

**Background Information:**

Survival of the fittest is an everyday affair. One of the most basic needs of all living things is food. The ability of an animal to get enough food basically depends on two things: the type of “tool” the animal has and the type of food available. The two factors are dependent on each other because, without the right tools the animal can’t get the food, and without the right types of food, the animals’ tools are useless. To make an analogy, it’s like trying to change a flat tire with garden tools.

**In this lab you will discover how these two factors interact by using “bird beaks” to pick up the various “foods” they eat.**

An adaptation is a characteristic that helps a plant or animal survive in its environment. Bird beaks have adapted for many things such as eating, defense, feeding young, gathering and building nests, preening, scratching, courting and attacking. The size and shape of a beak is specific for the type of food the bird gathers. For example, cardinals have heavy thick bills used to crack seeds, and hummingbirds have thin bills to sip nectar. Other uses include sifting, sucking, cracking, crushing, spearing, tearing, picking, probing.

## Beak Bingo

*Can you match the beak with the food it catches?*



**Purpose:**

To gather enough food for yourself to be healthy and strong enough to reproduce, passing on your genes to the next generation.

**Materials:** (per group of 4 students)

1. Bird beaks:
  - a. Spoon (Spoonbill)
  - b. 2 skewers (Avocet)
  - c. Tweezers (Finch)
  - d. Test tube clamps (Pelican)
2. Food (Prey):
  - a. Pennies (clams)
  - b. Marbles (fast beetles)
  - c. Toothpicks (stick bugs)
  - d. Rice (small insects)
  - e. Beans (slugs)
3. Cup: bird's stomach
4. Box lid: feeding environment
5. Large cup: "waste" food

**Procedure:**

1. Choose a bird beak. These may NOT be traded among birds. In other words, once you are a spoonbill bird, you may not evolve into a tweezer-bird.
2. Scatter the assorted prey into the box lid.
3. The teacher will be the timer. On her signal, each student will pick up **ONE food item at a time** in their beak (**NO HANDS –that's cheating**) and "swallow it" by putting it in their cup stomach. The cup must remain flat on the table. No "flinging" or "dragging" prey. If you drop it, the prey returns to the environment – not your stomach!
4. Each round lasts 30 seconds. At the end of each round, count and record the number of each type of food gathered on the data sheet (last page) for each bird. Note if the bird was able to reproduce: if it received 6 pieces of food.
5. The food items do NOT return to the box lid. All students should empty their cup stomachs into the large waste cup.
6. Repeat steps 3-5 until all of the food is gone or until all the birds have died. If a bird gets less than 3 pieces of food in a round, that bird dies and is out of the game.
7. At the end of the simulation, stack all plastic cups together, place the beaks, cups, and "food" in the box lid.
8. As a group, create a bar graph of your collected data before completing the Analysis & Conclusion questions to be turned in.

Hypothesis (If... then...) (example: If there is a relationship between beak and food, then the \_\_\_\_\_ will eat the most \_\_\_\_\_(food)).

\_\_\_\_\_  
\_\_\_\_\_

**Analysis and Conclusion**

- 1. Which bird or birds seemed best adapted to picking up...
  - a. Flat clam pennies: \_\_\_\_\_
  - b. Fast marble beetles: \_\_\_\_\_
  - c. Toothpick stick bugs: \_\_\_\_\_
  - d. Small rice insects: \_\_\_\_\_
  - e. Bean slugs: \_\_\_\_\_

- 2. Which bird or birds seemed least adapted to picking up....
  - a. Flat clam pennies: \_\_\_\_\_
  - b. Fast marble beetles: \_\_\_\_\_
  - c. Toothpick stick bugs: \_\_\_\_\_
  - d. Small rice insects: \_\_\_\_\_
  - e. Bean slugs: \_\_\_\_\_

3. Which bird or birds survived to the end?  
\_\_\_\_\_

4. Which bird or birds died off first?  
\_\_\_\_\_

5. In this lab, what is the selection pressure? (What caused the adaptations to occur?)

\_\_\_\_\_

6. Suppose a drought caused the local extinction of all insects, slugs and clams. This allowed the drought-resistant “deep stick bug” to grow in their absence, which lives 12 centimeters underground. Using your knowledge of the steps of natural selection and the beak variations used in this lab, explain how the change in the environment would affect the populations of birds.

Round	1	2	3	4	5	6	7	8	
<b>Pelican (test tube holder)</b>									<b>Beans</b>
									<b>Rice</b>
									<b>Toothpicks</b>
									<b>Marbles</b>
									<b>Pennies</b>
<b>Finch (tweezers)</b>									<b>Beans</b>
									<b>Rice</b>
									<b>Toothpicks</b>
									<b>Marbles</b>
									<b>Pennies</b>
<b>Avocet (skewers)</b>									<b>Beans</b>
									<b>Rice</b>
									<b>Toothpicks</b>
									<b>Marbles</b>
									<b>Pennies</b>
<b>Spoonbill (spoon)</b>									<b>Beans</b>
									<b>Rice</b>
									<b>Toothpicks</b>
									<b>Marbles</b>
									<b>Pennies</b>

	Total	
<b>Pelican (test tube holder)</b>		<b>Beans</b>
		<b>Rice</b>
		<b>Toothpicks</b>
		<b>Marbles</b>
		<b>Pennies</b>
<b>Finch (tweezers)</b>		<b>Beans</b>
		<b>Rice</b>
		<b>Toothpicks</b>
		<b>Marbles</b>
		<b>Pennies</b>
<b>Avocet (skewers)</b>		<b>Beans</b>
		<b>Rice</b>
		<b>Toothpicks</b>
		<b>Marbles</b>
		<b>Pennies</b>
<b>Spoonbill (spoon)</b>		<b>Beans</b>
		<b>Rice</b>
		<b>Toothpicks</b>
		<b>Marbles</b>
		<b>Pennies</b>