The Journal of Spelean History
OFFICIAL PUBLICATION OF THE AMERICAN SPELEAN HISTORY ASSOCIATION

Volume 26, No. 1 January-March, 1992

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The American Spelean History Association is chartered as a non-profit corporation for the study, dissemination, and interpretation of spelean history. All persons who are interested in those goals are cordially invited to become members. Annual Membership is $8.00. Meetings are held in conjunction with the annual convention of the National Speleological Society and sometimes at West Virginia's Old Timer's Reunion.


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Official Quarterly Publication of
AMERICAN SPELEAN HISTORY ASSOCIATION
History Section
National Speleological Society

Printed by D.C. Grotto
Potomac Speleological Club Press
1992 SPELEAN HISTORY SESSION

The 1992 Spelean History Session will be held at the NSS Convention in Indiana, 9 AM-noon, Wednesday, August 5, at Expando, Room 2.

IN MEMORY OF BRADFORD COBB

Gary K. Soule

Many speleo historians will remember Bradford Cobb as the gentleman who owned and ran Massanutten Caverns near Keezletown, Virginia. I know I remember him well from when I visited the beautiful cave on Monday, December 31, 1979. Bradford lived in a small building near the cave entrance. He loved the cave, and if visitors showed any interest at all, he would literally spend hours with them inside his cave. Although Massanutten Caverns does not have the volume of Luray Caverns, it does have many fine and beautiful cave formations and rimstone dams.

The Friday, December 27, 1991, issue of the Daily News-Record of Harrisonburg, Virginia, includes his obituary. I am going to take the liberty of having it reproduced below. Although it does not mention it, Bradford was a member of the National Speleological Society (NSS 2513 RE) and proud of it. I might also point out that the cave will probably be put on the market soon. It will sell along with 17 acres of land. No price is available at this time.

Bradford Cobb, age 68, of Massanutten Caverns at Keezletown, died December 26, 1991, at Rockingham Memorial Hospital in Harrisonburg.

He was born on September 8, 1923, in New York, and was a son of the late Dr. O. Howard Cobb and Dr. Lucy McCrea Cobb. He graduated from Harvard University in 1943. He served in the U.S. Air Force during World War II, and had been making his home at Keezletown for 30 years. He owned and operated Massanutten Caverns.

NOTES ON CAVES BY J. C. FREMONT IN 1843

Frederick Grady

There are three brief mentions of caves by John Charles Fremont in Report of the Exploring Expedition to the Rocky Mountains in the year 1842 and to Oregon and Northern California in the years
Fremont explored and surveyed much of the western United States during the middle part of the nineteenth century. He eventually became involved in the seizure of California from the Mexicans. His military career had its ups and downs. Fremont ran for president in 1856 as a Republican and lost. Fremont was a general during the early years of the Civil War before resigning his commission after being defeated at the battle of McDowell, Virginia.

The first cave note is on page 139 and is as follows:

As we were about resuming our march in the afternoon, I was attracted by the singular appearance of an isolated hill with a concave summit, in the plain, about two miles from the river, and turned towards it, while the camp proceeded on its way to the southward in search of the lake. I found the thin and stoney soil of the plain entirely underlaid by basalt which forms the river walls; and when I reached the neighborhood of the hill, the surface was rent into frequent fissures and chasms of the same scoriated volcanic rock, from forty to sixty feet deep, but which there was not sufficient light to penetrate entirely, and which I had not time to descend.

Fremont's location at 42° 39' 57" North latitude and 111° 46' 00" West Longitude on this day is in southernmost Idaho just north of the Utah line.

Four days later on August 29 at Latitude 42° N. on the Utah Idaho boundary, Fremont describes some rock walls of a valley as follows: "These were of a blue limestone, which constitutes the mountain here; and opening directly on the grassy bottom were several curious caves, which appeared to be inhabited by root diggers. On one side was gathered a heap of leaves for a bed, and they were dry, open, and pleasant. On the roofs of the caves, I remarked bituminous exudations from the rock."

Fremont's third cave note was on September 30: "Immediately opposite to us, a subterranean river bursts out directly from the face of the escarpment, and falls in white foam to the river below." That evening Fremont's location was 42° 38' 44" North Latitude and 114° 25' 04" West Longitude, which is in southern Idaho, and the river is the Snake noted elsewhere by Fremont.

Perhaps someone in the western states can pin down these localities more closely to known features.

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LURAY CAVERNS IN 1895

Trevor R. Shaw

Introduction

A little known and apparently now forgotten tourist visit to Luray Caverns, Virginia, took place in 1895. An Englishwoman, Winefred Lady Howard of Glossop, went there in January of that year in the course of her travels in America.

The cave had been rediscovered in 1878 and opened to the public in the same year. So the visit described here, though not one of the first, is perhaps typical of a winter one nearly a hundred years ago, in the cave's early years of tourism.
The Traveller

Lady Howard was born Winefred Mary Lisle de Lisle, the third daughter of Ambrose Lisle March Phillipps de Lisle of Garendon Park and Grace Dieu Manor in Leicestershire.1,2 She was born on December 20, 1841, and so was 53 years old at the time of her visit to Luray. Finding out her date of birth presented some difficulty. Whereas Burke2 gives this information for men, female members of the family have only their date of marriage recorded. Clearly it was neither necessary nor desirable to reveal the age of the ladies. In the end the information came from an entry in her mother’s unpublished diary.3

Winefred married, on July 16, 1863, Lord Edward George Fitzalan Howard (second son of the 13th Duke of Norfolk), as his second wife. He was created first Baron Howard of Glossop in 1869, whereby Winefred acquired her title. Her husband died in 1883,1 so she had been a widow for some years when she toured America.

Two portraits have been traced (Cover and Fig. 1) but both show her as a young woman, some 30 years before her cave visit. The dates of both are known from her mother’s diary,3 the area of searching being reduced by the years in which the photographers are known to have flourished4 and by the styles of dress.5 For the portrait in Fig. 1, on June 14, 1861, “Ambrose, Alice, [Wine]Freda, & I went to be photographed by Mr Silvy—38 Porchester Terrace [Bayswater, London]—charge 2 guineas each person.”3

Lady Howard died at Felixstowe (Suffolk) on December 7, 1909,6,7 aged 67. She left no children.

