
INTRODUCTION

Significance of Mammoth Cave National Park

Mammoth Cave was designated as a national park in 1941 because of its beautiful hills and valleys, the scenic rivers, and the vast cave system located within its boundaries.

Mammoth Cave National Park contains the world's longest known cave system and offers internationally renowned examples of karst topography. Many types of cave formations are present within this extensive 350-plus mile cave system. The park is part of what is believed to be the most diverse cave ecosystem in the world.

In addition to the cave system, the park is noted for its outstanding scenic rivers, valleys, bluffs, forests and abundant wildlife. Outstanding physiographic features include karst terrains, sandstone capped plateaus, and bluffs overlooking rivers and streams, which provide an unusually wide variety of ecological niches.

The geologic and cultural time line for the park extends prehistorically from the Middle Mississippian Period (300-350 million years ago) to the Paleo-Indian period (10,000 BC to 15 AD). The historic time frame begins with early settlement (1774-1825) and continues through the Depression Era (1929-1941). Representing these time periods are fossil remains, prehistoric and historic archaeological sites, and standing structures on the surface and in the cave.

On October 27, 1981, Mammoth Cave National Park became a World Heritage Site and on March 27, 1990 it was designated as an International Biosphere Reserve.

Paleontology

Paleontology comes from the Greek word for ancient life. Paleontology studies the remains of living things. The Earth is dynamic and nothing remains the same for long. The Earth has been changing for 4.6 billion years. Climates change, rivers and glaciers alter course, seas rise and fall. Animals and plants flourish and then die to make room for new forms. The sediments that are laid down change. To give order to these changes, the scientists developed a scale that divides time into meaningful periods. This time scale is called geologic time.

Fossils are a record of life as it has evolved through geologic time. Fossils are invaluable to scientists in reconstructing prehistoric environments. These life forms have been buried in the earth, buried in the sea, and captured in rock. They have been preserved in peat, tar, ice, and amber. They may be unchanged from the originals, or they may be a mineral replacement. They range in size from dinosaur skeletons to tiny plants and animals that can only be seen under a microscope. Most fossils are formed from the hard parts of plants and animals such as shells, bones, teeth, or wood. Eggs, footprints and burrows can also be fossilized. The study of fossils indicates that life originated on the earth 3 billion (3,000 million) years ago. Since that time there has been a succession of plant and animal species. Most are now extinct and only a few remain as fossils. When one considers how quickly organisms are destroyed after death it is remarkable that fossils are as common as they are. Remains that can be destroyed by scavengers, bacteria, chemical decay and erosion make the odds against preservation extremely high.

Paleontologists are scientists who seek to understand the succession of plants and animals through time. They try to determine how these creatures lived, how they grew and how they died. They try to answer questions concerning the web of life, interactions between organisms, and interactions between organisms and their environment. Around the world, researchers are studying thousands of sites, excavating fossils, and transporting them back to laboratories where they are reconstructed. The main clues for reconstruction come from comparisons with living plants and animals. The rules that govern how animals and plants cope with life are presumably the same today as they have always been. Some of the organisms that lived on earth left no descendants, but many are still represented. These "living fossils" can provide clues to the way long-dead organisms looked and functioned.

The world of fossils is never static. Paleontology is continually growing and evolving.

Paleontology and Geology

Geologic time is a measurement of the past. Without a measurement tool, objects and events could not be placed into proper relationships. The divisions of geologic time are made on the basis of life that existed at the time.

A geologic column indicates the types of rock that were deposited.

The rocks of Kentucky were laid down in water. Soft mud is often converted to shale. Loose sand and gravel become converted to sandstone and conglomerates. The third type of sedimentary rock is limestone, which is precipitated from seawater. Limestone is also formed from the shells of dead sea animals. Heat, pressure, and chemical action may change these three kinds of sedimentary rocks into a variety of metamorphic rocks.

The rocks of Kentucky belong to the Paleozoic Era. The periods within this era are: Ordovician, Silurian, Devonian, Mississippian, and Pennsylvanian. The Mammoth Cave region of Kentucky was primarily a result of events which occurred within the Mississippian period.

