



Super Selection

7th Grade

Duration

Pre-Visit: 40 minutes

Museum Visit: 60 minutes

Post Visit: 50 minutes

Location

Age of Mammals Hall

Supplies

- Worksheet
- Pencil
- Clipboard (optional)

Standards

[NGSS](#)

MS-LS2-1, MS-LS2-2, MS-LS2-4, MS-LS3-1, MS-LS4-1, MS-LS4-2, MS-LS4-4

[S+E Practices](#)

6, 7, 8

[CCSS ELA](#)

RST.2, RST.9, SL.4

[CA State](#)

ELA Research and Technology 1.4

Science 3.a.b.c.d

Vocabulary

Evolution · Climate · Adaptation · Predator · Prey · Natural Selection · Selection Pressure · Food Source · Geology · Fossil · Comparative Anatomy

Concepts

- Natural selection is the process by which evolution occurs.
- Natural selection was first defined by Charles Darwin
- Evidence from geology, fossils and comparative anatomy provide support for the theory of natural selection.
- Extinction occurs when selection pressures change and the adaptive characteristics of organisms are insufficient for its survival.

Objectives

- Students will understand what natural selection and selection pressure mean in regards to evolution.
- Students will be able to identify examples of selection pressures
- Students will research the selection pressures that have influenced the evolution of a particular species.
- Students will present their research to the class.

Outline

1. In one classroom session before visiting the Museum, review vocabulary, read about and discuss Charles Darwin and his ideas regarding evolution and natural selection.
2. During a trip to the Museum explore the Age of Mammals Hall, where students will research an animal and selection pressures that drove its evolution.
3. Back in the classroom, students will work in groups to create a poster of their research and present their findings to the class.

Pre-Visit

In the classroom, print out and distribute the vocabulary list and the biography of Charles Darwin.

Next, show the images (below) to the class. You may choose to show students images as a digital slide show or print them out. Use questions on the slides, and encourage students to share their responses with a partner or the class using the new vocabulary words.

Museum Visit

Distribute the graphic organizer (Research) to at the Museum. Gather students in front of the Early Mammal and Evolution Explosion exhibits and ask the following questions:

- How might the early mammal relate to the modern mammal seen here?
- What physical differences do you see?
- What selection pressures might have led to those adaptations? (reference terms on vocabulary list)

Divide students into groups of four or five and assign each group an animal in the exhibit (extant or extinct) and ask students to explore how at least three of the selection pressures discussed affected it:

- Climate (Challenges of Mammals)
- Food supply (Grasslands)
- Survival (Predator/Prey)

Students should use their graphic organizer to record research notes and sketch images about selection pressures. Encourage students to circulate the hall and use critical thinking as they collaborate and take notes.

Post-Visit

Gather students in their groups from the Museum and have them compare notes from their graphic organizer. Have each group create a poster that presents the research of their animal, using images and text.

If students were prolific, you may choose to have them focus on only one aspect of their animal that changed, or one selection pressure.

The group should work together to present their research to the rest of the class using the poster.

Variations & Extensions

- Have students share findings informally in the Age of Mammals hall.
- Instead of a poster, ask students to write a multi-paragraph essay, create a digital slideshow (such as a PowerPoint), or make a short video exploring the evolution of their selected mammal.

Organisms Evolve in Response to Selection Pressures



Early Whale

Pygmy Sperm Whale

Food Sources



This animal's ancestor was a browser—it ate shrubs and bushes.

What do you think this animal ate?

What might the change in diet say about the environment?

Interactions with Other Organisms



Was this animal a predator or prey?

How might have this animal pursued its food?

What adaptations do you see that support your ideas?

Climate Change

In what ways is climate change be impacting this animal?

What adaptations might be selected for?

What might a future version of this animals look like? Or will it exist at all?



Vocabulary List

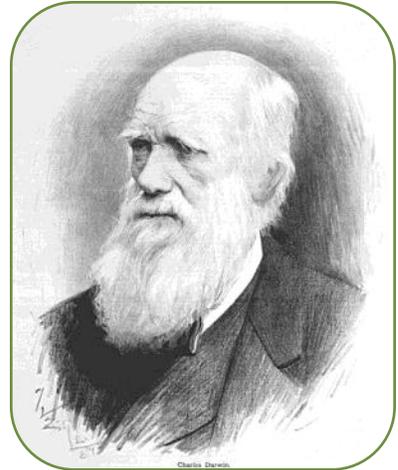
Review and become familiar with these terms prior to visiting the Natural History Museum

Vocabulary	Definition
Evolution	The change in organisms (as a consequence of changes in their genes) over time due to selective pressures from their environment.
Climate	Temperature, humidity, atmospheric pressure, wind, rainfall, and numerous other meteorological elements in a given region over long periods of time.
Adaptation	A feature an animal has (physical) or does (behavioral) that is important for the animal's survival.
Predator	An animal or organism that eats other animals or organisms for its food.
Prey	An animal or organism that is consumed by a predator for food.
Natural Selection	The process through which traits that aid survival and reproduction become more common, and traits that hinder survival and reproduction become more rare.
Food sources	Where and how an organism gets its food.
Geology	The study of the earth and its history as recorded in rocks and minerals
Fossil	Evidence of pre-historic life. A remnant or trace of an organism of a past geologic age, such as a mineralized skeleton, leaf imprint, invertebrate trapped in amber, or mummified and frozen organisms.
Comparative Anatomy	The study of similarities and differences in the anatomy of organisms.
Selection Pressure	A force that causes a particular organism to evolve in a certain direction, i.e. the forces that drive Natural Selection

Charles Darwin

Read the information below to learn more about Charles Darwin.

Born Feb. 12, 1809 to a wealthy family, Charles Darwin was a British naturalist who eventually became famous for his theory of natural selection. As a student, he studied medicine at the University of Edinburgh and biology at Cambridge. Darwin was recommended for the naturalist position on the ship the HMS *Beagle*, which was bound on a long scientific survey expedition to South America and the South Seas (1831 - 1836).



Darwin's zoological and geological discoveries on the voyage resulted in numerous important scientific publications and formed the basis of his theories of natural selection. Seeing competition between individuals of a single species, he recognized that within a population any given individual may have a better chance of survival because that individual possess certain traits that others do not.

For example, a bird that has a sharper beak might have more success finding and eating food, and thus have a better chance of survival. Survivors are most likely to reproduce and pass on that trait to new generations, making it predominant in future populations. Darwin coined this process natural selection, defining it as the mechanism by which advantageous variations were selected for by being passed on to later generations and less advantageous traits were selected out, gradually disappearing from a population.

Darwin worked on the theory of natural selection more than 20 years before publishing it in his famous book, *On the Origin of Species by Means of Natural Selection* in 1859. The book was both popular and controversial: although Darwin was a religious man himself and once considered a career in the church, his theory of natural selection was attacked by those who felt it was contrary to the teachings of the Bible. Today Darwin's theories are embraced by nearly all scientists and are the starting point for the modern study of evolutionary biology, even as the religious arguments continue. Darwin published many other books and pamphlets on the topic in later years, most notably *The Descent of Man* in 1871.

Research

Explore the Age of Mammals Hall and collect information about your chosen animal and the selection pressures that affected its evolutionary process. You'll then present this information to your peers.

Animal:

What was its Food Supply/Environment:

How did it have to adapt to access the food? Why?

What are some ways it interacted with others organisms?

What physical features contributed to the success or failure of these interactions? What do you see that makes you say that?

What was its climate like, did it change?

How did this animal survive in this climate? What might have/did happen when the climate changed?

Research Continued

Use this space for additional notes and research.