The spelling of her name seems to vary widely. “Winefred” is used here, as on the title page of her book; but it is also spelled as “Winefrida,”10 “Winefrid,”7 and “Winifred.”1,8,9,12

Winefred de Lisle, aged 19.
Photograph by Camille Silvy of London, June 14, 1861.9
The Tour

"My brother G. and I suddenly made up our minds to cross" the Atlantic. "G." was Gerard de Lisle, her younger brother, who was born on January 24, 1860, and thus 34 at the time of the visit. It may have been this journey that inspired him to settle in Canada after his marriage in 1902. He died there in 1924.10

Brother and sister sailed from Liverpool on September 22, 1894, and reached New York on the 28th. They travelled together until December 24, when Gerard had to leave her to return to New York, thus missing the last six weeks of the tour and the visit to Luray. Her return, by the same route, was from February 16 to 23, 1895. The journey had included Canada, Colorado, Utah, California, Mexico, New Orleans, South and North Carolina, Virginia, Washington DC, Baltimore, and Boston. No special interests were evident, such as politics, agriculture or industry; her book just describes the travelling and the scenery and places visited.

The visit to Luray, described below, took place on January 15 and 16, 1895.

The Book

The book describing the journey (Fig. 2) contains xii + 355 pages. Although all the other illustrations are from photographs, the two of Luray Caverns are reproduced from drawings previously
published in 1882. There is an imaginative picture of an almost lifelike "Dragon" (helictite) on page 304. "Pluto's Chasm," opposite page 326, has been developed from the 1882 version by omitting handrails and figures and adding a "spectre." There is no map, nor a cave plan.

The National Union Catalog records copies only at the University of Texas at Austin and at the University of Virginia at Charlottesville. A five-card "micro-opaque" version (8 x 13 cm) was published in 1965 by the Lost Cause Press, Louisville, Kentucky.

The Cave

Winefred arrived in Luray by train from Natural Bridge on Tuesday, January 15, 1895, and spent the night at the Mansion Inn (Fig. 3). The magnificent English Tudor style Luray Inn on the hill above the cave had been burned down on November 5, 1891, and was not rebuilt. Having visited the cave on the Wednesday morning, she left Luray at 5:30 pm for Shenandoah Junction and thence Washington DC.

Mansion Inn, Luray, Virginia
Walter Campbell, Prof.

The Mansion Inn, Luray.
From a postcard used in 1905 but possibly printed earlier.

Her account, reprinted below from pages 301 to 307, is mainly an unremarkable description of various rooms and speleothems. The only real point of interest concerns the lighting. The electric lighting was not used in winter because the small number of visitors made it not worthwhile. Each
person carried a candle on a small tray with a reflector on one side, as had been used for decades in show caves, and the guide carried magnesium wire or ribbon in addition (pp. 301-302).

The "resident guide" (p. 301) was not named. According to the Luray Caverns papers at the University of Virginia, several guides were needed in summer and extra ones were hired when railroad excursions were due. No doubt in the cold of January the resident guide alone was employed. By this means, and the economies in lighting, the cave remained just profitable even in winter.13

Lady Howard's Account

After describing her arrival by train and relating what she had been told about the discovery of the cave, Winefred gives the following account of her visit and a description of the cave, reprinted here verbatim.

From the [railroad] depot, I proceeded to the Mansion Inn, very warm and comfortable; and early next morning started, in a pelting snowstorm and icy blasts of wind, in a four-wheeled sort of trap with a hood, through snow so deep that the two strong horses required to drag us struggled and plunged in the deep drifts till they nearly upset us. However, although frozen and one mass of snow, we at last reached the conical hill, and alighted at the little house built up against a rocky dome at the top, where you take off your wraps and put on a waterproof (if you have had the wisdom to bring one), the resident guide lights seven or eight candles, securely fixed upon small trays protected on one side from draughts, one of which he gives you to carry, himself armed with another, in addition to plentiful coils of magnesium light; he then opens a door, and, lo! there you are in the cave, descending a steep, slippery staircase, till you reach, at a considerable depth, what is called the "entrance hall."

The temperature here, and in the whole of the caverns, remains always at from 54 to 58 deg. Fahr. The ventilation is said to be everywhere perfect, although there are moments, in the narrower and more intricate parts, when one feels, or perhaps imagines, a suffocating sense of weight and oppression.

In summer the caverns are lighted by electricity, but in winter the few and rare visitors have to be content with tallow candles and magnesium lights.

At once you feel plunged into a new and strange "Wonderland!"

At first, in the awful darkness just made visible by the seven or eight candles, one is only dimly aware of a gigantic column of ghastly white, reaching from floor to ceiling, shining and dripping, with curious incrustations. But eyes soon get accustomed, and everything becomes distinct, and you pass through the great entrance, prepared to enter, with due awe and reverence for Nature's mighty handiwork, into the range upon range of vast halls, gardens, fountains, lakes, and fearful abysses, all encompassed and teeming with strange shapes and fantastic growths, passing all imagination, and baffling description!

The beginning of the slow growth of the huger of these formations carries you back to a period millions of years ago; the "blue limestone" dolomite, which constitutes this hill, belongs to the middle period of the Lower Silurian; and here is found a strange formation, unknown elsewhere, to which the name "helictite" has been given—neither stalactite nor stalagmite—but extending horizontally, without support, to a distance of four or five inches, after which it grows in various snaky and contorted forms, mostly upward and scarcely ever downward.

No gypsum occurs in this cave.

One very curious helictite formation is an admirably-shaped small pink stone hand with perfectly-formed fingers, extending horizontally, without support, from a mass of translucent alabaster drapery.

At one point you come to a terrific abyss, 70 feet deep and 500 long, called Pluto's chasm, at the further end of which, in black darkness, enhanced by surrounding shining giant draperies,
hangs suspended--its point of suspension invisible--a stalactite ghostly form with threatening arm extended, a really startling presentment of a spook!

