



Evolution 1: Birds and Beaks Lab

CH. 16

Name: _____ Period: _____ COOK

Every day offspring are created by parents of vast number of species. Most populations remain the same size over a long period of time because each parent on the average replaces itself with just one offspring. However, if you take a close look at a population you will discover that some parents leave more offspring than others. All parents in the population possess traits and characteristics that are special to themselves, such as quicker reflexes, long beaks, or duller colors. Offspring tend to inherit the traits of their parents. The occasional new variation is due to mutation of DNA and the reproductive imbalance resulting from some variations surviving in greater numbers. This provides the condition for evolution. When an organism survives and reproduces in greater numbers because it is larger or smaller, or greener or hairier, natural selection has occurred. When an environment changes and the new conditions stress a population, this imbalance in reproductive success often becomes exaggerated.

Dr. Peter Grant of the zoology department of Princeton University spent over 30 years studying the effects of environmental changes in the Galapagos Island on the differing survival rates of finches. His observational evidence document the process of evolution. In this lab, you will use a variety of tools to simulate the beaks of the Galapagos finches. The lab demonstrates the principles of natural selection by showing the different adaptations (usually physical structures) have value in a specific environment or for a specific purpose.

Pre-Lab Questions:

1. Describe the difference between biotic and abiotic factors. (Use your textbook)

2. List two abiotic factors that could influence an organism's ability to survive and reproduce. _____

3. Explain Darwin's theory of natural selection. _____

4. Describe what it means to be "fit" in Darwin's sense of the word. _____

5. Identify the organism that is most fit and explain.

a. A rabbit lives three years and has 27 offspring.

b. A rabbit lives until the ripe old age of 18 and has no offspring.

Hypothesis

Which beak will perform best? _____ Which beak will perform worst? _____

Explain: _____



Procedure:

1. At the lab station, your group will find four feeding environments (petri dishes) and four beaks (tools). Each group member should pick one tool to use for the entirety of the lab.
2. Record the description of your beak this in the Individual Data Table. Do not record for the other members in your group.
3. You will each use your beak to collect food. Follow these rules for simulated feeding:
 - a. hold the beak straight up and down
 - b. open the beak with two hands and insert them into the feeding environment
 - c. close the beak and deposit the seeds into the lid of the Petri dish
 - d. if the seeds fall out, they do not count
4. Have your lab partners time you for 15 seconds. Gather as many seeds as you can in 15 seconds. Count the number of each type of food eaten and record in your Individual Data Table. Return the food to dish and repeat. You should repeat this procedure 3 times. Each box of the data table should contain 3 numbers for your 3 individual trials. Return the seeds to the containers and have each lab partner repeat the process. You will have 3 trials for each type of feeding environment.
5. Return your materials. Please make sure all food is returned to the correct feeding environment.
6. Average your results and record in the Group Data Table. Share your results with your group to complete your table.
7. Add each row to get total seeds eaten for each beak type.

HINT: Pair up, Partner 1 do all measurements with your tool (3 trials with each type of food) and partner 2 time, then switch after you have filled in your individual table (below)

Individual Data Table

Type of Beak	1: _____	2: _____	3: _____	4: _____
	Trial 1 –	Trial 1 –	Trial 1 –	Trial 1 –
	Trial 2 –	Trial 2 –	Trial 2 –	Trial 2 –
	Trial 3 –	Trial 3 –	Trial 3 –	Trial 3 –
	Average _____	Average _____	Average _____	Average _____

Group Data Table Total = Averages added together

Type of Beak	1: _____	2: _____	3: _____	4: _____	Total
	Average =	Average =	Average =	Average =	
	Average =	Average =	Average =	Average =	
	Average =	Average =	Average =	Average =	
	Average =	Average =	Average =	Average =	

Post-Lab Questions:

1. Which bird functioned as a “generalist”? A generalist bird beak would catch approximately an equal number of each seed type. _____
2. Which bird was most specialized? This beak was most successful with a specific type of seed. _____
3. Which bird’s genes will be passed on to the next generation? _____



4. What were some hidden factors (did you develop a strategy) you realized while doing these trials to help your “beak” eat more “seeds” during the trial?

5. How does this relate to animals in real life? _____

6. How might these finches avoid extinction due to competition? _____

7. What would happen to a bird in a natural situation if it was unable to secure an adequate amount of food?

8. What will happen to the bird that can obtain the most seeds? _____

9. We had each bird look for food one at a time. Predict how the results might have been different if all the birds foraged for food all at the same time.

10. Simulations try to simplify nature to help explain natural events but in doing so, some natural factors are left out (such as feeding individually instead of together). List one other natural factor that is missing from this simulation that might affect our results. Explain how it might affect our results.

11. Explain how this lab related to Darwin’s theory of natural selection.



Conclusion:

Explain and discuss what you have learned about evolution by natural selection during this lab by using and underlining ALL of the following terms in a paragraph (a paragraph is 4-5 sentences at least).

population, environment, competition, fitness, adaptation, and extinction.

BIRDS BEAKS