Paleontology and Mammoth Cave

Marine invertebrates existed in the Mississippian Sea that covered Kentucky 300-350 million years ago. Bits of shell, bone and dissolved carbonates combined to form the limestone strata of south central Kentucky. Fossil remains of these prehistoric marine organisms became exposed when water dissolved holes in the limestone layers and formed the caves we have today.

More recent fossils were also deposited after the caves formed. Vertebrate remains are often found in caves, including bones, teeth, and mummified remains. Bones accumulate in nests, under roosts, and in dens. Bones may be washed in during times of floods. Caves also serve as pitfalls for large animals. Guano, feces, footprints, scratchings, and other traces of animal activity (such as ceiling stains from hibernating bats, wood-rat middens, and bear dens) are also well-preserved in dry cave areas.

The interiors of caves provide a protected environment that naturally preserves deposited materials. The cave environment offers protection from wind, rains, and sun and this dry, protected environment yields materials not found elsewhere.



Goals of the Paleontology Curriculum Guide

Mammoth Cave and approximately another 300 caves located on park property are the repository of paleontological resources. Paleontological remains are nonrenewable and vulnerable. This curriculum was developed:

- to provide a variety of experiences to teach paleontological concepts.
- to teach about the rarity and conservation of paleontological remains.
- to foster an understanding of the importance of preserving fossils in situ.
- to communicate how paleontology relates to the conservation of the living cave system.

Use of the Paleontology Curriculum

This curriculum provides some lessons to be used before a park visit. These lessons will enhance the park visit by providing background information that will enable the student to understand concepts of paleontology before visiting the resource.

Some of the curriculum materials are designed to build on the park experience and re-enforce learning.

Each lesson contains information to help students understand paleontological concepts.

Environmental Education and Paleontology

The Environmental Education staff at Mammoth Cave National Park is committed to assisting you with your study of paleontology. If you have questions or need additional information, we urge you to call for assistance. The educators at Mammoth Cave National Park may be available to come to your classroom to assist with teaching many of these concepts. You may find that a trip to view the resource would be more beneficial to your students. Qualified educational groups are invited to take advantage of the Mammoth Cave extended classroom concept. Details of planning park participation in your curriculum can be found on the next page.

PARTICIPATION

The Environmental Education Program

Qualified groups are invited to participate in the Mammoth Cave Environmental Education program. This is a tightly structured, hands-on experience designed to introduce and excite students about the unique surface and subsurface environments found within Mammoth Cave National Park.

By using the park's natural resources, this program strives to give each child a better understanding of his or her fragile world, and of the interdependency of all environments and their inhabitants. Each day's customized program will be structured to provide visual and tactile experiences, reinforcing the classroom curriculum of each group.

Who Can Participate?

Available on a first-come, first served basis, the Environmental Education program is open to any education or scientific group whose course of study can be enhanced and/or supplemented by a visit to Mammoth Cave. The park's resources must directly relate to your class curriculum and proof of your school curriculum or syllabus may be requested prior to your visit. Because there are a limited number of slots, your group will want to reserve early.

How Long Does the Program Last?

Participants should plan to devote a minimum of four (4) hours to the on-site program. This time will be equally divided between surface and cave activities. You will need to budget additional time for lunch, breaks, and gift-shop visits.

When Can I Come?

The Environmental Education program is offered on weekdays throughout the year.

What Do We Need to Bring?

Students are asked to wear jackets while on their cave tour, as subsurface temperatures are in the mid-50s. Good walking shoes should also be worn, as both surface and cave trails are uneven and occasionally rock-strewn. Because ticks and chiggers are prevalent in the area, insect repellent is suggested. Teachers will need to provide one supervisor for every ten students.

What Does the Program Cost?

There is no fee charged to groups who can show that their course of study directly relates to resources found within Mammoth Cave National Park. Visits for recreational purposes should follow the standard fee schedule.

How Can I Participate?

To make reservations, contact the Environmental Education coordinator Monday through Friday, between the hours of 8:00 a.m. and 4:30 p.m. Central Time. Please keep in mind that reservations are available on a first-come, first-served basis, so please make your plans early.

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