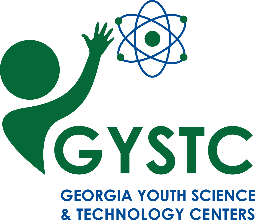
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**Birds of a Feather**

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| **Estimated Time:** 45 minutes – 1 hour | |
| **GSE Standard(s) and Element(s):**  **S7L4. Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments.** | |
| **Science and Engineering Practices:**  **Constructing Explanations and Designing Solutions**  Construct an explanation that includes qualitative or quantitative relationships between variables that describe phenomena. | **Disciplinary Core Idea:**  **Natural Selection**  Natural selection leads to the predominance of certain traits in a population, and the suppression of others. |
| **Crosscutting Concepts:**  **Cause and Effect**  Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. |
| **Authentic Scenario (Phenomena):**  Show the students a picture of a bird with an unusual beak, like the Rhinoceros Hornbill. Ask, “Why do birds have different shaped beaks?” | **Vocabulary:**   * adaptation * habitat * organism * species |
| **Guiding Questions:**  How do adaptations allow organisms to survive in their environments? |
| **Materials Needed (per group):**  “Food”:   * Gummy worms or rubber bands * Gummy or Swedish fish (placed in a large bowl of water) * Dry rice, lentils, sunflower seeds, or birdseed * Raisins or tiny marshmallows * Coffee stirrers or thin straws   “Beaks”   * Spoon (1) * Tweezers (1) * Small binder clip (1) * Tongs (1) * 4 plates for “food” stations * 1 bowl for “food” station * Water * Timer | **Safety Considerations:**   * N/A |
| **Technology Integration:**   * Device with Internet access to access video links. |

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| **5E Stage** | **Student Activities**  How will students engage actively in the three dimensions throughout the lesson?  **Teacher Activities**  How will the teacher facilitate and monitor student learning? |
| **Engage** | Remind students that all living things need food to survive. Ask, “how do different animals eat their food?”  After someone mentions birds, ask, “What are some different types of birds? Do they all have the same kind of beak? Do they all eat the same kind of food?”  Show the students a photo of a bird with an unusual beak (ex. Rhinoceros Hornbill). Ask, “Why do birds have different shaped beaks?”  For example, the Rhinoceros Hornbill’s beak has a feature called a casque that takes five or more years to develop. This casque is a hollow chamber that is thought to amplify the bird’s calls that may be involved in courtship and other social interactions. |
| **Explore** | Explain to the students that today you are going to find out how the features of a species become adapted to an environment.  Procedure:   1. In small groups, have the students set up five environments:  * Plate 1: Gummy worms or rubber bands * Bowl: Gummy or Swedish Fish in water * Plate 2: Dry rice, lentils, sunflower seeds, or birdseed * Plate 3: Raisins or tiny marshmallows * Plate 4: Coffee stirrers or thin straws  1. Have each student select a beak (spoon, tweezer, binder clip, or tongs). 2. Select an environment to start in. Tell the students that they will have one minute to “eat” as much food as they can with their beak. They may use the beak in any manner (grasping, scooping, spearing), but they may not gather more than one piece of food at a time. 3. Start the timer and have students gather as much food as they can for one minute, placing it in their cups. At the end of one minute, they should count how many food items they collected. Students should record the results on their Birds of a Feather Recording Sheet. 4. After they have recorded the results, they should carefully put the food back in the environment for the next bird. 5. Have students rotate through all the environments using the same beak type, recording their results for each different food type. 6. After the students have rotated through all the environments, students will share their data for their beak type with the rest of their group. |
| **Explain** | Review with the students that adaptations are any physical or behavioral property that helps an organism survive in its environment. Adaptations can be related to how an organism gathers food and eats, how it protects itself from predators and the environment, how it builds its home, how it attracts a mate, or other factors that help it survive. Ask, “Which of the “beaks” that we tried today was best suited for each “food” type?”  In each environment, some birds will have beak features that make them better suited to survive than others. Because of that feature, those birds will tend to reproduce, and those babies will have the same features. Over time, more and more birds will be born with “well-suited” bird beaks for that environment, and that feature will begin to be seen on many of the same kind of bird in that environment.  Introduce the STEM career of zoologist. Zoologists study animals and their interactions with ecosystems. They study their physical characteristics, diets, behaviors, and the impacts humans have on them. They study all kinds of animals, both in their natural habitats and in captivity in zoos and aquariums. They may specialize in studying a particular animal or animal group. Zoologists can work in zoos, wildlife centers, wildlife parks, and aquariums. They can also work in offices, laboratories, and universities. Zoologists earn bachelor’s degrees in zoology, wildlife biology, ecology, or general biology. Courses include classes on animal behavior and physiology, parasitology, virology, ecology, chemistry, mathematics, and statistical software. Research and faculty positions require a Ph.D. Outdoor skills can also be very helpful, so try to get experience with backpacking, camping, and wilderness survival.  **Differentiation:**  Preferential seating; Lower or higher leveled texts; Flexible grouping |
| **Elaborate** | * Whole Class Activity:   + Create an environment with one type of food.   + Give every student a beak.   + Allow one minute for students to pick up as much food as they can, following the rules from before.   + Record how much food was picked up.   + The beak type that picked up the least amount of food will be replaced with one of the other more successful beaks.   + Repeat until only one beak type remains. |
| **Evaluate** | Using the C-E-R Method, have students pick and bird and explain why the bird is well suited to its habitat. |

**Resources:**

<https://birdwatchingbuzz.com/what-are-the-different-types-of-bird-beaks/>

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**Birds of a Feather Recording Sheet**

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| **Food Item** | **Beak Type:**  **Binder Clip** | **Beak Type:**  **Spoon** | **Beak Type:**  **Tongs** | **Beak Type:**  **Tweezers** |
| **Gummy Worms or Rubber Bands** |  |  |  |  |
| **Gummy/Swedish Fish** |  |  |  |  |
| **Dry rice, Lentils, Sunflower seeds, or Birdseed** |  |  |  |  |
| **Raisins or Marshmallows** |  |  |  |  |
| **Coffee stirrers or Straws** |  |  |  |  |

**Questions:**

1. Is any beak type the best for all places where birds live?

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1. What happens to birds that can’t pick up food easily in the place where they live?

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1. What happens to birds that can pick up food easily in an environment?

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1. A snowshoe rabbit lives in a place where there is snow. How does the white fur help it to survive?

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1. Why might your fingers be an adaptation to the place where you live?

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