Then the Fish-market, in which thousands of perfectly-formed fishes, with parted tails, hang suspended in thick, yet absolutely distinct masses, even scaly and coloured as they should be, wet and glossy (as if just caught) by the action of the ever-trickling water. A "frozen fountain," of which the exquisite upward and falling jets glitter like drops of water turned to diamonds, many "frozen cascades," and a gorgeous one of shining chalcedony. An absolutely perfect "scaly dragon" twisted round the delicate spirals of, as it were, some lovely fragment broken from the groining of a Gothic church.

A huge stone basket of exquisitely-grouped marbled fruits, perfect in form and bloom, and a basket of flowers, equally beautiful.

A "cathedral," with stately columns covered with exquisite tracery, in which an "organ," with innumerable translucent pipes, gives forth grandly deep and sonorous perfect harmonics when gently struck.

The lovely "gnome’s pavilion," covered with fairy-like tracery in dazzlingly-white crystals. The "Saracen’s" and "Stonewall’s" tents--marvellous both, one in yellow, the other snowy white.

A mermaid, simply perfect!

A "vegetable garden," stocked with every imaginable vegetable; a "theatre," with a stage, on which spectral actors stand turned to stone; a "giant’s hall," where everything is on a gigantic scale, with stalagmitic pyramidal columns of stupendous size and dazzling ornamentation, on the floor of which may be seen the print of a mocassined foot.

A huge "tower of Babel," and a "leaning one of Pisa," of marvellous beauty and finish, snowy white! "Botryoids," bunches of grapes, very beautiful, resulting from the besprinkling of a fine spray.

An "Angel’s wing," of colossal size, every feather standing out separately in delicate fretwork of dazzling snowwhiteness.

"Titania’s veil," an exquisitely-beautiful, almost transparent mass of most delicate drapery. Draperies of every size and hue and texture, most of them musically resonant. A "wet blanket," that you can scarcely believe is not the real thing!

An exquisite "crystal spring," in a huge marble basin raised some feet from the floor, inside and out one serried brilliant mass of the loveliest shining crystals of lime--a circular canopy of translucent stalactites suspended over it from above.

"Alcinda’s Spring," a large ornamented shallow basin, lined with brilliant crystals, on the summit of a stony bank, brimful of transparent sparkling water, which flows into a series of basins, symmetrically placed by nature on the descending slope, gracefully decreasing in size.

Lions, elephants, birds, statuary in admirable groups and single figures, cannon-balls, a bird’s nest, with three perfect white eggs! (cave-pearls). Sixteen alabaster scarves, hanging all of a row, of the loveliest textures, folds, and colours! Then the magnificent "ball-room," in which the good people of the neighbourhood come to be married, the wedding breakfast laid out in an adjoining hall.

"Hades," a region of crystal lakes, encrusted with exquisite formations, full of pellucid water, over-arched by magnificent stalactites.

"Campbell’s hall," and many other superb halls; and a fallen monster column, weighing 170 tons, which scientists say, judging by the overlying stalactitic masses, must have lain there over 4,000 years--seven millions of years consumed in its formation!

All these marvels, for ever in a never-resting state of slow growth, and decay, and reformation!
In short, no words can give the faintest notion of the incredible wonders of these enchanted caverns, unrivalled in the whole known world, and far surpassing in interest, of every kind, the great "Mammoth cave" of Kentucky, gigantic in size and extent but almost bare.

Hour after hour passed, but when at last we returned to the light of day, I felt that I had seen only an infinitesimal portion of the wonders below. Many grand caverns, including the "crystal room," so called because studded with innumerable clusters of large transparent hexagonal crystals, were inaccessible to me, being to be reached only by crawling twenty or thirty feet on all fours, along a low, narrow passage in the rock, deep in watery mud.

In the little house above, I chose a few specimens of divers of the formations, some almost rivalling in beauty the lovely Mexican onyx; and then plunged once more through snowdrifts and snowstorm back to the Mansion Inn, where a good dinner was not to be despised.

Notes and References

3. Unpublished manuscript diary of Eleonora Mary de Lisle (née Clifford). For this and other extracts from the diary I am grateful to Gerard de Lisle, the present Squire de Lisle, of Quenby Hall, Leicestershire.
5. Although the portraits were taken only two years apart, Penelope Ruddock of the Museum of Costume in Bath, UK, was able to estimate the approximate date of the earlier portrait from the dress style along. The later picture had already been dated when she was consulted.
A BRIEF HISTORY OF CAVE STUDIES IN THE UNITED STATES BEFORE 1887
(16th to the 19th Century)

Russell Gurnee

INTRODUCTION

The curious limitation (pre-1887) placed upon this cursory glimpse of speleology in the United States is at the request of the sponsors of Simposio Internazionale Sulla Protostorica Della Speleologia, a symposium held in Citta di Castello, Italy, September 13-15, 1991, to show the status of speleological work up to one specific time in history. The date was chosen because it is the date that Edouard Alfred Martel, of France, began his explorations as featured in Les Abîmes describing his explorations from 1887 to 1893. The purpose of this paper will be to attempt to feature the work done in America before that date. This research necessarily relies upon the opinions, observations, and deductions of authors long dead, and it is not intended to criticize (one hundred years later) their opinions or conclusions.

Much of the earliest evidence of man on the North American continent has been found in caves. In the sheltered entrance of Meadowcroft Rock Shelter, Pennsylvania, human artifacts have been radio carbon dated between 16,200 and 19,000 years before present, and it is possible that there may be other sites that will show the presence of native Americans prior to this date. These early people were a nomadic race that migrated across the Bering Strait to populate what is now North and South America. The present political boundaries of Canada and the United States of America are considered the access corridor traversed by these itinerant hunters and gatherers.

They were a stone-age people, adept at survival in a hostile environment, and caves offered shelter and sanctuary. However, the native American did not give caves as much religious importance as their counterparts in Europe. Perhaps the north-south orientation of the mountains in North America permitted the gradual "escape" of the migrants from the advancing cold of ice sheets during the ice ages. In Europe, the mountains and the sea prevented such an exodus and the safety and sanctuary of caves was more important to them.

