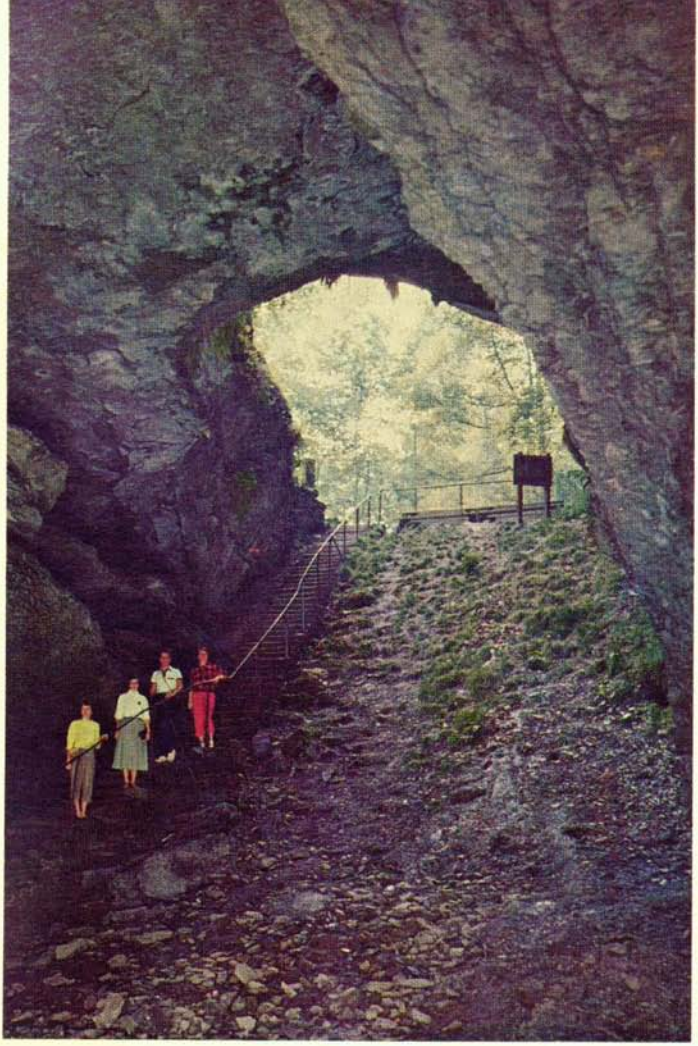

GEOLOGY OF THE MAMMOTH CAVE NATIONAL PARK AREA

KENTUCKY GEOLOGICAL SURVEY 1962
UNIVERSITY OF KENTUCKY, LEXINGTON

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WALLACE W. HAGAN
Director and State Geologist

Series X
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Geology of the Mammoth Cave National Park Area

By Ann Livesay, 1953

Revised by Preston McGrain, 1962

SPECIAL PUBLICATION 7

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LETTER OF TRANSMITTAL

January 30, 1962

Dean M. M. White
College of Arts and Sciences
University of Kentucky

Dear Dean White:

Geology of the Mammoth Cave National Park Area by Ann Livesay, 1953, is such a popular publication that two printings of 11,000 copies are exhausted. Since the cave trips have been changed and more recent and improved pictures are now available, we have revised this publication in order to update it and increase its usefulness.

This report enhances the individual's appreciation of this natural wonder, Mammoth Cave.

