Investigating Adaptations

4th Grade

Duration
Pre-Visit: 40 minutes

Museum Visit: 60 minutes

Post Visit: 50 minutes

Location
Age of Mammals Hall

Supplies
- Worksheets
- Pencil
- Clipboard (optional)
- Images of specimens
- Mask making supplies

Standards
NGSS

LS1.A, LS1.B, LS1.C, LS1.D, LS2.C, LS2.D, LS3.A, LS3.B, LS4.A, LS4.B, LS4.C

S+E Practices

2, 3, (4), 6, 7

CCSS

SL.1.b.c.d, SL.2

CA State

ELA 2.1.a.b.c , 2.4

Science Grade 3

Life Science 3.a.b

Vocabulary
Organism ·Observe · Plausible/Random · Ecosystem · Climate · Predator/Prey · Adaptation · Extinct/Extant · Food source · Geology · Fossil

Student Work

Concepts

- Adaptations reveal what organisms need in their environment to survive.
- Changes in an organism's adaptation indicate changes in the environment.

Objectives

- Students will understand that adaptations reflect an animal's environment and changes in that environment.
- Students will create narrative presentations.
- Students will recite brief poems using figurative language and a creative voice to showcase their new knowledge.

Outline

1. In one classroom session before visiting the Museum, review vocabulary and discuss how animals' adaptations reflect their environment. Choose an animal to focus on, and make a mask representing that animal.
2. During a trip to the Museum students will explore the Age of Mammals exhibit and conduct a case study on a specific mammal by reviewing the walls, drawings, diagrams, text, and figures. Students will answer questions regarding the mammal and its environment.
3. Back in the classroom, students will share and discuss their findings through writing and performing poetry.

Pre-Visit

In the classroom, go over the vocabulary below (the definitions presented relate to the content of the Age of Mammals Hall).

Term	Definition
Ecosystem	An area within the natural environment in which physical factors, such as rocks and soil, interact with organisms, such as plants and animals, within the same habitat to create a stable system.
Climate	Temperature, humidity, atmospheric pressure, wind, rainfall, and numerous other meteorological elements in a given region over long periods of time.
Predator	An organism that hunts other organisms for food.
Prey	An organism that is hunted.
Adaptation	Something an organism has (physical) or does (behavioral) to help it survive in its habitat. For example, a horse species' tall teeth are an adaptation to grind tough grass
Extinct	A species that no long exists as a living organism. An organism becomes extinct when the last existing member of that species dies.
Extant	A species that is still alive today.
Food Sources	Where and how animals find their food.
Geology	The study of the earth as recorded in rocks and minerals.
Fossil	Any evidence of ancient life. A fossil can be bones, teeth, poop, a frozen mammoth or even a bug trapped in amber.

Show the images (below) to the class and discuss them together using the notes are provided to guide the discussion. You may choose to show them via a digital slide show or print them out to share.

Teacher Notes for Specimen Images

Explain that organisms rely on their habit (ecosystem) for survival, we see this through their *adaptations*. When we observe adaptations closely, they tell us about an animals life, including how and where they lived. This is true for both modern day, or *extant*, animals as well as ancient, or *extinct*, animals that have fossilized. *Fossils* tell us about what ancient animals ate, what kind of environment they lived in, and even how that environment has changed over time.

Animals & Environment Change Together

The animal pictured here lived approximately 65 million years ago! Though it is hard to tell from these pictures, a skilled scientist can see clues that tell use that this specimen is an early ancestors to modern day whales, and is even referred to as a *walking whale*! Whales' bodies have changed over time, telling us that the environment they lived in has changed over time as well, from a land-based environment to a water-based environment.