Only in a few places in the United States are there evidences of deep penetration of caves by native Americans before the 16th century. Most of these were not "explorations" for discovery's sake, but were in search of water, minerals, or medicine. At the time of the European colonization of America there was in place a well-established native trade network among tribes dealing in flint, alabaster, gypsum, copper, gold and ornaments. Some minerals were found on the surface, but continued search for them required excavation and tunneling often resulting in small underground mining industries. A few of these minerals were found in natural caves; but only in the region of Kentucky, Indiana, and Tennessee was any extensive exploitation of the resource done. Flint nodules used to make arrowheads and knives were mined in WYANDOTTE CAVE, Indiana; aragonite and calcite were collected and worked for trade ornaments. In MAMMOTH CAVE, Kentucky, Epsom salts and gypsum crystals were collected and traded for medical purposes. Many other caves in the region were explored by the natives as evidenced by the remains of thousands of torches and sandals scattered about.
THE 16TH CENTURY  
(1500 TO 1600)

The 16th century was certainly one of major discovery, but it was hardly the information age. There is little recorded of the caves of the New World by early explorers. Ponce de Leon, in 1513, was the first European to officially record the discovery of the mainland of America and he called it Florida, but it was not until 1540 that a more thorough exploration of the southern United States was made by Hernando De Soto.

De Soto was an experienced soldier in the Spanish invasion of Peru and took part in the conquest of the Inca. He was hoping to duplicate the discovery of gold in the region north of Florida and took a force of 600 men on a four-year search for riches. The journey was not successful, De Soto died of fever, and his dismal reports discouraged any further journeys into the area for nearly twenty years.

In his search through Alabama it is possible that he visited a cave that now bears his name, DE SOTO CAVERNS, and if true this is one of the earliest reports of exploration in a major cave in the United States.

The rest of the 16th century occupied the combined energies of the French, Portuguese, British, Spanish, Italians, and Dutch in a race to seek out the riches of this new land and to continue a search for a direct route to the Far East. Leaving the coastline of the continent, small groups of hearty men took canoes and small boats into the interior using the rivers as highways for extending their knowledge of the land. Caves were a minor part of their interest; and with the limited exception of a few sea caves or cave spring entrances visible along the river banks, there were no outstanding discoveries.

THE 17TH CENTURY  
(1600 TO 1700)

Political conditions in Europe shaped the direction of exploration in America during the 17th century. In the 1620s, the British founded colonies on the east coast of North America, staking claims in New England and Virginia. The Dutch were already established in New York, the Spanish in Florida, and the French in Canada. In 1652, in settlement of a brief war between England and Holland, the Dutch swapped Manhattan Island for the island of Curacao in the Caribbean. This political decision set the stage for settlement and exploitation of the richest prize in the world—the entire mid-continent of North America—leaving only three principal players in the game: France in the north, England in the middle, and Spain in the south and west.

Politics were not restricted to Europe however. The colonies of these three nations were “catch-alls” for adventurers, malcontents, and particularly social, religious, and political exiles. Minor things like caves were not of great importance to those colonists who were struggling to secure a foothold in this near wilderness. But it was a good place to hide. One such hiding place was JUDGE’S CAVE, near New Haven, Connecticut.

A Puritan revolt took place in England in 1649 when Oliver Cromwell took power, formed a Commonwealth government, and tried and executed King Charles I. For ten years the Puritans struggled to make a success of a great experiment, but on the death of Cromwell, the enterprise failed. The Royalists now took power and the new Parliament proclaimed Charles II king and immediately sought revenge on the "Judges" (regicides) who had dared to kill a king.

Three fled to the America where they were received by the Puritan settlers as patriots. Sheltered by their religious brethren, but hounded by the King’s men, they retreated to a remote area in Connecticut. For the next ten years the three men alternated their hiding place with friends and when threatened by officials from Boston took refuge in JUDGE’S CAVE. The regicides are forgotten now but there is a bronze plaque set by the city of New Haven on the cave entrance that reads:

OPPOSITION TO TYRANTS IS OBEDIENCE TO GOD.
This political seed planted in the puritanical minds of religious exiles would, within a hundred years, flower into a full-scale revolution. By the end of the century the eastern seaboard was crowded with land-hungry emigrants and pressure was building for the fulfillment of the dreams of opportunity that made them leave their homes in Europe.

Caves had no attraction or importance for these adventurers. The sandy coastal plains and the granite-based terrain of New England are not places where caves are found. While the settlers might have brought with them a knowledge of caves—along the sea coasts this would have been of no value to them. It would be necessary for a new generation of explorers and adventurers to push west if they were to find the financial success they sought and create an economy where the study of natural features could take place.

THE 18TH CENTURY
(1700 TO 1800)

During this century nearly all of the area of the United States was explored by adventurers of England, France and Spain. By the year 1800, only the northern Rocky Mountains had not been recorded and mapped. This was also a period when the settlement of the country included the foundation of many schools, colleges, and universities. In 1700 there was only one "college" available for the sons of artisans, merchants, or landed gentry—Harvard College—and most of its graduates became ministers. England continued to supply the higher education needs of the colonies until the American Revolution. At that time there were only eleven colleges in America, but with the end of hostilities, fifteen additional state and private colleges were established.

The students were given a classical education fitting them for the few "white collar" jobs available. Law, business, agriculture, and the ministry were the principal subjects taught here. Engineering, medicine, and architecture required additional work in Europe. All professions had a firm economic base. There were no research laboratories or "think tanks," only the very rich could afford to indulge in such esoteric subjects as geology or natural history.

Most exploration was done in the search for minerals, furs, exploitable land, or access routes for the transport of goods and services across country. One expedition led by Alexander Spotswood in 1716 resulted in the opening up of the Shenandoah Valley of Virginia. This fertile area attracted settlers from the east and spurred a wave of migration over the mountains into this attractive valley. It also introduced the farmers to one of the most favorable limestone regions of the United States. The clearing of the land revealed many natural limestone caves and some achieved local fame as curiosities.

