

Loretta Ingram
SUMMER 1999 COMMUTER INSTITUTE ON BIODIVERSITY
Institute Project

Pupil Profile: The students that I teach are a heterogeneous group of tenth graders with reading abilities ranging from seventh to eleventh grade. My students have different learning styles. As a result, the lessons and activities will be developed to meet their special needs. The school is in an urban area and many of the student population are first and second generation Americans. In this unit, the students will read aloud for oral/linguistics, they will have discussions and debates for social/interpersonal learning, they will develop and write reports and journals using verbal/linguistic strategies; also they will create models and participate in labs for visual/concrete sequential learning.

I am responsible for teaching the Regents Biology curriculum and that includes preparing and teaching all labs. I would like to expand my student's knowledge and appreciation for all living things.

This unit will be offered early in the school year. By the end of September, students will have had lessons explaining the importance of tools in biology, the cell theory, and an introduction to taxonomy. For two days, on Tuesday and Thursday, of each week the students will have an introduction to biodiversity beginning with the Kingdom Monera.

In order to motivate and inform my students on the topic of biodiversity as it pertains to microbes, I will use illustrations of the different types of bacteria and a large paper mache model of an E. coli.

Making Connections: My unit will address Major Understanding 6.1g in the "Living Environment" text. Relationships between organisms may be competitive or beneficial. Some organisms may interact with another in several ways: They may be in a producer/consumer, predator/prey, or parasite/host relationship. Or one organism may cause disease in, scavenge, or decompose another. In order to motivate my students I will make a connection between the material I want to teach and the interests and needs of my students. (We will talk about diseases that they know, spices that they know, and how this is all relevant to them). I will elicit the question that needs to be answered and the problem that needs to be solved from the student. I will use student centered experiences in order to review and revise prior knowledge.

Inquiry Questions: What is biodiversity? That will be the topic that I will be addressing during this unit and at other times throughout the year. Our introduction to biodiversity will be with microbes; therefore, my other inquiry questions will be, What are microbes? Where will we find microbes in our everyday life? In order to motivate the students to think about these issues, we will have discussions, take local field trips, look at videos, and take a trip to the American Museum of Natural History. The students will develop two projects over a period of four weeks. The first project will develop out of the first

local field trip where the students will collect marsh mud, marsh water, and leaf litter. It will consist of making a simple Winogradsky Column. The method selects for organisms that are photosynthetic and are anaerobic. The second project involves finding if spice extracts have an effect on bacterial growth. It will include the use of analysis, prediction, measuring and other lab skills.

Schedule, Topic, Methods: October 5, 1999: 1 day: 45 min. What is biodiversity? Introduce the students to the topic using focus questions. What do dogs, squid, daffodils, eagles and Puff Daddy have in common? List some characteristics of living things. Have students use their journals to record their answers. Introduce the video, "Life in the Balance." Ask the students to be prepared to discuss specific points after viewing the video.

October 7, 1999: 1 day: 1 field session. Trip to Prospect Park Pond. This is a local field trip to collect marsh mud, marsh water and leaf litter. The students will be prepared, we will discuss the rules, the selection of the site, and their responsibilities in advance. The students will observe the site, use their journals to record observations and make their sample collections. They will collect the marsh water and leaf litter in jars and collect the pond mud in a pail.

October 12, 1999: 1 day: 45 min. lab. The Winogradsky Column. This is a classic enrichment technique. The students will use a tall transparent glass or plastic cylinder, they will layer bits of paper towel hard boiled egg yolk, marsh mud and a bit of water to the top and cover the open end. Illuminate the cylinder with an ordinary incandescent lamp. After several days, colored areas of anaerobic photosynthetic sulfur-using bacteria will start to appear on the illuminated side. The column can be brought into the classroom and utilized for periodic discussions and observations.

October 14th and 19th 1999: 2 / 45 min. labs. The Antimicrobial Effects of Spice Extracts on Bacterial Growth. Introduce the students to the topic using focus questions. What is the purpose of spice? Why do you think people in ancient times began to use them? What causes food to spoil? How can we test to see if spices help in reducing bacterial growth? A complete section is included to highlight this lab, it consists of lab materials, procedures, and data chart.

October 21st and 26th 1999: 2/ 45 min. labs. The Antimicrobial Effects of Spice Extracts on Bacterial Growth II The first lab that deals with spice extracts has all spices chosen by the teacher, also the procedures and data table are preset. In the lab given at this point, the students will choose the spices using material indigenous to their native countries. The student focus questions are: What spices are used in your home or your culture? Predict the spices that you feel will produce a zone of inhibition?

Student tasks: Analyze the previous experiment and construct a procedure that will improve the experiment. Prepare a data table, and present your data graphically. Explain how your predictions compare with the results.

October 28, 1999. 1 day: 45 min. Writing a critique of published material. Focus questions. What comes to mind when you hear the word bacteria? Student task: Read the article, "Bacteria," by Rachel Mock, the recipient of the 1998 Young Naturalist Award. Write a critique of Rachel's article, describing in your own words, the concepts that you think are important. How does Rachel's report affect you? Do you agree or

disagree with the article? Write a rough draft on loose leaf paper. For homework, write your finished paper and be prepared to present it in class the next day.

November 4, 1999: 1 day: 45 min. Preparation for a trip to the American Museum of Natural History. Preparation : discussion of what the students already know about infectious disease. Focus questions. What do you know about infectious diseases? What would you like to learn? What are some of the ways that infectious diseases enter our bodies? How can you avoid getting sick? Student tasks: Read the handout of the diagram of the hantavirus. Discuss the natural cycles of infectious diseases. Read the handout of the diagram of the body. Discuss the concepts of “doorways” where diseases enter the body.

November 9, 1999. 1 field session. Trip to the AMNH The World of Infectious Disease. Have students break up into small groups to do the activities on the handouts entitled When Humans and Microbes Meet. Student tasks. Complete the handouts. Observe the models of microbes. After visiting the museum the students will build a model that each group chooses. Students will use any materials that they like, they can be creative.

Reasons for the Methods: