

Habitats and Adaptations

9-12 Post-Activity

Lesson Summary

Through a multi-round simulation using tangible materials, students examine the process of natural selection, and observe likelihood that some adaptations are better suited for some habitats than others.

Objectives

Students will be able to simulate natural selection

Students will be able to identify advantageous characteristics in given environments

Essential Question

Why are adaptations important?

Materials

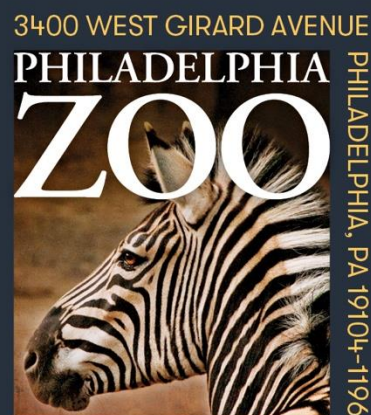
- Multiple colors of yarn (at least 5 different colors)
- Multiple types of fabric (1 for as many groups expected, at least 5 different patterns)
- Tweezers or other grabbing utensils (1 for every student)
- Cups or bowls (1 for as many groups expected)
- Paper (or worksheet such as provided at the end of the lesson)
- Writing utensils

Prep

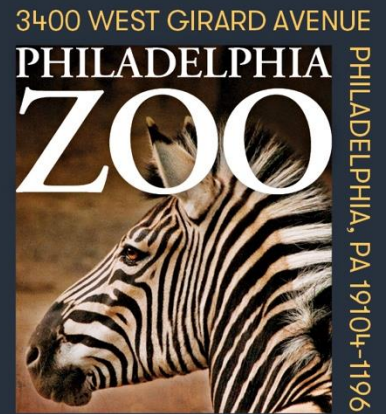
1. 1 Week before: Acquire and/or purchase any materials that might be necessary.
2. 1 Day before: Cut the yarn up into about 3 inch pieces. Then, while keeping a stash of each color separate and available, create multiple randomized groups of 20 pieces of yarn of various colors. Group the materials so that every group will receive one holding container and the proper number of grabbing utensils for as many students as will be in each group.
3. 1 Hour before: Print out worksheets as needed (1 for each group). Place one piece of fabric at separate tables, one for each group.

Key Terms

- **Habitat:** the natural environment of an animal or plant, where that living thing can find their food, water, shelter, and space
- **Competition:** the process of trying to get something that others are also trying to get
- **Adaptation:** features that an organism has developed that helps them meet their basic needs, survive, and multiple in their habitat
- **Behavioral Adaptation:** inherited behaviors of an organism that helps the success of the animal, such as searching for food, mating, or vocalizing
- **Physical/Structural Adaptation:** physical features of an organism that helps the success of the animal, including shape, covering, or armament
- **Physiological/Functional Adaptation:** special functions within the animal that helps the success of the animal, such as regulating temperature or making venom



- **Basic needs:** the absolute minimum resources necessary for long-term physical well-being and survival
- **Survival:** the ability to stay alive, especially through hard conditions
- **Food Web:** The entire flow of energy in an ecological community
- **Food Chain:** Flow of energy through a series of living things that feed on each other shows how living things get energy from the food they eat
- **Predator:** an animal that hunts other animals for food
- **Prey:** an animal being hunted, caught, and eaten by another animal
- **Biodiversity:** the variety of living things in terms of individuals, species, and ecosystems.
- **Natural Selection:** a process in which the organisms that have features that are best adapted to their environment survive and are able to reproduce, while those that are weak leave fewer or no offspring, leading to a population predominantly with these advantageous features overtime.



Background

All animals require food, water, and shelter in order to survive. Where an animal finds these basic needs are within their habitat. There are many different habitats, and they are characterized by physical and biological features. For a population of animals living in the habitat, there is competition amongst the individuals for these needed resources available.

An adaptation is a trait that helps an organism survive and succeed in the habitat that they live in. They help the animal obtain its basic needs while. Adaptations can include physical traits and structures, like body color and wings, as well as behavioral traits, like migration. If an animal is relocated to a different kind of habitat, its adaptations would not necessarily be suited for survival, and could possibly cause harm to its success.