The rapid settlement of the area provided a business for land surveyors, and one apprentice to this profession was George Washington. At the age of 15 he helped survey some land for Lord Fairfax near Charleston, West Virginia. During this time he went into a local cave and scratched his name and the date, 1748, on the ceiling of a small alcove. This signature has assured the fame of what is now called GEORGE WASHINGTON CAVE.

Several other caves were visited by Washington including MADISON'S CAVE, Augusta County, Virginia; and his signature, made while he was surveying with Colonel Peter Jefferson, Thomas Jefferson's father, in 1750, can be found on NATURAL BRIDGE, Virginia.

Thomas Jefferson, in 1782, was interested in caves and in his Notes on the State of Virginia he published a map of MADISON'S CAVE, Virginia; the oldest known map of an American cave.

Another well-known American associated with caves was Daniel Boone. This farmer, hunter, surveyor, and wilderness scout was born in Pennsylvania but made his legendary reputation in the Indian wars in Kentucky. Although he had little education, his exploits were publicized by John Filson who gave his story the romantic flavor that appealed to the European market and cast him as a prototype of the American hero. One of his stories told of his hiding in a cave along North Carolina's Yadkin River to escape from a band of marauding Indians. This tale has been preserved, along with the cave, at BOONE'S CAVE STATE PARK near the place where Daniel lived as a young man. The cave, during
the early 1750s, in granite-gneiss, is little more than a fissure but is large enough for several people to be concealed.

Daniel's younger brother, Squire Boone, was not as well known nationally, but his memory has been preserved in the hill country of southern Indiana for building the first grist mill in Harrison County. The water that powered this mill flowed from the mouth of a large cave (known locally as BOONE'S MILL CAVE) into Buck Creek. Squire Boone hunted in the area in the late 1700s and described an incident similar to his brother Daniel's when Squire was attacked by a band of Indians and took shelter in a small cave on the bank of the creek. This sanctuary must have impressed Squire Boone for he requested that he be buried in the cave (BOONE'S GRAVE CAVE) just a short distance from the present show cave SQUIRE BOONE CAVERNS which features an operating replica of the original grist mill built in 1804.

In 1778, Jonathan Carver published his observations and wrote in detail about CARVER CAVE, Minnesota, which he visited in 1766. This is perhaps the first description of a large cave in the United States.

The end of the 18th century brought great changes to the North American continent. Politically the maps were redrawn when the American Revolution cut ties with Britain. The sanctuary offered by the new Constitution attracted refugees and settlers from all over Europe. The establishment of local schools of higher learning prepared a generation of "movers and shakers" who would exploit the technologies. The opportunities of expanding land area to the west prompted tradesmen, merchants, traders, artisans, and inventors to extend their markets, and farmers moved to raw, virgin land available almost for the asking.

The 18th century also saw the birth of many of the people who would be influential in establishing scientific knowledge of caves in the United States. Popular writers were also born in this century and their accounts would stimulate interest in caves. Thomas Ashe, Nahum Ward, Josiah Priest, Constantine Rafinesque, and Ebenezer Meriam would provide material for newspaper articles and folklore stories for the next hundred years.

THE 19TH CENTURY
(1800 TO 1900)

In 1800 the population of the entire United States numbered less than five million, most of them working the land and living along the eastern seaboard. Transportation was principally by water along the coast and on the lakes and streams or along the wilderness trails through the mountains.

It was only the trapper, traveler, or trader who recorded caves and publicized them beyond the local area. There was no great value placed on caves until it was discovered that the earth in certain caves could be worked to produce saltpeter, potassium nitrate, an essential ingredient for making black gunpowder. This was an important commodity for the hunter and military who until then had relied upon imported explosives.

FLATT'S CAVE along the Green River, in Kentucky, was one of the many caves found to contain "petre dirt." Local promoters, in 1810, changed its name to MAMMOTH CAVE and sold it to eastern businessmen who proceeded to produce saltpeter in great quantity. During the War of 1812, with Britain, MAMMOTH CAVE became a major supplier for manufacturers of munitions used by the government.

Ebenezer Meriam, a local Kentuckian, spent several years (1813 to 1815) working in the cave producing saltpeter. He then moved to New York City, became a successful business man, and in 1844 published an extensive description of the cave. In addition to his description of the niter production he also wrote about archaeological discoveries, the meteorological conditions within the cave, and published some of the earliest scientific speleological observations in the United States.

MAMMOTH CAVE was opened as a show cave in 1816 and has been shown as a visitor attraction ever since. It became a point of destination for travelers in the 1830s and '40s and became the standard by which all American caves were judged. Every American speleologist is familiar with the cave, and international speleologists list it as the number one choice to visit. It has lived up to the name of
MAMMOTH by being the longest cave in the world (more than 300 miles of mapped passageway—and still growing). It has more references in the literature than any other cave in the United States, and it is recognized on the United Nations World Heritage List as a unique natural site.

In 1805, an archaeological discovery by saltpeter workers of an Indian burial in nearby SHORT CAVE, Kentucky, attracted the attention of writers and travelers and perhaps was the basis of some of the "tall tales" circulated about the Catacombs of Kentucky. Thomas Ashe, an English writer noted for his caustic tongue and vivid imagination, picked up the story in his Travels in America, Performed in 1806, and founded the myth of an Egyptian/Greek/Roman burial crypt in a cave near Lexington, Kentucky. This spectacular diversion led serious researchers astray, but provided the public with fascinating reading.

Archaeologists in the early part of the 19th century had more enthusiasm than expertise. Almost any educated person (in any field) could become an antiquarian (an authority on the subject) by simply digging in a cave or burial mound. Only a few scientists were making definitive studies and publishing serious works about the Mound Builders. In 1847, Ephraim Squier and Edwin H. Davis produced Ancient Monuments of the Mississippi Valley, a landmark publication for the archaeologist. This monumental work was only marred by the long-held theory that there must have been a lost race who built these monuments as it was not conceivable that ancestors of the existing native population could have built them.

