

"Fill the Bill"

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Audubon at the Francis Beidler Forest

Overview: Students will experiment with different representations of bird bills and different representations of food to see how bills or beaks have evolved to obtain specific food items.


Connection to the Curriculum:

- 3-2.2 Explain how physical and behavioral adaptations allow organisms to survive (including hibernation, defense, locomotion, movement, food obtainment, and camouflage for animals and seed dispersal, color, and response to light for plants).
- 6-3.2 Summarize the basic functions of the structures of animals that allow them to defend themselves, to move, and to obtain resources.
- 8-2.1 Explain how biological adaptations of populations enhance their survival in a particular environment.

Suggested Grade Range:

Time: 30-40 minutes

Materials Needed:

1. Clipboard with pen and [record sheet](#) (one per station). 
2. Materials shown in columns with (*).

<u>Utensils*:</u>	<u>Represents:</u>	<u>Which eats:</u>	<u>Represented by*:</u>
1-7 tongs	crow	about everything	everything
1-7 tweezers	Prothonotary Warbler	seeds/worms/bugs	seeds/spaghetti/raisins
1-7 nails	woodpecker	bugs	raisins
1-7 clothespins	Yellow-crowned Night Heron	crayfish	bowtie pasta
1-7 droppers	hummingbird	nectar	colored water
1-7 staple removers	Red-shouldered Hawk	meat	staples in cardboard

Objectives:

1. Students will be able to describe how adaptations in bird bills allow different birds to find prey without competing directly with other birds.

Procedures:

1. Set up stations:
 - a. Clipboard with pen and [record sheet](#)
 - b. 2-4 students per station --one acts as recorder, the others act as birds
 - c. One food product per station

- d. One set of one kind of utensils per station
- e. Students rotate from station to station with their initial utensil, using it in the demonstrated way each time.
 - i. Station 1: Plate with hulled sunflower seeds on plate with extra plate
 - ii. Station 2: Colored water (nectar) in a cup with an extra empty cup
 - iii. Station 3: Raisins (insects) on plate with extra plate
 - iv. Station 4: Bowtie pasta (fish) on plate with extra plate
 - v. Station 5: Squares of cardboard with staples (meat) stapled into them and a plate
 - vi. Station 6: Spaghetti (worms) on plate and extra plate
2. Divide the class into 6 groups.
3. Explain that each food represents something that a bird might eat. Each utensil represents a bird's specific beak or bill. Most birds have bills, but raptors, such as hawks, owls, and falcons, have beaks. The different types of bills/beaks that birds have are adapted to the type of food they eat. Look at the different pictures of bird bills/beaks with the students to show them the differences on the sheet following this activity.
4. Students will be using their bill/beak utensil to see how much food they can collect. Explain the following rules for feeding:
 - a. A student may only pick up one piece of food at a time. Students must use their utensil, as it has been demonstrated to be used, keeping one hand behind their backs. It is not a problem if no food is collected.
 - i. tongs - grasped at the handle, used like pincers, no shoveling or scooping
 - ii. tweezers - grasped at the handle, used like pincers, no shoveling, scooping or stabbing
 - iii. nails - grasped at the head, no shoveling, or scooping
 - iv. clothes pins - grasped at the handle, used like pincers, no shoveling or scooping
 - v. droppers - grasped at rubber end, used by squeezing rubber end, no shoveling, scooping or stabbing
 - vi. staple remover - grasped at the handle, used like pincers, no shoveling or scooping
 - b. They should put the food into the empty plates/cup at each station.
 - c. After the 30-second time limit, the students will put down their utensil and count the number of each food item.
 - d. The recorder will write that number in the space on the data sheet.
 - e. Students will then replace the food (except staples) on/in the original plate/cup. At the teacher's signal, all groups will rotate clockwise one station. Each group will carry their utensils and clipboards to the next station.
5. The recorder for each group will place their group's data on a master chart (prepared by the teacher on board or overhead). A discussion might help students better understand the purpose and answer any questions they might have about adaptations and why they have occurred over time.
6. Ask each group to look at their data and decide which station was their best feeding station and which station was their worst feeding station.

7. Ask each group to share their best and worst feeding station and explain why they think this was the case. Two students, other than the recorder, should be chosen to explain either the best or the worst feeding station.
8. Compare and contrast the results for the various bills/beaks. Solicit opinions from the students as to why there is such a variety of bills and beaks. (If all birds had the same type bill/beak, they would all be competing for the same resources and some resources would be unattainable. By having a variety of bills/beaks, more species of birds are able to exist, especially within the same habitat. Few niches in nature go unfilled for long.)

Suggested Evaluation:

1. Teacher observation during the activity.
2. Explain why a heron would have trouble feeding like a hummingbird. (A heron's bill is designed to capture large prey like frogs, crayfish, or fish, so the heron would not be able to get its bill into a flower.)

Extending the Lesson:

1. Create a bar graph showing the results for each type of bill/beak at each station. Review the elements of a bar graph (title, labels on the X and Y axes, increments labeled).