**Bird Beak Natural Selection Lab**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_

**Purpose**  
To model and learn how natural selection can change a population over time.

To make predictions about a population based on their adaptations.

**Background**  
In any habitat, food is limited and the types of foods available may vary. Animals that have **adaptations** that enable them to take advantage of available foods will be more likely to survive. **Adaptations** are inherited characteristics that increase an organism’s chance of survival. Those with the most helpful adaptations have an advantage and are more likely to survive. They will be the most likely to live long enough to pass on their genes to the next generation. The beneficial adaptations will continue in future generations, while disadvantageous characteristics will die out. Understanding the concept of adaptive advantage is absolutely required for an understanding of how populations evolve.

**Pre-Lab Questions**

1. List the 5 points of natural selection

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**Materials**  
scissors, plastic spoons, tweezers, large binder clip, paper clips, rubber bands, toothpicks, dried macaroni or beans, plastic cups, cardboard box lids

**FOOD CODES:**

Macaroni Beetles (1 point each)

Toothpick Scorpions (4 points each)

Rubber Band Worms (2 points each)

Paper Clip Ants (3 points each)

**PART I: WHICH BEAK IS BEST FOR EACH FOOD?**

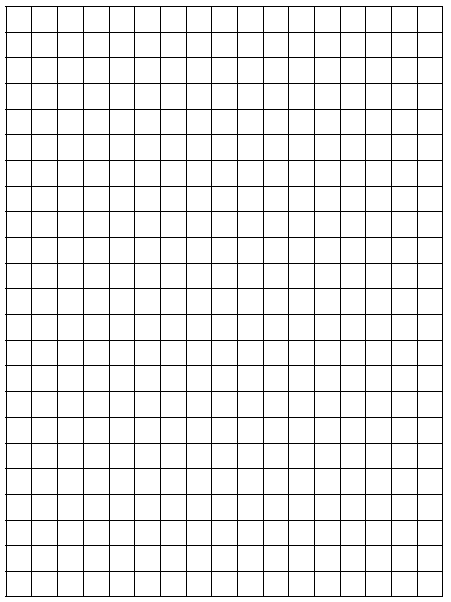
1. Each student in the group of 4 will be given a “beak” (spoon, tweezers, binder clip, OR pair of scissors). Each student will also get a plastic cup (their stomach).
2. You are now a very hungry Bird! You must hold your beak in one hand, and your stomach in your other hand, close to your body. Only food that is placed in the cup by the beak has been “eaten”. You may only eat ONE item at a time...otherwise your bird chokes and dies.
3. Food items will be placed in your “habitat”. When the teacher says, “Go”, you will have 20 seconds to get as much food as possible until the teacher says, “Stop!” or there is no food left.
4. When the teacher says, “Stop!”, students will count the contents of their stomach. Record your data in GROUP Data Table. Clean up food items.
5. You will run the simulation with Macaroni, Toothpicks, Rubber Bands, and Paper Clips, and all of them at once (disregard any food values right now).
6. After collecting your data, combine the class data and make a bar graph for each beak type and each of the food types. You will have 5 bars for every beak!

GROUP DATA

|  | **Macaroni** | **Toothpicks** | **Rubber Bands** | **Paper clips** | **All Foods** |
| --- | --- | --- | --- | --- | --- |
| **Spoon** |  |  |  |  |  |
| **Binder Clip** |  |  |  |  |  |
| **Clothespin** |  |  |  |  |  |
| **Tweezers** |  |  |  |  |  |

CLASS DATA

|  | **Macaroni** | **Toothpicks** | **Rubber Bands** | **Paper clips** | **All Foods** |
| --- | --- | --- | --- | --- | --- |
| **Spoon** |  |  |  |  |  |
| **Binder Clip** |  |  |  |  |  |
| **Clothespin** |  |  |  |  |  |
| **Tweezers** |  |  |  |  |  |



**PART II: NATURAL SELECTION SIMULATION**

1. Each person in the group will have 1 of the 4 beak types, and all foods will be present.
2. For the first round, every food type is present. Predict which beak will be most successful now. PREDICTION:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Compete for 20 seconds. Count up your food score using the codes on the front.
4. The lowest score in your group is now dead. If someone has a score of 0, they are also automatically dead. The highest score in your group survives AND reproduces! (The dead bird gets to act as the new baby, so if the winner was a spoon, you now have two spoons). Record how many of each beak type (including the new baby) are present at the end of this first round in the data table below.
5. A tsunami comes! It kills all the worms in the area, leaving only three food types. Predict who you think will be most successful, and run the simulation again with only 3 types of food. PREDICTION:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. The worms have returned, but a new predator has eaten all of the scorpions. Predict who you think will be most successful, and run the simulation again with only 3 types of food. PREDICTION:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. A drought comes, and only the ants have survived. Predict who you think will be most successful, and run the simulation again with only 3 types of food. PREDICTION:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DATA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Number of Spoon beaks left** | **Number of Binder Clip Beaks Left** | **Number of Clothespin beaks left** | **Number of Tweezer Beaks Left** |
| **ROUND 0** | **1** | **1** | **1** | **1** |
| **END OF ROUND 1: ALL FOODS** |  |  |  |  |
| **END OF ROUND 2: NO WORMS** |  |  |  |  |
| **END OF ROUND 3: NO SCORPIONS** |  |  |  |  |
| **END OF ROUND 4: ANTS ONLY** |  |  |  |  |

**Analysis Questions:**

1. Use the class data to determine which beak type was best for obtaining each food type.

\_\_\_\_\_ Macaroni A. Spoon beak

\_\_\_\_\_ Toothpicks B. Binder Clip beak

\_\_\_\_\_ Rubber Bands C. Tweezer beak

\_\_\_\_\_ Paper Clips D. Clothespin beak

\_\_\_\_\_ All foods together

2. What was the environmental pressure that caused some beaks to be successful?

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3. Explain how the 5 points of natural selection were demonstrated in Part II of the lab.

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4. Imagine that 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. Describe the evolution of this population over several generations.

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5. Which beak is “Best“ in your opinion? Explain why.

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6. Evaluate the following definition of evolution and explain two reasons why it isn’t accurate: “Evolution is when an animal (or other organism) changes to get better adaptations so it can survive”.

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7. Describe your results after PART II of the simulation. Which beak became more common? Why did it become more common?

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8. Explain why it would be bad to have a lack of variety for the birds if the environment kept changing.

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9. Describe a way that all of the birds could go extinct if we started with 10 of each beak type.

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