Another scientist at that time was Constantine Samuel Rafinesque, a professor of botany at Transylvania University, Lexington, Kentucky. He was educated in Europe and published information on the caves of Kentucky in the 1830s. His interest was extensive and among his discoveries were fossil bones that he excavated and identified or named. He was also interested in existing cave life and he discovered and named a subterranean salamander Eurycea lucifuga and identified it as a year-round resident. His work was extensive, but marred by a fascination for the bizarre that made his serious accomplishments an easy mark for critics and for writers who were interested in sensationalism.

Josiah Priest was the epitome of a sensational writer. As a trained journalist he sensed a national interest in the "lost-race" theory of an earlier people that left evidences in mounds and caves before Columbus. To satisfy that interest he wrote American Antiquities and Discoveries in the West in 1833. This skillfully prepared publication exploited every question raised at that time by antiquarians—and supplied answers. The Lexington Catacomb story presented by Ashe, in 1806, is quoted in its entirety but then embellished with the Greek, Roman, and Egyptian references and associations. Priest goes on to tie the story in with the Celts, the Lost Tribes of Israel, Noah and the flood, etc.

Compared with this, serious scientific writing by biologists, geologists, and geographers interested in caves was pretty dull stuff, but this century did produce many outstanding researchers.

**BIOLOGY**

European biologists preceded those on the North American continent in studying cave life, but it was soon recognized by American naturalists that here was an opportunity for original work. Jeffries Wyman described a blind-fish, Amblyopsis speloeus, from a Kentucky cave in the American Journal of Science in 1843. Other reports followed by Thompson in 1844; and Theodore Tellkampf published his observation on fish and other blind animals in the New York Journal of Medicine in 1845.

Louis Agassiz, the Swiss-born, peripatetic Harvard biologist/zoologist/geologist, in 1851 also reported observations on the blind fish of Mammoth Cave in the American Journal of Science. In the same issue Benjamin Silliman, distinguished editor, discussed caves in general. As professors of chemistry and natural history at Yale, both Sillimans, father and son, shared editorship of the Journal and sustained an interest in caves for more than 50 years.
GEOLOGY

Geology as a word did not appear in the literature until 1778 when Jean Andre Deluc and Benedict de Saussure, both naturalists as well as mountain climbers, were using a barometer to determine the elevation of various fossil-bearing rocks in the Alps. They discovered that there was an order to the kinds of fossils found in different layers and they proceeded to build a stratigraphic column from their observations. This led to the development of a systematic geological time scale and the use of the word "geology" as opposed to the much broader science of "cosmogony," the study of the whole world.

All of the early workers in Europe influenced the study of geology in the United States. David Dale Owen (son of the British Socialist Robert Owen who founded the ill-fated social experiment in New Harmony, Indiana) was trained as a geologist in Switzerland. In 1848 Owen was appointed by the U.S. government to do a geological survey of Iowa, Wisconsin, and Minnesota before the land was opened to settlement by the public. His mission was to determine the mineral potential of the region and to set aside those areas that might have commercial value. The lands chosen would be leased separately to mining companies.

David Owen was eminently successful in his task and went on to do similar geological surveys of the State of Kentucky, Indiana, and Arkansas. The remarkable resulting publications included descriptions of the major caves of the regions and their potential for saltpeter manufacture, and a general description (including sketches) of many Indian Mounds, Rock Houses (shelter caves) and cave springs.

All of these advances in the discipline of geology did not simplify the subject; it merely made it more complex and caused a spin-off of independent branches of study. The earth science of caves is only a minor part of the whole field and until the 20th century there were no detailed American theories on the origin of caves in geologic literature. In the 1850s, speleology as a science did not exist, caving as a sport was not yet popular, and with the exception of a few show caves there was little economic value to interest business investment.

SHOW CAVES

Caves have always been considered curiosities. In the first half of the 19th century several caves in the United States were opened to the public and some of them became popular tourist attractions. The first successful attempt to exhibit a cave was Weyer's Cave, in Virginia. Opened in 1806, it enjoyed a moderate success during the first part of the century, but competition from many other caves in the region limited its appeal. It is now known as Grand Caverns.

Mammoth Cave, Kentucky, was opened to the public in 1816, and Wyandotte Cave, Indiana, another long-time saltpeter cave, was made a tourist cave when a major new discovery was made in 1850. Howe Caverns, New York, was developed by its discoverer, Lester Howe, in 1845.

None of these businesses were very successful, as the transportation system of the United States did not provide an adequate number of visitors to make the ventures profitable. The economic return from Show Caves did not create much interest in financial circles.

The War between the States, or Civil War (1861-1865), did create an economic boom in the search for caves that might have the potential for production of saltpeter. The Confederacy was particularly hurt by the blockade by the North of southern ports that prevented the importation of foreign gun powder. During the war years an all-out effort was made to seek out and exploit all saltpeter caves in the South. Men were conscripted to work the caves, and during the war more caves were discovered and explored than during any period since the discovery of America. Hundreds of caves were tested and when they proved suitable, miners would excavate and process the cave dirt to produce potassium nitrate.

The Civil War, with more than 750,000 casualties, destroyed the flower of an entire generation of young men on both sides and left psychological scars that would take a hundred years to heal. Many battlegrounds in the limestone regions of the South were near caves used for the production of saltpeter. Both armies fought for these caves and the scrawled names of soldiers and saltpeter miners remain on
the cave walls as poignant reminders of this tragic period in our history. It would be nearly twenty years before the veterans of both sides, and a new generation of young men and women, would return to a normal pattern in the country.

The scientific community in Europe, during the war, continued to produce papers and reports related to caves; but the reports of caves in the United States had slowed to a trickle. Renewed popular and scientific interest in caves can be traced directly to a remarkable man whose literary work influenced national and international interest in America.

HORACE CARTER HOVEY

Born in 1833, in a log cabin near Rob Roy, Indiana, Hovey's introduction to speleology was through visits to local caves near his home. In 1850, he helped map and explore a new discovery in WYANDOTTE CAVE, Indiana, and published newspaper reports about it. But caves were to be only an avocation for him, after he graduated from Wabash College as a clergyman. As a vocation he took on the stewardship of a family as well as a congregation.