Implementation

1. Excite: Ask students to think of an adaptation they would want to have if they could choose.
2. Ask students to consider why they might not be able to literally choose the adaptations that they have. Answers might include that our genetics are what determine our features, that the adaptations have to have existed in the species gene pool, or that the adaptations are specific to a certain habitat.
3. Ask students to consider then how adaptations become prominent in a population or in a given habitat.
4. Explore: After discussing, share with students that they will be exploring this process today. Share with the students that they will be taking on the role as a prey animal, trying to stay safe in their habitat. Split the students into groups in front of one of the pieces of fabric, representing their habitat. Supply each group a separate random assortment of the different colored yarn (about 20 pieces). Encourage students to hide their prey animals throughout the fabric, using the present adaptations in the best effort to camouflage in their habitat and avoid detection by predators. Give the students 1 minute to do so.
5. Then, ask the students to stand up and rotate around to a new table.

6. Share with the students that they will now be acting as a predator in the habitat in front of them. Provide each group with a holding container and grabbing utensils. Share with the students that they will be looking for food in the habitat, using their mouths (the grabbing utensils) to capture prey (the yarn), and placing them in their stomachs (the holding container). They should only grab one prey and only be use one hand to do so. Provide the students 1 minute find and eat as many prey as they can.
7. Invite students to keep the materials as they are but to return to their original tables. Ask the students to record how many of each color they started with, how many of each color remained in the habitat at the end of the round, and what percentage of those remaining were of each color.
8. Return as a class and ask the students to describe their habitat and to share which adaptations seemed more favorable in that environment, and which did not. Ask the students to consider why that might be.
9. Explain: Share with students that these adaptations are considered to be advantageous characteristics – those that are favorable in their specific environment. As students may remember, adaptations are features that an organism has developed that helps them meet their basic needs, survive, and multiple in their habitat and environmental conditions.
10. Elaborate: Ask the group to consider what might happen to these adaptations and features in the next population.
11. Share with the students that they will be doing the activity again to observe. However, their population needs to reproduce and grow first. Set the previously eaten population off to the side. For every piece of yarn that survived in the habitat, provide each group 2-3 pieces of that same colored yarn to symbolize the population growing. Ask the students to follow the same protocol of first hiding their population in its habitat, switching tables to act as predators, then returning to their table to record the population changes.
12. Ask the group to consider what might happen to these adaptations and features in the population overtime, if they were continue doing more rounds of repopulation and feeding.
13. Evaluate: Share with the students that through these rounds, they simulated natural selection of features within a population. Ask the group to use their experiences and observations to define and describe natural selection.

Expansion

Invite groups to do even more rounds to see how the population changes and make some inferences as to why.

A similar activity can also be completed outside in the grass with tricolored pasta.

Provide multiple pick up utensils (tweezers, tongs, spoons, chopsticks, etc.) to then discuss which utensil worked the best for this food type, and how mouth adaptations (like bird beaks) might be selected for in natural selection.

Curriculum References

3.1.12.A5, 3.1.10.C1, 3.1.12.C1, 3.1.10.C2, 3.1.12.C2, 3.1.10.C3, 3.1.12.C3, 4.1.10.A, 4.1.12.A, 4.1.10.C, 4.1.12.C, HS-LS2-1, HS-LS2-2, HS-LS2-6, HS-LS2-6, HS-LS2-7, HS-LS2-8, HS-LS4-6, HS-LS1-3, HS-LS3-2, HS-LS3-3

Name: _____

Date: _____

Adaptations are features that helps an organism to meet their basic needs and survive in their habitat. However, some adaptations are more beneficial that others, especially in changing environments.

You have been giving a population of organisms with different adaptations (colors) in a given habitat. Record the number of each adaptation present. After keeping these organisms safe and once prey have hunted for food the habitat, record the number of organisms that survived with each adaptation and calculate the percentage of that population that remained. Record and observe how these percentages change over multiple generations of repopulation and survival.

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Adaptation Color	Round 1			Round 2		
	Number at Start	Number at End	Percentage of remaining population	Number at start	Number at End	Percentage of remaining population

How would you describe and define the process of natural selection based on your observations from today's activity?