Respectfully,

Wallace W. Hagan
Director and State Geologist
Kentucky Geological Survey

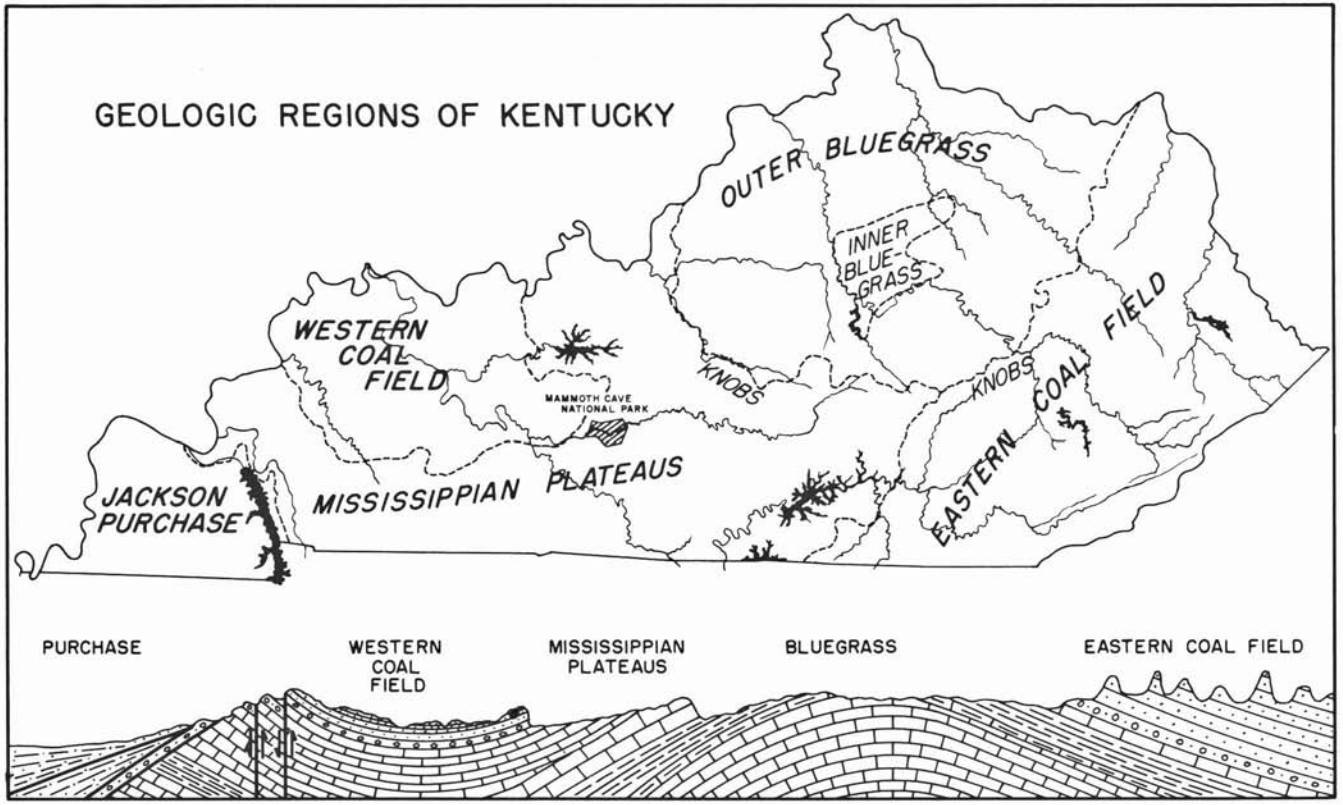
COVER PHOTOS

Front cover. Natural entrance to Mammoth Cave. It is situated in a deep valley near the south bank of Green River. Since 1816, when the cave was first opened to the public, hundreds of thousands of people have passed through this historic entrance to view the wonders of this outstanding scenic attraction. The Echo River, Historic, and All-day trips begin here.

Back cover. Frozen Niagara. This is one of the most spectacular natural features of Mammoth Cave, and was formed by the slow deposition of calcium carbonate from water dripping or flowing down the cave walls and over collapsed blocks of limestone. It is the largest single depositional feature in the cave, being 75 feet high and 50 feet wide, and is featured on the Frozen Niagara trip. It provides mute evidence of the power of water to dissolve limestone and redeposit the mineral material elsewhere.

Photos by W. Ray Scott
National Park Concessions, Inc.

ILLUSTRATIONS



Frontispiece. Outline map of Kentucky showing geologic regions and the location of Mammoth Cave National Park. The oldest (Ordovician) rocks exposed in the State are found in the Bluegrass region and progressively younger rocks outcrop on either side of this area. The coal fields contain rocks of Pennsylvanian age. In the generalized cross section the versical scale is greatly exaggerated.