He served two tours of duty during the Civil War, first as a field chaplain, and later in relief efforts after the battle of Richmond. After the war, he concentrated on his career, developing his speaking and writing abilities which permitted him to move to larger churches. It was at this time that he began lecturing on geological and cave subjects. In 1876, he made another move to New Haven, Connecticut, where he was to spend a major part of his pastoral career, and begin a new calling as the premier authority on caves in the United States.

Hovey was not only well versed in the popular and scientific cave literature of the United States and Europe—but he knew most of the people personally. He was able to combine the viewpoints of other popular scientist/authors as he described the caves he visited. This ability made him popular not only with the public, but with scientists as well, and he developed a distinctive personal style and enthusiasm in his own writing.

By 1882, Horace C. Hovey was well known by the public for his articles in Scribner's Magazine, The Scientific American and others. The release of Celebrated American Caverns was originally intended to give a popular account to MAMMOTH, WYANDOTTE, and LURAY CAVERNS but fortunately Hovey extended it to encompass many other caves and regions.

Throughout his writings he credited other researchers and personally aided and encouraged younger people to pursue careers in the earth sciences and geology. In his later years he received numerous commendations and honors and traveled to many scientific meetings. He joined with R. Ellsworth Call to produce Mammoth Cave of Kentucky, an Illustrated Manual in 1897, and later a revised edition in 1912. This popular manual sold thousands of copies at the cave and was instrumental in promoting the popularity of MAMMOTH CAVE.

ALPHEUS SPRING PACKARD

A. S. Packard, as a student, worked with Louis Agassiz at Harvard and was exposed to a traditional "naturalist" viewpoint where biology/zoology/geology were all necessary subjects for a student to master. Agassiz had studied with George Cuvier and Alexander von Humboldt in Europe and brought to America a knowledge of the scholars who were at the cutting edge of science at that time.

Packard became one of the leading entomologists in America and went on to become the Director of the Peabody Museum in Boston and the founder and editor-in-chief (for 20 years) of the American Naturalist.

In 1874, Packard took on the project of producing a report on the Cave Fauna of North America for the National Academy of Science in Washington. This monumental task was to take twelve years to accomplish and required the cooperation of dozens of authorities in different fields in order to publish the results. Packard called upon geologists who were working in the various areas: Professor N. S.
Shaler and W. Le Conte-Stevens in Kentucky, the owners and managers of various show caves such as LURAY CAVERNS, Virginia; MAMMOTH CAVE, Kentucky; ENDLESS CAVERNS, Virginia; WEYER'S CAVE, Virginia; and MANITOU CAVE, Colorado. He also shared and credited Dr. Hovey's work in providing descriptions, maps, temperatures and general information on the caves that were to appear in Celebrated American Caverns.

First presented in 1866 then published in the Memoirs of the National Academy of Sciences in 1888, this paper established the basis for the study of cave fauna in the United States, and provided recognition of the field work and published accounts of many fellow researchers in geology and hydrology, as well as entomology. It also provided an example of the mutual benefits that can be obtained by maintaining close ties with different scientific disciplines and dedicated non-professionals who study caves as an avocation.

HENRY CHAPMAN MERCER

Henry Mercer graduated from Harvard in 1879 as one of the bright young American lads who were the stock-in-trade of this prestigious school. He had a strong interest in archaeology and paleontology and his economic condition was such that he was able to indulge in these pursuits throughout his life. He was particularly interested in the problem of Man's antiquity in the New World. In the 1880s, he devoted his time to seeking out caves in the Appalachian Mountains to find evidences of early man that might be related to discoveries in Europe.

His strict standards of proof (and the lack of scientific dating methods) prevented him from accepting a separate measure of antiquity for the native Americans—he wanted to tie them to European paleolithic man in association with extinct fauna. This lack of evidence persuaded him to look elsewhere; and in 1895, he headed the Corwith Expedition to Yucatan, Mexico, in search of paleolithic man. His resulting report was published as Hill Caves of Yucatan in 1896. This expedition, by a skilled and experienced speleologist, was the first major American expedition devoted entirely to the exploration of caves in the New World. But Mercer was not pleased with the results. The twenty-nine caves he visited (thirteen of them excavated) did not yield the answer he wanted and so he turned away from the study of caves to devote his attention to other areas. Mercer's loss of interest in caves, at age 39, was a great blow to American speleology.

By the end of the century, a period of active field work brought the work of American scientists and speleologists to the attention of their European colleagues. The flow of original speleological work was beginning to turn, and researchers such as William Morris Davis, geologist; E. D. Cope, paleontologist and biologist; and G. P. Merrill, mineralogist, were presenting papers of international significance. By 1887, educational opportunities for American students were no longer limited to a few schools and a few subjects. Training in all of the scientific disciplines was now available in America; and by the turn of the century it was a nearly level playing field for interchange of ideas and information among all nations.

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A while back I did a short article on the speleological work of Edward Drinker Cope, noting that his personal caving experiences lasted from 1867 to 1871 (Grady 1987). Since then a more thorough reading of Osborn's (1931) somewhat disorganized and confused biography of Cope has led to some additional facts. Checking additional references has also brought to light more on Cope's caving.

Cope's first caving trip was to Howe's Cave, New York, in August of 1864. Cope made two trips into the cave where he noted a frog of a type found outside of caves, bats, earthworms and flies (Osborn...
He also found bones of bats, salamanders and rattlesnakes, and purchased the skeleton of a bear found by the proprietor of the cave. Cope described Howe's cave as follows:

It is altogether in limestone rock and has of course been formed—sometimes by scooping out by water of fault and other fissures, and sometimes of fissures of stratification. In the latter case the passages are wider and the edges of the cut continually break away and fall, especially as the stream usually wears sideways in the direction of the strike. We followed the cave in its main passage perhaps four miles and as much remained which had been followed to no termination. The side passages too are numerous and many not yet followed out. There's quite a body of water in one place which we cross in a boat. (Osborn 1931).

