



Adaptations Lesson 2: *The Make* Student Guide

Directions

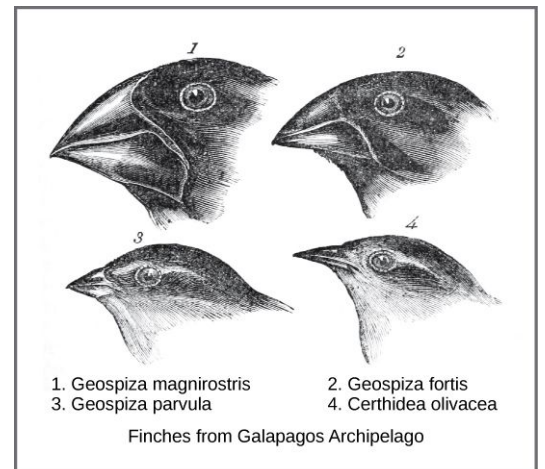
Have you ever wondered why penguins can't fly? Or why camels have humps? Today, you are going to learn how **natural selection** and **adaptation** cause different traits to become more or less common over time. To do that, you will:

- Participate in a survival challenge! The game will represent the adaptation and natural selection of finches on the Galapagos Islands.
- Track data to analyze trends of inherited traits.
- Respond to discussion questions.
- Write and produce a nature documentary that explains natural selection and adaptation as witnessed during the bird beak activity.

Introduction

On his voyage in the 1830s, naturalist Charles Darwin visited the Galapagos Islands off the coast of South America.

He observed the animals on each island, recording in his journal as he went. He noticed a variety of flora and fauna he'd never seen before. But then he noticed something that made him curious. Each island had a population of finches. But the finches on the different islands had different beaks! Why could this be? What would cause the finch beaks to be so different from one another?





MOSA MACK SCIENCE

STUDENT GUIDE

1. Finch Beak Feeding Frenzy Challenge

To investigate this phenomenon, you will compete in the *Finch Beak Feeding Frenzy Challenge* in which you'll take on the role of finches.

If you're doing this activity virtually, [click here](#).

If you're doing this activity in-class, follow the directions below:

Today you will compete with other birds to survive and reproduce. In this challenge, you will be feeding on the Wild Loop insects that inhabit the island.

The Goal: In each round, your goal is to eat as many Wild Loop insects as possible with your specific beak type. Your teacher will give you the following materials:

- Your "beak" (one of three types of fork: 1-prong, 2-prong, 4-prong).
- Your "stomach" (plastic tumbler).

You will be tasked with using your "beak" to take Wild Loops from the feeding area into your "stomach." In each round, you will track who collects the most Wild Loops.

If you are among the Top 3 Wild Loop Eaters:

- You survive to see another day and are given the chance to compete in the next round.
- You reproduce an offspring (one) that inherits your beak type.

If you are among the Bottom 3 Wild Loop Eaters:

- You do not survive.
- You are out of the game.

If you are neither in the Top 3 nor the Bottom 3 Wild Loop Eaters:

- You survive.
- You do not reproduce.

Rules

1. Your teacher has identified a large "feeding area" in the middle of the room, where you'll be competing.
2. Wait outside the feeding area until you hear the whistle.
3. At the whistle, use your beak to collect as much food as possible.
 - a. Keep your "stomach" upright in one hand and your "beak" in the other hand, at all times.
 - b. Your "stomach" should remain behind your back as you enter the "feeding area" each round.
 - c. You may not use any human hands to collect the loops.