INTRODUCTION

The Mammoth Cave area, in east-central Edmonson County, Kentucky, is one of the world's famous cave regions. A hunter named Houchins is rumored to have chased a wounded bear into a previously unknown cave in the late 1700's, thus discovering one of the great natural wonders of the world. This booklet is written to provide answers to questions which might arise in the visitor's mind concerning the location and formation of this and other caves of the area. Geological literature contains much information about various aspects of Mammoth Cave and its special features, but no attempt has been made previously to present this material in a semitechnical fashion. Some of the more important scientific references have been included in a list at the end of this discussion for those who may want to study further the technical details concerning cavern development.

REGIONAL SETTING

Age of Rocks—The rocks of the area date back about 325 million years[1] to that division of geological time called the Mississippian Period. Vast regions of this state and many others were then covered by shallow seas in which layer upon layer of clay, silt, sand, and limestone were forming. The limestone was formed from mineral matter in the sea water and from the shells and other parts of animals and plants that lived there. Fossil remains can be seen in these rocks in many places.

Sediments from nearby land sources were carried by rivers and streams to these Mississippian seas and were deposited there as mud, now hardened into shale, and sand and gravel, now hardened into sandstone. Similar processes now in operation are forming layers of sediments in ocean and lake basins. Thus, about 1,200 feet of Mississippian limestones, sandstones and shales came into existence. The caves were formed much later.

Earth Movements Affect Cave Area—At the beginning of the Pennsylvanian Period, crustal movements of the earth caused the seas to withdraw from this area as the whole region was slowly warped upward. During this slow upraising, rivers flowing over the newly

[1] Estimates of various geological age dates are revised from time to time as further information and data are gathered. The time of formation of the limestone in which Mammoth Cave is formed is estimated to be between 310 and 325 million years ago.

formed land surface deposited layers of sand and gravel, some in delta-like form, which were later covered by other layers above to form rocks known to be Pennsylvanian in age. At the close of the Paleozoic Era, the earth's crust in this region was warped upward into a great dome-like structure called the Cincinnati Arch. This feature can be seen in the cross-sectional view of the state (frontispiece). Located on the western flank of the Arch, the rocks of the Mammoth Cave area dip about 30 feet to the mile in a northwest direction, toward the Western Coal Basin.

The later history of the area is mainly one of erosion, when great thicknesses of rock were removed from the Cincinnati Arch. Some of this material accumulated as sediments which helped to form the younger rocks of the Purchase area in western Kentucky. Later uplifts, occurring to a greater degree in the east than in the west, rejuvenated or reactivated all the streams in the region. Erosive forces thus produced the present landscape features.

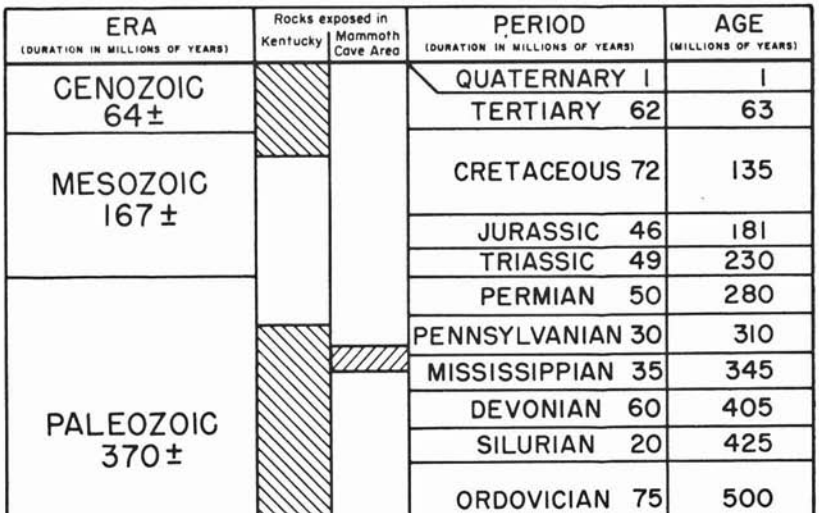


Fig. 1. Geologic time chart showing the relation of the age of the rocks in the Mammoth Cave area to those of the rest of Kentucky. The scenic features of this interesting region have been forming during the last 25 or 30 million years in rocks which are 310 to 325 million years old.