Exercise 6: Predator–Prey Interactions

This exercise illustrates how different populations interact within a community, and how this interaction can influence the process of evolution in both species. The relationship between a predator (you) and a prey species (beans) will be used as an example. It should help you to understand how certain physical characteristics that confer an advantage to survival can come to predominate in a population. These advantageous characteristics are called **adaptations**. An adaptation aids survival by either decreasing a prey's chance of being eaten, or by increasing a predator's chance of obtaining food to survive and reproduce.

Summary of Activities

1. Hunt for 1 minute, using the available foraging tool.
2. Count up your individual kills and add them to the class totals.
3. Calculate reproduction of the next generation.
4. Repeat foraging process for up to four generations.

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Each student in our class will be a member of the predator population. You will have one of three different physical characteristics for capturing prey. One group will hunt with teaspoons, one group will hunt with soupspoons, and one group with forks. This is the foraging equipment you were "born" with. You all have the same mouth, which is a paper cup in your other hand.

The prey population, consisting of three different types of dried beans, will be scattered in an area outside.

The biological success of the predator species will depend on your ability to collect energy resources, or food. This will be measured by counting the number of beans you are able to pick up during the foraging period. The survivability of the prey species will depend on how many beans survive and escape capture.

Materials:

- Red beans, white beans, pinto beans
- Plastic forks
- Plastic teaspoons
- Plastic soupspoons
- Paper cups

Procedure:

1. Begin hunting when you are given the signal. The prey must be picked up with the fork, teaspoon, or soupspoon and placed in the cup. Only one bean may be picked at a time. No scraping or pushing of the prey into the mouth is allowed. You may, however, dash in and pick up any prey being pursued by another predator. Don't hesitate to intrude; any hungry natural predator must compete for survival.

2. When the end of the feeding period is signaled, stop the hunt and count up the number of your "kills". Only those prey in your cup can be counted. If you are in the process of capturing one when time is called, you must drop it. Report the number of your kills to your group "accountant".

3. After each hunting session, we will approximate the number of surviving predators based on the total kills for the group as a whole. Those that "starve to death" will be given the feeding mechanisms of the more successful predators, representing reproduction.

4. The number of surviving prey will be doubled to represent reproduction. We will repeat each generation as time and resources allow.

Exercise 6: Predator–Prey Interactions

Pre-Lab Exercise **Name** _____

1. Describe the three foraging characteristics found in each of the predator species in today's lab.

2. Describe each of the three different physical characteristics of the prey species in today's lab.

3. Which characteristic assigned to the predator species is most likely to be advantageous for survival? Why?

4. Which characteristic found in the prey species is most likely to be advantageous for survival? Why? What environmental factors might influence this?

5. Predict what will happen to individuals with a particular feeding characteristic if they do not capture a minimum amount of prey? How do you think this will affect the make-up of the population?

Exercise 6: Predator–Prey Interactions

Data Sheet

GENERATION: _____

	Starting No. of Predators	Pinto Beans	White Beans	Red Beans	TOTAL KILLS	% KILLS
Starting No. of Prey						
Teaspoon						
Soupspoon						
Fork						
Total Prey Deaths						
No. Surviving Prey						

GENERATION: _____

	Starting No. of Predators	Pinto Beans	White Beans	Red Beans	TOTAL KILLS	% KILLS
Starting No. of Prey						
Teaspoon						
Soupspoon						
Fork						
Total Prey Deaths						
No. Surviving Prey						

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Teaspoon						
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Fork						
Total Prey Deaths						
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Lab Report **Name** _____

1. Which characteristic was the most successful for each of the predator and the prey populations? What was the **selective pressure** that allowed this characteristic to be successful? Remember that selective pressures are external factors, either environmental or from a different population.

   Predator Characteristic:

   Prey Characteristic:

2. For both predator and prey populations, which characteristic was the least successful? What was the selective pressure?

   Predator Characteristic:

   Prey Characteristic:

3. In our hunt today, what factors besides the interactions between predator and prey, such as weather or surrounding environment, were affecting the population size of each species? Use specific examples.

4. Use your imagination to create an environment that would allow the least successful trait to become the most successful trait, and vice versa. (Create one scenario for the predator population and a second scenario for the prey population.)

5. Predict what could eventually happen to both the predator and the prey populations after many generations (100 generations, for example), based on the results of our four generations.