

NATURAL SELECTION OF FORKS AND BEANS

AKA “The Beaks of Finches”

Introduction: Within every ecological community there exists several species. In stable communities each of these species tends to maintain a relatively stable population size, particularly when viewed over the long term. This condition is known as equilibrium. However, when environmental conditions change, a new equilibrium must be established. This lab will explore how the forces of natural selection operate to favor species with certain phenotypes while limiting the success of others. In this activity two different color morphs of a prey species (red and white beans) and three different predator species (students equipped with plastic knives, forks or spoons) will begin at equal levels. Predators will be allowed to forage for their prey. At the end of each season “reproduction” will occur within both the predators and prey populations however the relative reproductive rates will reflect the successes of the prey at escaping and predators for catching and feeding.

Objectives: Students will observe natural selection at work in both predator and prey populations.

Prelab Questions:

1. Which prey items will be captured the most? Why?

2. Which predator will capture the most prey? Why?

3. What will happen to those predators that can't get enough food?

Directions: We will be foraging for 4 “seasons”. Students will be given a few minutes each season to forage for prey on our “island”. For safety purposes, feeding appendages can be used for foraging only and not for predator/predator aggression (i.e. no fencing with plastic knives). After each season we will return to the classroom to count beans and adjust our populations accordingly.

Generation THREE

Starting RED bean population	
Starting WHITE bean population	

Predators:	Knives		Forks		Spoons		Total caught		Total avoiding	
	Red	White	Red	White	Red	White	Red	White	Red	White
total beans/mass										
Percent										
	Total avoiding		Percent avoiding							
	Red	White	Red	White	Red	White	Red	White	Red	White

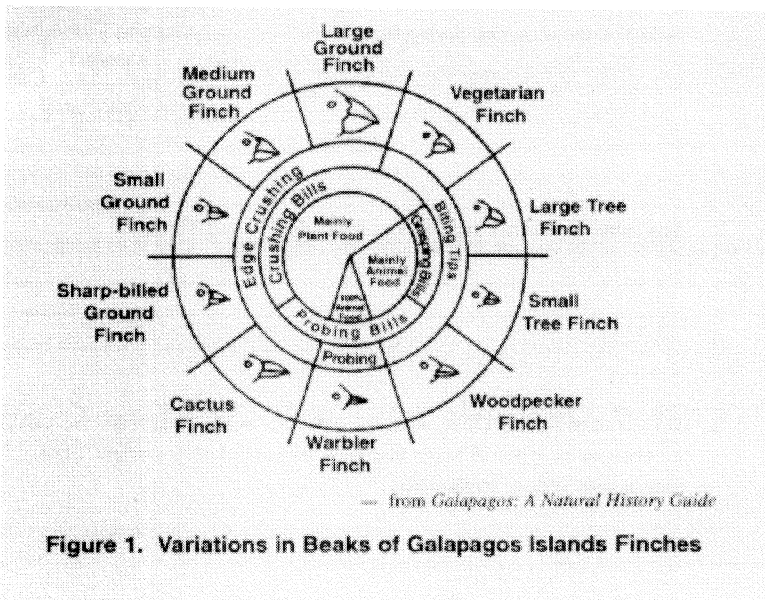
Generation FOUR

Starting RED bean population	
Starting WHITE bean population	

Predators:	Knives		Forks		Spoons		Total caught		Total avoiding	
	Red	White	Red	White	Red	White	Red	White	Red	White
total beans/mass										
Percent										
	Total avoiding		Percent avoiding							
	Red	White	Red	White	Red	White	Red	White	Red	White

Conclusion:

1. Describe the physical characteristics of our "island" (the region we foraged in).
2. Which prey morph had the lowest survivorship? How could you explain these results?
3. What trait besides color might give one species an adaptive advantage over another species?
4. Based on your results what would you expect to happen to the population makeup over the course of many generations?
5. If the "losing" predator species was able to migrate to a different island, describe some characteristics of that island that would allow that predator to thrive.
6. What environmental change to our island might benefit the "losing" prey morph?



*** Be sure you study the diagram to the left that shows the variations in beaks of Galapagos Island finches. The diagram represents the types of beaks, the function of the beaks, and the type of food the finches eat.**

7. Use the diagram above and do some other research on Darwin's finches and his observations of their populations on the Galapagos Islands. How does this lab relate to Darwin's observations?

8. Define the following:
- Variation
 - Competition
 - Adaptation
 - Environment
 - Selecting agent