MOSA MACK SCIENCE

STUDENT GUIDE

- d. You may collect as many loops in one go as you can.
 - e. Do not touch, interfere with, or distract other “birds” (other students) intentionally.
 - f. If you break any rule, you immediately return any food you have collected. If you interfere with other birds, it will result in immediate death!
4. When you hear the “stop” whistle, you must stop feeding and step outside the area.
 5. Count the total number of loops you have collected. **Only count unbroken loops. Broken loops cannot be included in the tally.**
 6. Report the number to your bird recording station director (each beak type will have a designated reporting station). The station director will record the names of each student and the total number of loops they have collected. The station director will then bring the completed recording sheet for the round to your teacher.
 - a. If you are one of the Top 3 competitors, your teacher will direct you to choose a bird from outside the feeding area to join the game (who will inherit your beak type).
 - b. If you are one of the Bottom 3 competitors, your teacher will direct you to put your unbroken Wild Loops back in the area and return your beak and stomach.
 - c. All other birds will return unbroken Wild Loops back to the area before beginning the next round.
 7. After five generations, your teacher will have compiled all of the information into the master data table. Record data from the master table into the table below.

Data Table: Wild Loops

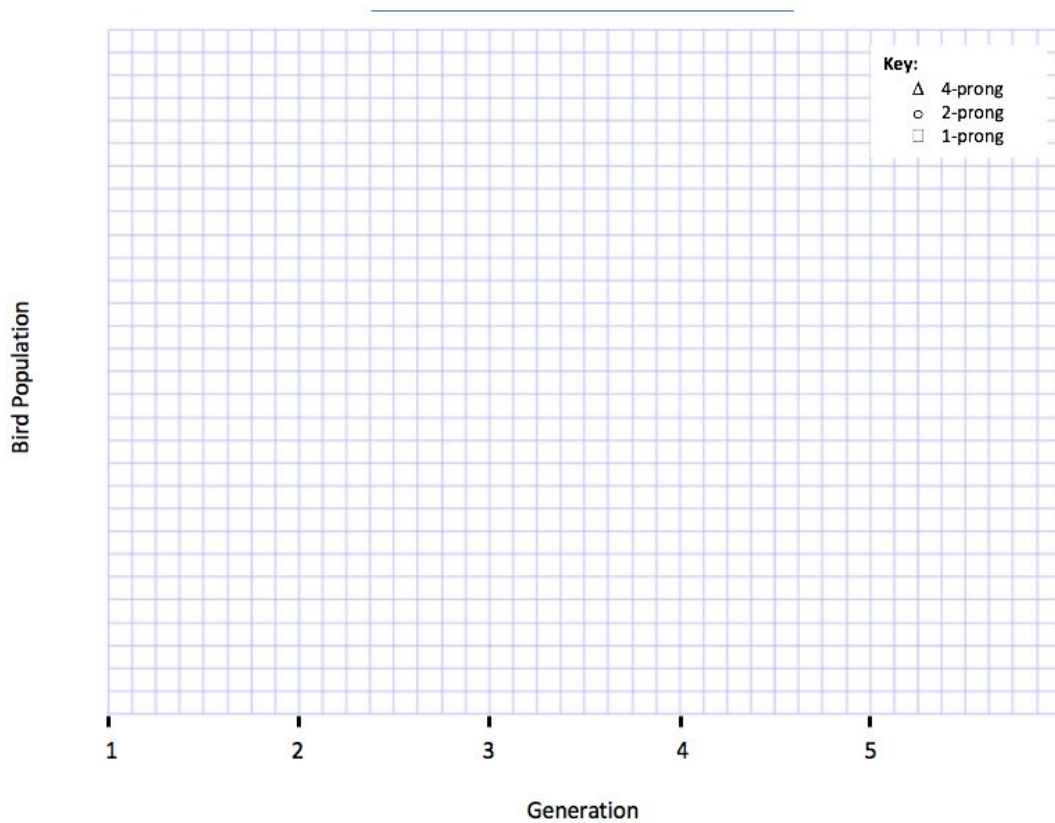
Generation	4-pronged birds		2-pronged birds		1-pronged birds	
	# Birds	# Wild Loops captured	# Birds	# Wild Loops captured	# Birds	# Wild Loops captured
1	4		4		4	
2						
3						
4						
5						



MOSA MACK SCIENCE

STUDENT GUIDE

Make a graph of the data you collected. Don't forget to label your graph.



Discussion Questions

1. Which population of finches increased in this activity?
2. Which population of finches decreased in this activity?
3. How does inheriting a specific trait impact your likelihood of survival?



