Name:_____ Date:_____

Predator and Prey
An Example of Microevolution in Action

I. Introduction

Evolution is a difficult idea to illustrate in real life situations. We acknowledge that evolution occurs but in a classroom setting it is impossible to illustrate that population's change over time. This is because individuals do not evolve. This lab will demonstrate how populations are influenced from one generation to another by the environment. For example, consider a population of rabbits with a spectrum of colors from black to light grey. How does the environment interact with the rabbit population to select what traits are successful? That is what we will observe in this lab.

While you work through this activity, be able to identify the variations in a population. See that the variations influence the survival and reproductive fitness of the organisms. As a result you should be able to observe a shift in phenotypic frequency: a direct result of microevolution. Recall that natural selection acts upon the variations in a population. It is not a force that creates new variations.

You will be a part of a group and you will act as predators on a population of beans in a designated "habitat." The predators (*studentis legumeconsumeris*) will all have slightly different morphs of feeding apparatus: knife, spoon, fork or hand, and eat the animal (*beani legumeris*) also consisting of slightly different morphs: red, black, speckled or white. As in most natural examples, there are variations within both the predator population and the prey population. This activity will focus on the prey population. In this simulation, the prey will also reproduce according to the rate of survival.

II. Materials

Groups of (4) students
One plastic drinking cup per person
One capturing device per person
100 of each type of bean
Beaker
Calculator

III. Hypothesis (answer before performing lab)

a.) Which feature/variation among the prey population do you expect to affect fitness?

b.) Which variation (color) do you think would be the most "fit"? Why?

IV. Procedure

1. Count out 100 beans of each type and place in your group's beaker. The beans are now bugs. You will spread these over the habitat area outside.

2. We will all go outside together.

3. Use the string to designate boundaries for your habitat.

4. Stand around the habitat and prepare to forage for food. Turn your backs to the habitat until you are told to start.

5. At my count, you will be given 1 minute to forage for food. Catch as many bugs as you can. Color does not affect the nutritive value. Catch as many bugs as you can and put them in your cup.
    a. You must ONLY use your particular capturing device. You may not scoop with the cup.

6. When I say "stop" and you have a bug in your capturing device but not in the cup, you must release the bug back into the habitat.

7. Each predator determines the number of prey captured.
    a. i.e. 21 speckled, 5 black, 13 red, etc.
    b. Enter the data into your chart. Record the number of each bug captured by the rest of your group.
    c. Calculate the number of each bug remaining in the population (100 – total of each type caught) for round 1.

8. Before the next round, the remaining bugs will be allowed to reproduce. Count out one bean of the appropriate color for each bean remaining in the habitat. If 65 beans were captured, that means 35 remain in the habitat. So count out 35 beans and put them in the beaker to represent the offspring. Repeat for all the colors and mix them into your group's beaker. (You should be doubling the surviving population by doing this.)

9. We will try to complete 5 rounds. Work quickly.

V. Results/Analysis

1. Complete calculations for all generations.
2. Create an Excel table and graph to represent which predator was the most successful using % of prey captured.
3. Create an Excel graph which shows the number of bugs surviving versus the generations.
4. Remember to include a key in your graph. There should be a title and labels for each coordinate along with appropriate units.
5. Turn in the following: (***Due May 23, 2008***)
    a. A lab report including an introduction, materials list, procedure, data table from packet, excel table and graph and the answers to the discussion questions.
    b. You may submit as many drafts of your lab report as you'd like up to the due date.

VI. Discussion Questions

1. Describe in a paragraph or two what happened in this predator/prey simulation. Include in your description the following: environment, variation, survival, reproduction, and fitness.

2. Which variation in the populations of bugs had the greatest survival rate? Why?

3. Do you think your results would have been different if we did this activity a few months ago in a "habitat" of snow? Why?

4. Do you agree or disagree with this statement? Why? Explain.

    "A particular adaptation that increases fitness in one environment may not necessarily do the same in other environments."

Population		**White**	**Black**	**Red**	**Speckled**	**Total**
Initial Population (1)	Initial Population	100	100	100	100	400
	Number captured by you					
	Number captured by others in your group					
	Total captured by your group					
	Number remaining after round 1					
	Percent of total population (%)					
Generation 2	Number captured by you					
	Number captured by others in your group					
	Total captured by your group					
	Number remaining after round 1					
	Percent of total population (%)					
Generation 3	Number captured by you					
	Number captured by others in your group					
	Total captured by your group					
	Number remaining after round 1					
	Percent of total population (%)					
Generation 4	Number captured by you					
	Number captured by others in your group					
	Total captured by your group					
	Number remaining after round 1					
	Percent of total population (%)					
Generation 5	Number captured by you					
	Number captured by others in your group					
	Total captured by your group					
	Number remaining after round 1					
	Percent of total population (%)					