

# PHILADELPHIA ZOO

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## Evolution and Variation of Traits (6<sup>th</sup>-8<sup>th</sup>)

### Objectives

1. Understand what evolution means and how it impacts life.
2. Understand why it is important to study the evolution of traits in a population.
3. Understand why evolution is important for conservation.

### Vocabulary

**Natural Selection:** the process whereby organisms better adapted to their environment tend to survive and produce more offspring.

**Evolution:** the process by which different kinds of living organisms are thought to have developed and diversified from earlier forms during the history of the earth.

**Genetic Variation:** differences in the genetic makeup between individuals, members within a population, or members within a species

### Recommendations

Read:

["Evolution: Why Did Fish Grow Feet?"](#) – Anne Rooney

Research:

- Animals or plants that have existed on this planet for a very long time
- Animals that have separately evolved the same adaptations (such as flight)

Discuss:

- What are some ways that humans have evolved over time? What makes us unique?

### Standards

**PA Academic:** 3.1 A1, 3.1 B1, 3.1 B2, 3.1 B4, 3.1 B5, 3.1 C1, 3.1 C2, 3.4 A3, 4.1 D

**Next Generation Science:** MS-LS1-4, MS-LS1-5, MS-LS3-1, MS-LS3-5, MS-LS4-1, MS-LS4-2, MS-LS4-3, MS-LS4-4, MS-LS4-6

**New Jersey Core Curriculum:** 5.1, 5.3D, 5.3E, 5.4B

**Common Core:** CCSS.ELA-LITERACY.RST.4, CCSS.ELA-LITERACY.RST.7, CCSS.ELA-LITERACY.W.7, CCSS.ELA-LITERACY.SL.1

# Endangered Species Survival

- Students will work in groups and as individuals
- Time needed: **60 minutes**
- Materials needed: writing utensils

## Classroom Activity

Use the included worksheets to have students complete the following tasks.

**As individuals:** Students should complete the questions on the first page of the worksheet. They should refer to the chart of squirrel population data and the definitions of 'adaptation' and 'fitness.'

**In groups:** The last page of the worksheet should be complete in pairs or groups. Students should work together to explore different scenarios that would impact their squirrel populations and discuss how these scenarios would impact different types of squirrels.

# Evolution by Natural Selection

Consider the definitions of **adaptation** and **fitness**:

**Adaptation:** a change or the process of change by which an organism or species becomes better suited to its environment

**Fitness:** an organism's ability to survive and reproduce in a particular environment

Examine the following population and the characteristics exhibited by the members of this population.

Characteristics of female squirrels	Color of fur and adaptations		
	<b>Grey</b>	<b>Brown</b>	<b>Black</b>
% of female population	60	25	15
# offspring surviving to adulthood	12	6	4
average life expectancy	4 years	2 years	1 year
primary habitat	whole forest	forest edge	dense forest
primary predators	owls	owls	foxes

1. According to the data in this table, which color variation of this population is best adapted to its habitat? Explain your thinking.
  
  
  
  
  
  
  
  
  
  
2. What adaptation of the grey squirrel do you think is most influential on its fitness?
  
  
  
  
  
  
  
  
  
  
3. If offspring always have the same color fur as their mother, which color will experience the most population growth over the next 4 generations? Explain your thinking.

4. Form a group with a few of your classmates. Work together to complete the following chart. You are given different scenarios that affect the squirrel population. Consider how these pressures will influence the overall population and indicate whether you think the number of each fur color will increase, decrease, or stay the same. An example is provided.

<b>Pressure</b>	<b>Grey</b>	<b>Brown</b>	<b>Black</b>
Owl populations decline	↑	↑	—
Fox populations decline			
A new species of squirrel is accidentally introduced by humans. These squirrels primarily inhabit dense forest environments.			
A change in climate alters the life cycles of the trees on the forest edge, reducing the number of nuts and berries (primary food source for squirrels) they produce.			
Humans begin clearcutting a portion of the forest. Though the overall size of the forest decreases, the perimeter of the forest increases.			
Pollution causes a change in plant growth. While grey squirrels once had the best camouflage, the changing color of the forest floor helps brown squirrels camouflage.			
A new predator has spread into the forest from a nearby location. This predator primarily lives in the perimeter of the forest.			

5. Over time, the squirrel population changes and now looks like this:

Characteristics of female squirrels	Color of fur and adaptations		
	<b>Grey</b>	<b>Brown</b>	<b>Black</b>
% of female population	20	75	5
# offspring surviving to adulthood	6	10	2
average life expectancy	2 years	3 years	6 months
primary habitat	whole forest	forest edge	dense forest
primary predators	owls	owls	foxes

How has this population evolved? What pressures may have acted on this population that would cause this change in frequency?