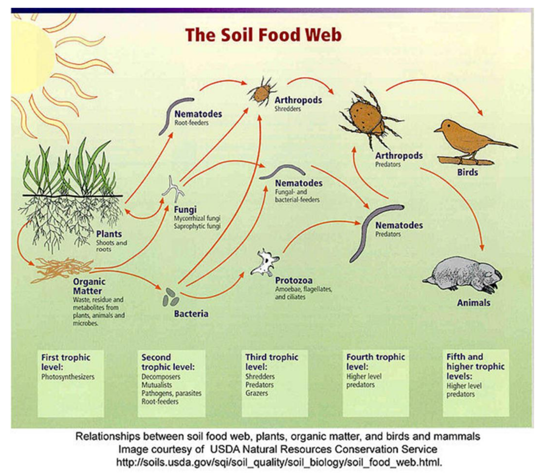
As a group, the class develops a hypothesis that diversity and abundance of soil animals will be related to the characteristics of the area that is sampled. Looking at the locations within walking distance of our lab—which include a small greenhouse, a constructed prairie, a woodland, a fairly natural wetland, a riparian corridor, a constructed pond, cultivated cropland, lawns and athletic playing fields—we order these according to how diverse and abundant a soil biota we expect to find.

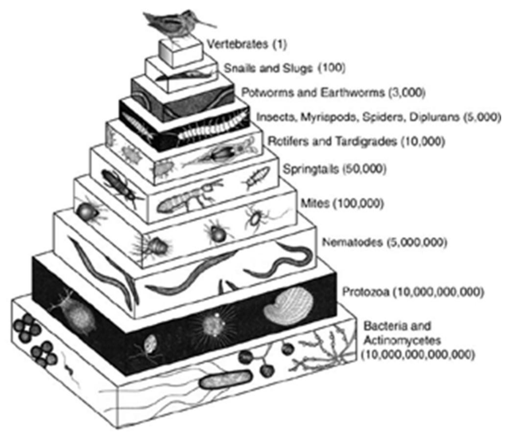


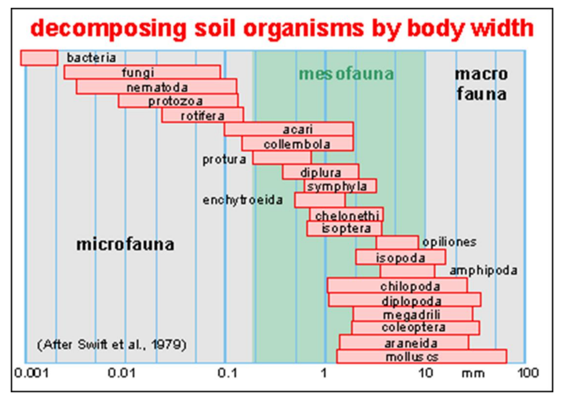
ASSIGNMENTS



PHOTOGRAPHS







SAMPLING AND PROCESSING

In teams of two, students collect samples at two assigned locations. Most locations are sampled by two teams.

Students sample leaf litter and the upper one or two centimeters of soil at each assigned location. They note the weather conditions, participants in the class, team members, soil sample numbers, and other items of interest during the sampling work.

Back in the lab, students construct a Berlese funnel from the available supplies. We use a killing jar filled with 70% ethanol to collect the soil animals. During the first lab period, they begin processing their first sample. Each sample should be processed for 24 hours. During the week, they monitor their samples and change to the second sample.

They can begin identifying organisms as soon as the first sample is completely processed. They use a binocular microscope to locate, identify and count the organisms. They compete to count the largest number of individuals and of different organisms in their samples. They calculate an index of diversity for their samples. Each team posts their results on the chalkboard.

Individual students write their own lab reports. They write about their own samples in detail, and use the class results as a background for comparison.

FUTURE ADDITIONS

Use of a scale in the photographs would be helpful. I would like to add a component that involves processing to retrieve nematodes.

REFERENCES

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