2. Make a Nature Documentary!

Your final *Make* activity is to create a nature documentary about the island, based on the findings from the bird beak activity. To create the documentary, you will:

- Write your script.
- Film a 3–5 minute video to teach others about the finches and their environment.

Reflect on the nature documentary that you watched as a class. Think about how the narrator makes the content interesting and accessible. How are the images and script connected? What did you like about it? Write your ideas below.

Now, reflect on the bird beak activity and write a script about how the population changed over time. Your writing should highlight the challenges to survival and reproduction and include vocabulary from the unit. Your script should be long enough to use in a 3–5 minute video and contain a clear beginning, middle, and end.

Be creative as you film your nature documentary! Feel free to use props, costumes, or drawings.

You must include:

1. Name of the documentary (ex. Rise of the _____ finch or Loss of the _____ finch).
2. Images or videos of the food and the feeding ground.
3. Information about the habitat and food sources.
4. Answers to the following questions:
 - a. What were the original and final numbers of the birds with each beak type?
 - b. What conditions caused the populations to change?
 - c. How did the distribution of traits change over time? What factor or factors caused the shift?
 - d. Which traits became more popular throughout the activity and which became less common? Why might that be?
 - e. What was the main food source in the environment of the island that the finches inhabited? Which traits were advantageous for the island? How do you know?
5. An explanation of how the activity highlights how a species adapts over time through natural selection.



3. Exit Ticket Questions

1. The finches in the Feeding Frenzy activity all competed for the same food source on the same island. Imagine this same starting population of finches flew to another island with the source of food being stick bugs (toothpicks). Would you expect the same trends in the finch populations over a series of five rounds (generations)? Explain your thoughts.
2. Darwin observed finches with different beak types on different islands. How does the Feeding Frenzy activity help to explain Darwin's observations?
3. For the Feeding Frenzy activity, food availability was the factor that determined which beak-types were advantageous. What other factors in an environment may determine whether specific traits are advantageous or not? (Hint: Think about all of the factors in an environment that are necessary for an individual to survive)
4. In a snow-covered environment, a population of rabbits has the trait of having a white coat, while another population of rabbits has the trait of having brown fur. Assuming no environmental changes, do you expect the "white coat" trait to increase or decrease in the population? Relate your answer to natural selection.



MOSA MACK SCIENCE

STUDENT GUIDE

4. Assessment Rubric/Checklist

Use the Checklist and Science & Engineering Practices Rubric to ensure you have addressed all aspects of *The Make* with quality work.

Adaptations *The Make* Checklist: Content Concepts and Practices

Your Challenge: Participates in a selection and adaptation game.

- Correctly tracks data in table.
- Completes graph representing data.
 - Correctly labels the x-axis and y-axis.
 - Appropriately includes all bird beak types.
- Successfully completes discussion questions.
- Completes final *The Make* activity:
 - Writes script that successfully addresses environment, food, and predators, and uses vocabulary from unit.
 - Creates nature documentary based on script to demonstrate population change during bird beak activity.



MOSA MACK SCIENCE

STUDENT GUIDE

Science & Engineering Practices

	Emerging (1)	Developing (2)	Proficient (3)	Advanced (4)
Developing and Using Models	Drawings, diagrams, or visual models include major misconceptions or have missing parts. Explanation of the model is minimal or not present.	Drawings, diagrams, or visual models include minor misconceptions or have missing parts. Explanation of the model is minimal.	Drawings, diagrams, or visual models are complete, but contain a minor misconception. Explanation of the model is complete but lacking complexity.	Drawings, diagrams, or visual models have no misconceptions and contain all details. Explanation of the model is complete and complex.
Constructing Explanations or Arguments From Evidence	Constructs an explanation with no clear sources of evidence.	Uses scientific principles and/or data from at least one source to construct or evaluate an explanation, but explanation contains minor misconceptions.	Uses accurate but incomplete scientific principles and/or data from multiple sources to construct or evaluate an explanation.	Uses accurate and complete scientific principles and/or data from multiple sources to construct or evaluate an explanation.