

Pre-Lab #11: Predator-Prey Interactions

Name _____

1. What are the 3 different physical characteristics in the predator species used to capture prey in this lab.
2. What are the 3 different color and size characteristics of the prey species in this lab.
3. Briefly describe the first step in the hunting procedure.
4. Which foraging characteristic in the predator species is likely to be the most advantageous for survival?
5. Predict what will happen to individuals with a particular foraging characteristic if they do NOT capture a minimum amount of prey?

Lab #11: 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 appropriate foraging tool.
2. Count up your individual kills and add them to the class totals.
3. Calculate population sizes of the next generation.
4. Repeat steps 1-3, for up to four generations.

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Each student will be a member of the predator population. Predators will have one of three different physical characteristics for capturing prey; a spoon, a clothes pin or a fork. 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 single prey population of dried beans consists of three different colors and sizes; small white, medium black and large pinto. The prey population will be scattered in an area outside of class.

The **biological success** of the predator species will be depend on the 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 biological success of the prey species will depend on blending into the environment or otherwise avoiding capture. **Selective pressure** is some external factor exerted on a population that can cause that population to change over time. For example, a selective pressure that might make predators with clothespins successful over time is if the beans were mobile and were able to move off of the forks and spoons. Predators with clothespins would be able to capture more prey items and hence survive and reproduce more successfully than predators with the other foraging characteristics.

Materials:

- Black beans, white beans, pinto beans
- Clothes pins
- Plastic forks
- Paper cups

Procedure:

1. Begin hunting when you are given the signal. The prey must be picked up with the spoon, clothes pin, or fork and placed in the cup. 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.
5. After analyzing the results of our hunt, answer the Lab Report questions at the end of this handout.

Data Sheet 1

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GENERATION 1

	Starting No. of Predators	Pinto Beans	White Beans	Black Beans	TOTAL KILLS	% KILLS
Starting No. of Prey						
Clothespins						
Spoon						
Fork						
Total Prey Deaths						
No. Surviving Prey						

GENERATION 2

	Starting No. of Predators	Pinto Beans	White Beans	Black Beans	TOTAL KILLS	% KILLS
Starting No. of Prey						
Clothespins						
Spoon						
Fork						
Total Prey Deaths						
No. Surviving Prey						

Data Sheet 2

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GENERATION 3

	Starting No. of Predators	Pinto Beans	White Beans	Black Beans	TOTAL KILLS	% KILLS
Starting No. of Prey						
Clothespins						
Spoon						
Fork						
Total Prey Deaths						
No. Surviving Prey						

GENERATION 4

	Starting No. of Predators	Pinto Beans	White Beans	Black Beans	TOTAL KILLS	% KILLS
Starting No. of Prey						
Clothespins						
Spoon						
Fork						
Total Prey Deaths						
No. Surviving Prey						

Lab Report Questions: Answer on separate paper

- Q1. a) For the predator population, which characteristic was the least successful?
b). What was the **selective pressure** that allowed this characteristic to be less successful? Remember that selective pressures are external factors, either environmental or from a different population.
- Q2. a) For the prey population, which characteristic was the most successful?
b) 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
- Q3. Use your imagination to create an environment or population that would allow the least successful trait of the predator population to become the most successful trait.
- Q4. In at least two paragraphs, predict what might happen to both the predator and prey populations after many generations (100 generations, for example), based on the results of our lab exercise.
- Q5. What did this lab activity teach you about predator prey interactions and evolution? What were some of it's shortcomings?