One of the caves in Virginia that Cope entered on his 1967 trip was apparently New River cave, a suggestion I made in 1988 which was disputed by Charlie Lucas based on lack of evidence (Grady 1988; Lucas 1988). In 1989 Hubbard confirmed Cope's note that the cave was mined for saltpetre based on mattock marks and information found in the Giles county deed books by Jim Washington (Hubbard 1989). Cope's description of the cave from Osborn (1931) is as follows:

We took provisions, candles, hammer, paper etc. and after a ride up the river of a mile and a steep climb up the river face of a mountain, we found ourselves at the entrance. It opened upwards and the general direction of the passages was shown to be downwards by the strong draft of very cold air that issued. The passage widened into a long room of 12 ft. high about, whose floor showed numerous marks of the excavations for Saltpetre earth. Piles of this lay around where they stood when the news of Lee's surrender reached the workmen. The passage narrowing, boards over pits showed use of wheelbarrows. After various courses stalactites began to abound, and soon we reached rooms where they could be counted by thousands, giving the walls the appearance of a scene in a forest or of frozen waterfalls, of organs and colonades; and the ceiling festooned with long points of drapery so no plane surface remained. These grew less numerous as we approached a really immense room perhaps three hundred feet long maybe more, whose roof I could hardly reach with a stone thrown from the bottom with all my force. One side was occupied by a hill encased in stalagnitic shell or covered with huge masses fallen from above as the case might be. This we clumbed or passed beneath by devious courses, the dark dome above still showing the same huge cavern. We left this at last and followed 1 1/4 mile perhaps beyond, still finding marks of excavations, and branching passages. There were no bottomless pits but one reached, after much descending, at last, a hole which we had to drop our lights into by rope before climbing down. This bag shaped pit let us into others from which proceeded roaring of water. Being determined to reach this and find, if possible, some eyeless denizens of the waters, we pushed still downwards, lying flat, and reached a low avenue which allowed us to stand erect, through which ran a very nice clear stream about as large as the Wingohocking at very low water. I found no inhabitants tho' I searched carefully. We sat down on its banks and ate our dinner. We did not go much farther as we feared that the candles would not last. We went in probably a mile; others have gone, they say, two miles beyond without reaching the end.

Cope explored caves in Tennessee in the summer of 1869 as previously noted (Grady 1987). Cope’s Lost River Cave in Grainger County is probably Indian Cave. Its entrance size, position on the Holston River (not Ralston as Cope was misquoted by Osborn), and long history (Barr 1961) seem to indicate a likelihood that this is the cave Cope visited. Cope's account from Transactions of the American Entomological Society (1870) is as follows:
The writer examined the Lost Creek Cave for a distance, stated to have been measured, nearly two miles from the mouth, and the statement is probably correct, judging from the time occupied in passing through, to the point reached. A creek of a considerable size issues from the cave; near the mouth it is dammed; and a race leads the water for a short distance to a corn mill on the banks of the Holston river. The water is crossed by the path perhaps five times before it fills up the passage so as to prevent further progress. The passage is wide, dry, and with so few irregularities that a public road might readily be made in it to that point.

Indian Cave is longer than Cope indicated. A survey by Jeff Bowers et al. during the mid-1980s netted 13,600 feet. Usually, Cope exaggerated his cave accounts.

In August of 1871 Cope went to Mammoth Cave, Kentucky, accompanying biologists Alpheus S. Packard, and Frederick W. Putnam on a biological collecting trip (Packard and Putnam 1871; Putnam 1872). Cope noted (1872) that he found most of the fauna described by the above authors and was not acknowledged for his efforts.

Cope's visit to Wyandotte followed shortly after the Mammoth visit, also in August of 1871. Cope wrote to his wife of his trip as quoted in Osborn (1931):

Spent the day [August 8] in the great cave for great it is. We had the fortune to have maps so did well without guides. We travelled about 9 1/2 miles and back again. The cave is finer than the Mammoth in stalactites, equal in gypsum ornaments and inferior in water and deep pits. There is no travelling in boats but little water, but there are some extra-ordinary rooms. One of these is gigantic, 275 ft. high, and contains a conic hill of 175 ft. high in the center. On the apex of this are some huge stalactites, two brown and one pure white. The room is oval and the strata or rock have broken from above the hill, their edges forming colored oval bands, narrowing to a central oval; this is pure white. After this comes the auger hole, a small orifice leading to a series of great rooms. Many of these contain very rough rocky hills. We dined on 'the Throne' an elevated place with large stalagmites and a fine spring. The beautiful gypsum rosettes were in 'Sylvan Arcade,' 'Beauties Bower' etc. I brought thee some needle crystals of gypsum from the latter--only going from one beauties bower to another.

Cope also visited another Indiana cave in August 1871, apparently Sibert's Well, based on the description in Osborn (1931) and Powell (1961):

We then went to Seyberts Spring to catch blind fish. We went down a well 20 ft. and struck a subterranean stream flowing through a low cave. We followed this up a 1/4 mile and had some crawling and scrouging of the worst kind to do and every little while the stream expanded into a pond and we seined these with our net faithfully. In the first we caught a blind crawfish; in another 3 blind fishes awarded our exertions. They were much like those of Mammoth Cave and may be the same. We also caught spiders, insects, etc. much like those of the other cave. Toward the upper part of the route, the water became deeper and occupied the whole gallery, leaving only 2-3 ft. for our heads. We had to walk in a (shape and then to crawl on rocks projecting above the water, on our bellies. We reached a broad room with stalactites and 3 1/2 ft. of water and drew seine with difficulties several times but without result. I was too cold to follow the water farther and we returned. Near the mouth I caught a blind fish in my hand, but could not hold it, I was too numb.

Osborn (1931) goes on to state that the Wyandotte trip was Cope's last cave exploration. However, Cope reports he did two trips to Nickajack Cave in Tennessee in 1881 (Cope and Packard 1881). Parker (1953) also reports Cope left his initials in several Pennsylvania caves though he does not indicate which
ones. Cope does state in his Wyandotte article that he found bones of turtle, rabbits and other animals in a cavern in Lancaster County (Cope 1872).


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