

Inquiry Activity on Biodiversity: Karen Kamm

- I. Title: Protozoan Diversity
- II. Lesson summary: Students will examine samples of water from a variety of habitats looking for protozoans.
- III. Goal: The students will observe, record data and analyze how habitat location affects the diversity of protozoans.
- IV. Duration: Four fifty minute class periods. Students will observe samples of pond water through microscopes for two days. The third day the class will comply their data in the form of a chart and graph the information obtained. The fourth day will be analysis and discussion of data collected.
- V. Specific Learning Objectives
Content goal: Protozoans exist in many different habitats

Process goal: Students will observe samples of water and show evidence of their findings of protozoans through written observations and drawings. Through class discussions, students will make conclusions.

Standards: These learning objectives align with our district curriculum of Honors Zoology.
The student will demonstrate proper laboratory techniques.
The student will analyze the role of adaptation that allows the animal to survive in its environment.
- VI. Prerequisite Knowledge/Skills for Students
Use of microscope
Preparation of wet mount slide
Graphing Skills
Knowledge of 3 groups of protozoa – Ciliophora, Mastigophora, Sarcodina – how they move, what they feed on.
- VII. Although protozoans consist of only one cell, they nevertheless carry out all the functions of life. Protozoans were formally classified into 4 groups – sarcodines, ciliates, flagellates and parasitic sporozoans – on the basis of their modes of locomotion.
Questions to ask: How will you recognize what group your species belongs to? What characteristics will you look for to help you identify your specimens?
- VIII. Preparation for lesson:
Materials required:

Water samples such as pond water, drainage ditches, puddles at base of trees, soil samples incubated in pond water

Microscope

Pipettes

Glass slides & cover slips

Culture dishes

Quieting solution (optional)

Video microscope (optional)

Preparation of materials : none

Maintenance of organisms: none

- IX. Instructional Strategy: The lesson will be a lab activity when studying the protozoans in my Honors Zoology class.
1. Have students work individually with their own microscopes if possible.
Two students at a microscope can work also but often the protozoan is too quick and quieting solution may slow down some natural behaviors.
 2. Identify the location from which the water samples were obtained with a label on the culture dish.
 3. Have students prepare a wet mount slide and observe under the microscope.
 4. Do this with each of the water samples.
 5. Repeat 3 and 4 another time if time allows.
 6. Have students make sketches and notes on behavior for each protozoa type observed.
 7. Based on sketches and behavior, have students identify to what group the protozoan belongs.
 8. Record number of each type of protozoan observed –i.e. 10 paramecium, 30 euglena etc.
 9. Tabulate results as a class with a chart on the blackboard/overhead, listing water sample location and types and number of protozoans observed in each sample.
 10. Have students prepare a line graph:
Location of sample on x axis
Numbers along y axis
Use different color for Sarcodina, Mastigophora, Ciliophora
- X. Assessment:
1. Based on sketches, notes, graphs ask:
Which phyla were the most common in which samples?
Does location affect the diversity of protozoans?
How does your data support your conclusions?
 2. Students will turn in sketches, notes, graphs and conclusion questions.
- XI. Comments:
- Students were excited about what they seen. One student commented, “It’s amazing – these things (protozoans) do exist and in my backyard!” Students have

observed 7 different samples. In addition to the two types I brought in, the students collected their own samples. I had them fill out a detailed data sheet stating specific location, stagnant or feed by water source, collected deep or at surface, at edge or middle, light intensity etc. As with collecting their leaves for Capstone, it gave them ownership. I then gave copies of this information sheet to everyone to be analyzed as they made their observations. This was at the end of my unit on protozoans and they were able to recognize which phylum/subphylum they saw. We had looked at pictures of common protozoans, discussed behavior of the groups and had observed prepared cultures from a biological supply company. They interpreted their findings by compiling as a group, discussion and graphing. Their analysis and discussion was good because the lab came at the end of the unit. I will use this lab during the next school year. However, I plan to introduce the unit with this lab. I believe it will be more inquiry based because they will have no or little knowledge of characteristics and/or behavior of the group that will hopefully promote more discussion and critical analysis.