


Adaptation and Evolution Lab
Bird Beak Lab


Background Information
An adaptation is a trait that helps an organism survive and reproduce. Beak shape and size is an example of an adaptation. In this lab, you will see how certain adaptations can increase the bird's chances of acquiring food. You will use utensils such as binder clips, forceps, chopsticks, and spoons to represent a type of bird beak. You will then use utensils to pick up food as represented by toothpicks (worms), pennies (bugs), glass marbles (fruit), and lentils (seeds). The cups represent the bird's stomach.

Problem
Which beak type is best adapted or suited to obtain certain foods?

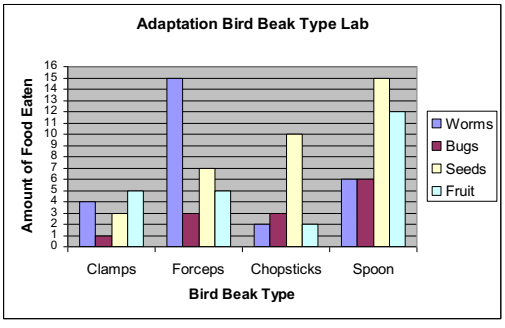
Hypothesis
*Which bird beak is best suited for eating worms?*_____
Which bird beak is best suited for eating bugs? _____
Which bird beak is best suited for eating fruit? _____
Which bird beak is best suited for eating seeds? _____

Materials

Binder Clip	Lentils
Forceps	Glass Gems
Chopsticks	Cups
Spoons	Calculator
Toothpicks	Time keeper
Pennies	

Procedure
1. Choose a beak type from the tray given in your group. Use the cup to represent the bird's stomach. Use the utensils appropriately.
2. When the signal is given, you will have 15 seconds to try to put as much food as possible into the bird's stomach. PUT ONLY ONE FOOD ITEM AT A TIME. DO NOT USE YOUR HANDS TO TOUCH THE FOOD!
3. Count and record the amount of food on Data Table I for the beak type.
4. Calculate group averages.

Conclusion
1. How did variations in bird beak types affect survival of the birds?_____
_____
_____
2. How is this lab an example of evolution by natural selection?_____
_____
_____
3. Graph your results. You are graphing the Bird Beak type and the amount of food eaten. See sample graph.



4. What would happen if all of the bird types in this activity flew to an island where no birds had been before and the only food available was macaroni? Which birds would be most successful? Which birds would be least successful?

5. If you came back to this island (from c) in 50 years, what should you expect to see? (What type of birds will live on the island?)

6. Would you change your feeding strategy if you had another opportunity to "feed?" Explain.

Data

DATA TABLE I: Individual Data and Group Averages

Beak Types	**# of Worms** (toothpicks)	**Group Average**	**# of Bugs** (pennies)	**Group Average**	**# of seeds** (Lentils)	**Group Average**	**# of fruit** (Glass Gem)	**Group Average**
Binder Clip								
Forceps								
Chopsticks								
Spoon								

Food Name	Represented by	Calories
Worms	Toothpicks	10
Bugs	Pennies	15
Seeds	Lentils	10
Fruit	Glass Gems	15

Beak Type	To Survive	To Reproduce
Large Beak (binder clips, spoon)	60	110
Medium Beak (forceps)	45	90
Small Beak (chopsticks)	25	50

Analysis: ***Use your group averages to fill in the Analysis table.***

Beak Type	Food best adapted to eat	Calories eaten with best food source	Did it survive with best food source?	Did it reproduce with best food source?
Clamps				
Forceps				
Chopsticks				
Spoon				

Name_____Pd_____

1. How did different bird beaks affect survival of the birds and what is the environmental pressure all the birds in the lab are facing?

   _____
   _____
   _____
   _____

2. How is this lab an example of evolution by natural selection?_____
   _____
   _____
   _____-
   _____
   _____

3. What would happen if all of the bird types in this activity flew to an island where no birds had been before and the only food available was macaroni? Which birds from the lab (Ae'o, I'iwi, 'Elepai'o, and Palila) would survive and why? Which birds would most likely go extinct and why?

   _____
   _____
   _____
   _____
   _____

4 In this lab, what is the Independent Variable (What we are testing or changing) and what is the Dependent Variable (the measured result of the Independent Variable)? **HINT: Look at the graphs and think MIX/DRY**.

   _____
   _____

5. Did you change your feeding strategy from trial 1 to trial 3 at the different stations (did you learn how to feed better, faster)? How would you change your feeding strategy if you had another opportunity to "feed?"

   Explain_____
   _____
   _____
   _____

6. Did competition for resources effect how much you were able to "put in your stomach? Explain._____
   _____
   _____
   _____

Station #1
Bird-Ae'o (Hawaiian Stilt)
Food Source-Grubs buried in marshy soil (flour, water and dirt)
Tools-Chopsticks, Turkey Baster, Tweezer

Challenge #1 –You have been given grubs to represent worms as your food source. You have also been given sample beaks:

1. Chopsticks
2. Turkey Baster
3. Tweezer

Your challenge is to obtain as many fishing worms as you can that are buried in the 'soil' within 30 seconds. Put your food in your stomach (plastic cup). Repeat each trial 3 times and record the amount of food after each trial.

Station #2
Bird-Palila
Food Source-Sunflower Seeds scattered in a tray
Tools-Chopsticks, Clothespin, Tweezer

Challenge #2 –You have been sunflower seeds to represent seeds as your food source. You have also been given sample beaks:

1. Chopsticks
2. Clothespin
3. Tweezer

Your challenge is to use each beak to CRACK the shell and remove the seed inside within 30 seconds. Put your SHELLED seeds in your stomach (plastic cup). Repeat each trial 3 times and record the amount of food after each trial.

Station #3
Bird-I'iwi
Food Source-Colored water (nectar)
Tools-Medicine dropper, Straw, Pipette

Challenge #3 –You have been colored water to represent nectar as your food source. You have also been given sample beaks:

1. Medicine Dropper
2. Straw (use finger to keep liquid in the straw, NOT your mouth)
3. Pipette

Your challenge is to use each beak to see how much water you can transfer to your stomach (beaker) in 30 seconds. You will then measure the amount in the graduated cylinders. Repeat each trial 3 times and record the amount of liquid in milliliters after each trial.

Station #4
Bird-Akikiki
Food Source-Rice spread out on a tray (to represent insects)
Tools- Tweezers, Clothespins, Test tube holder

PC. R. Kohley

<u>Challenge #4</u>- You have been given rice (to represent insects) as your food source.

You have also been given sample beaks:

1.Tweezer
2. Clothespins
3. Test Tube holder

Your challenge is to use each beak and transfer as many pieces of rice to your stomach (plastic cup) in 30 seconds. Repeat each trail 3 times an record the amount of food after each trial on your worksheet