

Lab: NATURAL SELECTION AND THE EVOLUTION OF DARWIN'S FINCHES

HONORS BIOLOGY: UNIT 8

INTRODUCTION: There are 13 different species of finch on the Galápagos Islands off the coast of Ecuador. On one of the islands, Daphne Major, biologists Peter and Rosemary Grant have devoted many years to studying four of these bird species. The Grants have studied the effects of drought and periods of plenty on the finches, and the results of their experiments have had an enormous impact on evolutionary science.

For this lesson, you will first analyze the characteristics of the 13 species of finch found on the Galápagos Islands. Then you will watch a short film about the research conducted by the Grants. Based on the information presented in the film (*The Origin of Species: The Beak of the Finch*, at <http://www.hhmi.org/biointeractive/origin-species-beak-finch>) and your own observations, you will construct an argument and make predictions about the role of natural selection on the evolution of finch populations.

MATERIALS:

- Finch cards (13 cards per student team)
- Large, white poster board or butcher paper
- Blue painter's tape for attaching cards to poster board or butcher paper
- Access to a camera (optional)
- Sticky notes or index cards
- Graph paper
- Science notebooks or paper for writing
- Different-colored pens (optional)



PART 1: What Do You Already Know?

4. Based on what you observed during your gallery walk:

- Does your team want to make any changes to its own groupings?

- What additional evidence would you need to better justify your team's groupings?

b. What evidence from the film convinced you to make the change?

c. What do the different groups of finches that you created represent?

PART 3: Examining Finch Beaks

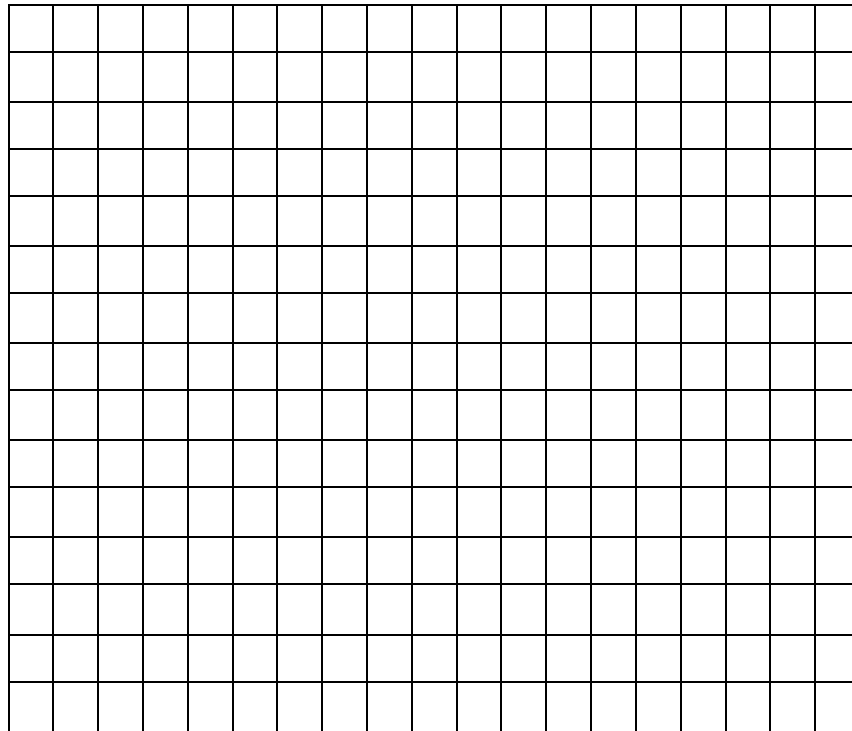
8. Watch the second segment of *The Beak of the Finch* (<http://www.hhmi.org/biointeractive/origin-speciesbeak-finch>), from time stamp 5:36 minutes to 9:00 minutes. As you watch, listen for evidence to help you answer the following questions.

a. Describe the beak sizes of the medium ground finch population (species 12 in the finch cards).

b. How did the population of medium ground finches on the island of Daphne Major change as a result of environmental changes?

9. Make a prediction. After watching the segment, **create a bar graph** (next page) on your own that shows the beak sizes of the population of medium ground finches before and after the drought. Your graph should indicate the number of medium ground finches with each of four different beak sizes (from smallest to largest) before and after the drought. (Hint: You will create two bars for each category of beak size, one representing the populations before the drought, and one representing the populations after the drought.) Include the following categories of beak sizes in your graph:

- Medium ground finches with much smaller beaks
- Medium ground finches with smaller beaks
- Medium ground finches with larger beaks
- Medium ground finches with much larger beaks



11. Watch the third segment of *The Beak of the Finch* (<http://www.hhmi.org/biointeractive/origin-speciesbeak-finch>), from time stamp 9:00 minutes to 11:12 minutes. After watching the film, answer the following questions.

a. How did your graph compare to the graph in the film? Did anyone on your team have a graph that was similar?

b. If no one on your team had a graph that was similar, what evidence did you not consider?

c. If your graph was close to the one in the film, what part of your thinking was the same as that of the scientists in the film?

d. Why did the drought have such an impact on the medium ground finch population?

11. Watch the third segment of *The Beak of the Finch* (<http://www.hhmi.org/biointeractive/origin-speciesbeak-finch>), from time stamp 9:00 minutes to 11:12 minutes. After watching the film, answer the following questions.

a. How did your graph compare to the graph in the film? Did anyone on your team have a graph that was similar?

b. If no one on your team had a graph that was similar, what evidence did you not consider?

c. If your graph was close to the one in the film, what part of your thinking was the same as that of the scientists in the film?

d. Why did the drought have such an impact on the medium ground finch population?

PART 4: Understanding Speciation

13. Watch the final segment of *The Beak of the Finch* (<http://www.hhmi.org/biointeractive/origin-speciesbeak-finch>), from time stamp 11:12 minutes to 15:45 minutes. As you watch the film, listen for an answer to the following:

- How did one ancestral finch population give rise to 13 species, each with different characteristics?

17. Construct an explanation based on the evidence. Write an explanation for how the process of evolution primarily results from competition for limited resources (such as water, shelter, and mates) and differences in the abilities of individuals in a population to survive and reproduce in that environment. Write your explanation below using the evidence in Figures 1–4 and information from the HHMI film.

- Construct three graphs showing the proportion of birds with symmetrical and asymmetrical wings in the population of birds before and after the windstorm and in their offspring. Explain your reasoning.

