Bird Beak Lab

Introduction:

In any habitat, food may be limited and the types of foods available may also vary. Animals that have variations that enable them to take advantage of available foods will be more likely to survive. We call beneficial inherited variations **adaptations**. *Adaptations are inherited characteristics that increase an organism's chance of survival.* Adaptations are not always present in an entire population. Only those with the most helpful adaptations for a specific environment will most likely survive and reproduce, a process known as **natural selection** or **survival of the fittest.** The individuals without the adaptation will fail to compete, and will either die or attempt to migrate. This process ensures that beneficial adaptations will continue in future generations, while disadvantageous characteristics will not.

Pre-Lab Questions:

1. **Define** the term adaptation.
2. **Describe** an adaptation that you have observed in a plant or animal and **explain**, using one example, how the adaptation helps the organism to survive in the environment.

Purpose:

The purpose of this lab is for you and each of your lab mates to separately design and build a different bird beak. The four members of your group will each design one of the following beak types:

Scooper (duck/pelican)   **Crusher** (parrot/grossbeak)

Grasper (seagull/hawk)   **Stabber** (kingfisher/humming bird)

Though your beak will resemble the beaks of real birds, it will still be totally new (real birds don't have paper beaks). New traits appear as a result of random mutations, so there won't be any one "perfect beak". Just like in nature, we won't know if your beak is well adapted until you try it. Before you begin, you each will need to create a hypothesis on which environment (sand, open space, constricted space, large objects) is best suited for your individual beak design.

Procedure:

1. Assign **one** beak type to each of your group members: *scooper, grasper, crusher, and stabber*.
2. **As a team**, design and build the four beak types using the supplies provided by your teacher and the specifications noted in Table 1.
3. Fill in Table 1 once your group's beaks are complete.
4. On your own, formulate a hypothesis (*"If…, then…, because…" format*) on which environment(s) your beak type is best suited for:
    - **Sand with "snails/small crustaceans"**
    - **Open space with "small seeds"**
    - **Constricted space with "insects/worms"**
    - **Large objects such as "seeds/nuts and fruit"**
5. Identify the variables of this experiment:
    - Independent
    - Dependent
    - Control
    - Constants
6. Once the teacher has instructed you to do so, go to the lab tables. You will rotate around 4 lab tables, each set-up with a different environment.
7. When the teacher says "go" you and your group will each use your bird beaks to compete for the "food" items at the same time, and place them into your cup (stomach). ***Note***: *you can only pick up the food items with your beak, not hands.*
8. When the teacher says "stop", count the food items in your stomach and fill in the data Table 2. Make sure to also write down your group member's data also.
9. As a class, you will rotate to the other 3 lab tables and complete the tests for all 4 different environments.
10. Return to your seats, create your graph and answer the analysis and conclusion questions.

Table 1: Bird Beak Specifications

Beak Type	Description	Dimension Requirements	Materials Used	Your Actual Dimensions
Scooper Beak	Beak should be designed to gather many small food items at a time.	6 cm long 4 cm wide < 5 cm height		
Grasper Beak	Beak is intended to grab or hold on to many different sized items.	8 cm long 3 cm wide < 4 cm height		
Crusher Beak	Beak should be large in order to pick up larger objects.	7 cm long 7 cm wide < 6 cm height		
Stabber Beak	Beak needs to be long and slim in order to be able to grab food items in small spaces.	11-13 cm long < 1 cm wide < 1 cm height		

Table 2: Amount of Food Collected by Each Bird Type in Different Environments

Write down how many of each food type each beak was able to consume in each environment.

Beak Type	Sand with Snails	Open Space with Seeds	Constricted Space with Insects	Large Objects with Fruits/Nuts	Total Food Items Collected
Scooper Beak					
Grasper Beak					
Crusher Beak					
Stabber Beak					

Table 3: Average Amount of Food Collected by Each Bird Type in Different Environments as a Class

Beak Type	Sand with Snails	Open Space with Seeds	Constricted Space with Insects	Large Objects with Fruits/Nuts
Scooper Beak				
Grasper Beak				
Crusher Beak				
Stabber Beak				

Results:

Using graph paper, make a stacked bar graph for the amount of food collected by each bird in the four different environments. Be sure to make an appropriate title, have a key showing the different types of beaks and label the axes.

Analysis and Conclusion Questions:
1. Which environment(s) was each beak most successful in? Give at least one reason that made them successful.
2. Which beak(s) were successful in at least one environment? Give at least one reason that made them unsuccessful.
3. How do new traits arise in the environment?
4. Define natural selection/ survival of the fittest.
5. How does the real world of bird survival compare to this lab?
6. Can evolution be observed in one lifetime of these birds?