

Land of the Mammoth: Teacher's Guide

Grade Level: 9-12

Curriculum Focus: Life Science

Lesson Duration: Three class periods

Program Description

Once scientists extracted a 20,000-year-old woolly mammoth from the northern Siberian tundra, they had to overcome the challenges of moving and preserving the frozen animal so they could study it. Discover how they gleaned important information from the tiniest bits of evidence—and what that evidence reveals.

Onscreen Questions

Part I— Before watching the video

- What do you know about the investigative methods of paleontologists?
- As you watch the documentary, consider how the analysis of the mammoth tells us about the environment in which it lived. What important steps do the scientists take to ensure that their analysis and results have integrity?

Part I— After watching the video

- According to the documentary, scientists learned about the Jarkov mammoth's life from its teeth and tusks and from plants found preserved alongside it. Discuss how scientists can reconstruct the past by analyzing fossil evidence.

Part II— Before watching the video

- What do you know about the extinction of wild animals today?
- As you watch the documentary, pay attention to the circumstances surrounding the extinction of woolly mammoths. How might similar circumstances be the cause for modern-day extinctions?

Part II— After watching the video

- According to the documentary, scientists have developed three main theories to explain the extinction of the woolly mammoth. Discuss the actual evidence that supports each theory.
 - How might understanding the woolly mammoth extinction help prevent future extinctions of other endangered species?
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Lesson Plan

Student Objectives

- Understand the difference between the terms “ice age” and “Ice Age.”
- Understand what causes ice ages.
- Learn about animals that lived during the Ice Age.
- Understand why some Ice Age animals became extinct.

Materials

- Paper
- Pens or pencils
- Computer with Internet access (optional but very helpful)

Procedures

1. Ask students what they know about the Ice Age. What images come to mind? How did the Ice Age change Earth and its living things?
2. Then ask students how we have learned about the Ice Age. Help them understand that we study fossils to learn about extinct plants and animals. Make a class list of different kinds of fossils, including bones, teeth, tusks, seeds, and hair.
3. Tell students that they will conduct research about the Ice Age and animals that lived then. Divide students into five groups. Each group will work on the three questions listed below; they may want to form subgroups to answer the parts of each question. Web sites with essential information follow each question. Have students record their answers on a separate sheet. (Brief answers are in italics.)
 - (1.) What is an ice age? What does “Ice Age” mean? When have ice ages occurred, and what has caused them? (During ice ages large areas of Earth’s surface were covered with ice sheets. “Ice Age” refers to the last major glaciation that occurred in North America and Eurasia during the Pleistocene epoch. Causes include Earth’s plate movement, reduced atmospheric carbon dioxide, and changes in Earth’s orbit.)
 - http://museum.state.il.us/exhibits/ice_ages/
 - <http://school.discovery.com/homeworkhelp/worldbook/atozscience//270780.html>
 - (2.) What animals lived during the Ice Age? Where have animal remains been found and what they have taught scientists? (Among the many animals are the mastodon, mammoth, saber-toothed tiger, dire wolf, and snowshoe hare. Remains have been found at La Brea Tar Pits, Eastside Reservoir Project, and sites in the Midwest. They show what these animals probably looked like and what they may have eaten.)
 - <http://www.tarpit.org>
 - <http://more.abcnews.go.com/sections/scitech/mastodon710/index.html>



- <http://www.zoomdinosaurs.com/subjects/mammals/Iceagemammals.shtml>
- <http://museum.state.il.us/exhibits/larson>

(3.) Why did many animals become extinct at the end of the Ice Age? (Some scientists believe that overhunting eliminated the mammoth, which led to the extinction of more species. Others believe rising temperatures, changing rainfall patterns, and melting glaciers caused changes that resulted in animal extinction.)

- http://museum.state.il.us/exhibits/larson/env_change_extinction.html
- <http://museum.state.il.us/exhibits/larson/overkill.html> Hearing dogs for the deaf

4. Have each group share their findings. What have students learned about the relationship of the Ice Age environment and its animals? What is the relationship between the Ice Age's changing environment and the animals that became extinct?
5. Have students complete the following take-home assignment. The purpose is for students to apply what they learned about the Ice Age to modern times.

Giving a Scientific Opinion

You are a scientist who has been asked if Earth is undergoing a period of global warming. How can you tell if global warming is occurring? (Hint: What happened to carbon dioxide levels during the Ice Age?) What effect do environmental changes have on the animals living now and those in the future? Should scientists try to stop global warming? If so, how?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Answered all the questions on the classroom activity sheet accurately. Participated in most class discussions. Wrote a clear and thoughtful response to the questions on the take-home activity sheet.
- **2 points:** Answered most of the questions on the classroom activity sheet accurately. Participated in some class discussions. Wrote a clear and thoughtful response to the questions on the take-home activity sheet, but had some errors.
- **1 point:** Answered few of the questions on the classroom activity sheet accurately. Participated in no class discussions. Wrote responses to the questions on the take-home activity sheet, but had many errors or did not complete the assignment.

Vocabulary

glaciation

Definition: The process by which glaciers spread over the land

Context: Evidence of glaciation is visible in the broad valleys of the northern United States.

Ice Age

Definition: The Pleistocene glacial epoch (2 million to 11,500 years ago), when ice sheets covered vast regions



Context: The Ice Age ended about 11,500 years ago, when most glaciers retreated.

mastodon

Definition: A large mammal that lived during the Pleistocene; related to the elephant

Context: Mastodons looked similar to woolly mammoths, but had shorter tusks and bodies.

paleontology

Definition: The study of life from past geological periods as known from fossil remains

Context: Paleontology provides clues about the environment, animals, and plants living on Earth millions of years ago.

woolly mammoth

Definition: A large mammal that lived during the Pleistocene; related to the elephant

Context: Scientists have found preserved specimens of the extinct woolly mammoth in Siberia.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Earth Science: Energy in the Earth System
- Life Science: Biological Evolution

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit link:

<http://www.mcrel.org/compendium/browse.asp>

This lesson plan addresses the following national standards:

- Science – Life Sciences: Understands relationships among organisms and their physical environment; Earth and Space Sciences: Understands atmospheric processes and the water cycle
 - Language Arts – Writing: Uses the general skills and strategies of the writing process, Gathers and uses information for research purposes
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>