Food Sources Indicate Environment

This specimen is an early horse. By looking carefully at adaptations on this fossil, we can infer a lot about the diet and environment of ancient horses. What do you think this animal might have eaten? (probably a diet rich in grass since the teeth are so tall and flat. Though you can't see the teeth very well in this picture, but notice that the jaw is large to make room for tall teeth!) Once you have figured out what this

animal ate, this gives you a clue about where it lived. If you are an animal that eats grass, chances are you live in a grassland! There is also other evidence we can see on the fossil to support that this animal lived in a grass land. The long legs and single toe that might be used to run quickly through an open environment, and eyes that are placed on the side of the head, ideal for keeping watch for predators in an open environment. Grasslands require a particular kind of climate to grow in, so we can even tell what the weather must have been like thousands of years ago. Early ancestors of the horse had shorter teeth that were more pointy and adapted to browsing (eating leaves and twigs), and smaller bodies with short legs and multiple toes. This kind of body is better adapted to living in a forested or shrubby environment. The change in the horse tells us there was a change in the environment!

Adaptations Indicate Environment

Like the horse, this saber-toothed cat fossil can tell us a lot about what this animal ate, how it behaved, and give some hints about its environment. Look closely at this animal: what do you think this mammal ate (is it predator or prey)? What do you see that supports your hypothesis (prediction)? i.e. What makes your idea plausible? Large sharp teeth indicate a meat-based or carnivorous diet, and claws at the end of legs with big bones (lots of muscle attachment) would suggest this animal is a predator. The big teeth in the front would are long and slender and may easily break if they bit into something hard like bone, so they were likely used to deliver a killing blow to a soft-part of the body. Also note the short tail—unlike cats that use a long tail to counter balance sharp turns (like cheetahs or lions) this cat has a very short tail, which might suggest it pounced its prey rather than chasing it. What kinds of things would an animal with this kind of hunting style might need in its environment? (for example, prey items that are big enough to support it and have fleshy exposed areas, places to hide in order to pounce).

Extant Mammals

Of course, we can see how animals have changed over time (and how their environments have changed over time) by looking at the adaptations of animals alive today also! At this image, have students form small groups with 4-5 students each and assign each group one of the mammals on the slide to observe. Each group should try and come up with one adaptation on the animals that might indicate what kind of environment it lives in. Students should their observations to explain why their prediction is plausible.

Hand out the Worksheet 1, and ask each group to pick a mammal —ancient or present day—to focus on and circle it on the worksheet (or otherwise indicate their choice). Provide each group with supplies to create a mask of chosen mammal to be used in post-visit activity, students should do their best to emphasize an adaptation. Collect worksheets at the end to re-distribute at the Museum.

Museum Visit

Hand back the first worksheet, and gather students in front of the Cheetah and Cheetah Skeleton ("What is a Mammal" exhibit case) and ask the following questions:

- In what kind of habitat does this animal live?
- What other organisms participate in the same ecosystem?
- What is the climate like?
- What kind of diet does this animal have?
- Is this animal extinct or extant? Why or why not?

Then divide students into their groups and assign each group a starting point:

Skeletons

- *Canus dirus* (Dire Wolf)
- *Miohippus* (Western Horse)
- *Smilodon* (Saber-tooth Cat)
- Gazelle
- Cheetah skeleton

Taxidermy

- Siberian tiger
- Cheetah
- Zebra
- Alpaca
- Polar Bear

Students will use the worksheet to take notes on their mammal. Encourage students to think critically and collaborate.

Post-Visit

Have students gather in their small groups from the Museum and compare notes and findings from their worksheet.

Hand out the second worksheet and ask each group to collaboratively compose a five-stanza poem based on the mammal investigated at the Museum. Give the students time to work out a presentation for the poem, using the rubric as a guidelines.

Assess students using the rubric provided.

Variations & Extensions

- Have students share finding informally in the Age of Mammals Hall
- Look at Charles Knight paintings of ancient ecosystems in Rotunda 2nd floor (next to the Age of Mammals Hall)
- Students create a drawing or diorama of the ecosystem of their mammal
- Have students score each other during the poetry performance.

Animals & Environment Change Together

Food Sources can Indicate Environment

What do you think this animal used to eat?

What evidence makes this idea plausible?

What might the food tell us about the environment it lived in?

Adaptations can Indicate Environment

Was this animal a predator or prey?

