Natural Selection

Grade Level: 4, 5, 6, 7. 8

Duration: 45-60 minutes

Classification: Classroom

Subject(s): Biology, Ecology

Categories (STEM): Science

Keywords: Evolution, Natural Selection, Adaptations, Birds, Fitness

Introduction

- Summary: Students will learn the meaning of adaptation and natural selection as they act out the situations of Darwin's finches on the Galapagos Islands.
- Description: Students will test out the efficiency of different "beaks" by acting as birds, collecting different types of food sources with different utensils. Students will be able to conclude the meaning of evolution and how genes and adaptations affect reproducibility and survival of species today.

Online Resource: https://web.northeastern.edu/reseed/activities-and-labs/natural-selection-bird-beak/

Vocabulary

- **Organism**: Any living thing
- **Habitat**: The specific place or environment in which a plant or animal lives
- **Species:** A group of organisms that share common characteristics and are able to successfully reproduce
- **Natural Selection:** the process whereby organisms are better adapted to their environment and tend to survive and produce more offspring
- **Fitness:** quantitative representation of the ability of an organism to survive and reproduce
- **Evolution:** process by which organisms have changed and developed varying characteristics throughout time
- **Adaptation:** any physical or behavioral change 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, or other factors that help it survive

Materials

Materials	Quantity	Reusable?
Bird Picture Handout	2 total	Yes
Rubber Bands	1 bag (roughly 400 rubber bands)	Yes
Rice	1 bag per classroom	Yes
Lima Beans	1 bag per classroom	Yes
Dixie Cups	1 cup per kid	Yes
Plates	1 per 3 kids	Yes

Tweezers	1 per 3 kids	Yes
Spoons	1 per 3 kids	Yes
Timer	1 per 3 kids	Yes

Beak Types	**Food Sources**
Spoon (scoop neck for fish)	Rice (Seeds)
Fingers (short stubby insect eater)	Lima Beans (Insects)
Tweezers (nectar drinkers)	Rubber Bands (Worms)

Directions

- Give 5-10 min background on the vocab words above. Pass around a picture illustrating different birds' beak types.
- Have the other role model set up environment stations with food and beak types. Place food types on plates.
- Split students into groups of 3. Have students pick the beak type they will use at all stations (with different food types).
- Time students for 2 min to collect as many of their food type as possible with their beak, being careful to only gather food **ONE AT A TIME**. Have students record their number of food gathered after each round.
- Have students rotate through every station with the same beak type.

Activity Extension

- Other vocab words that can be used to extend the activity with further discussion questions or background including **Darwin, Finches, Galapagos Island, Gene Flow, Founder Effect, Bottleneck Effect, Invasive Species, Endangered Species, Food Chain, Reproducibility, etc.**
- Have students go through all stations with all beak types (rather than just 1).

Discussion Questions

- What birds could the beak types represent?
- Is any beak type the best for all places where birds live?
- What makes some beaks more suitable to food sources than others?
- Why do we only allow students to collect food one at a time? **representative of environment because food is not all in one location (to account for hunting)**
- Which beak gathered food the best? Which beak type was the most difficult?
- How and why do organisms evolve?
- What is an adaptation and how does it help survival?
- What are some examples of animal adaptations? What about humans? **see below**

What is happening?

- Students act as birds, using different "beak types" in different environments with different food sources. Students will be timed for 1 minute to collect as much food as they can in different environments, determining their fitness and survival.

Applications:

- Majors
  - Biology (Evolutionary Biology)
  - Entomology (insects exist, die off, and adapt more than any other type of animal; their evolution is highly studied)
- Jobs
  - Evolutionary Biologist,
  - Conservationist, Preservationist
  - Ecologist, Entomologist
- Hobbies
  - Fishing Limit (can't adapt as fast as we can catch them)
  - Fishing Jigs (we adapted to use bright jigs)
  - Bird watching
- Real world applications
  - DNR
  - Endangered and Invasive Species
  - Gene Flow
  - Adaptation Examples: **Camouflage, Echolocation, Horns, Poisons, Musks (smells from skunks and snakes), Regulate body temperature (burrowing), Secretion of sticky substances (spider webs, mucus coats on frogs, trapping prey and protection)**