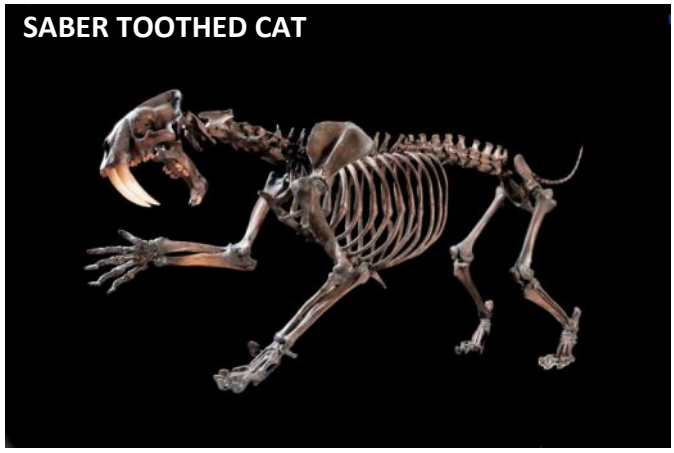
What do you see that makes you say that?

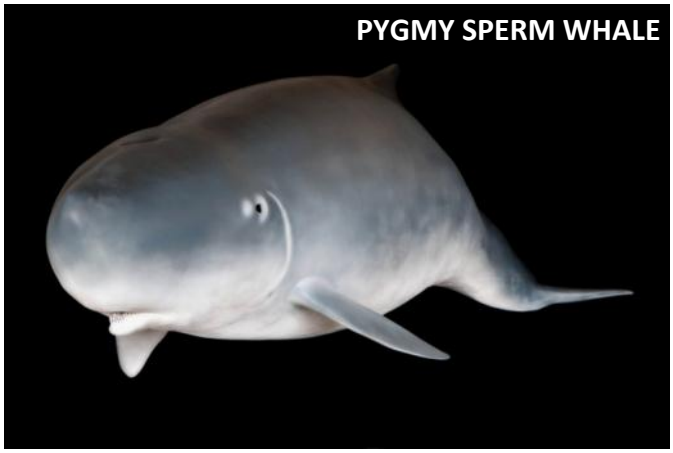
Extant Mammals

Investigating Adaptations

Case Study

Choose an animal below to investigate more closely!





Investigating Adaptations

Case Study

Use the boxes below to record research about your chosen animal. Remember to check the text, diagrams and pictures on the walls, labels and interactive screens to find the information.

Describe the Environment of this animal, include what the habitat and climate were like, and what other organisms lived in the environment.

What adaptations does the animal have that might reflect its environment?

Is this animals extant or extinct? What might be some reasons for this?

Investigating Adaptations

Poetry Presentation

Using the questions below to help inspire you, write a 5-stanza poem from the perspective of your animal with your group. Include figurative language and creative voice. Your team will present the poem to the rest of the class while wearing your masks!

Stanza 1: My Home

What does it feel like? What sounds do you hear? What do you see around you?

_____

_____

_____

Stanza 2: The Climate of My Environment

Is it warm or cold? Humid or dry? How does your skin or fur feel? What does the air taste/smell/feel like?

_____

_____

_____

Stanza 3: The Plants and Animals that Live with and Around Me

What colors surround you? What kind of plants grow? Do the plants make noise? How do you feel when you see the other animals?

_____

_____

_____

Stanza 4: My Food

What tastes good to you? What is the texture of the food you eat? Where do you find the food? How do you get the food?

_____

_____

_____

Stanza 5:My Existence

Are you extinct or extant? Does your home or environment still look the same? What do you see/hear/ smell? Where are you now?

_____

_____

_____

Poetry Presentation Rubric

Name of presenter(s):

How well did the student...

1. Incorporate big ideas from the Museum into the poem?

4 3 2 1

2. Speak clearly and loudly?

8 6 4 2

3. Recite the poem from memory?

12 9 6 3

4. Use his or her voice and mask to deliver meaning to the words:
i.e. did they do more than just read the poem?

8 6 4 2

6. Present the poem in a professional manner?

8 6 4 2

TOTAL: ____ / 40