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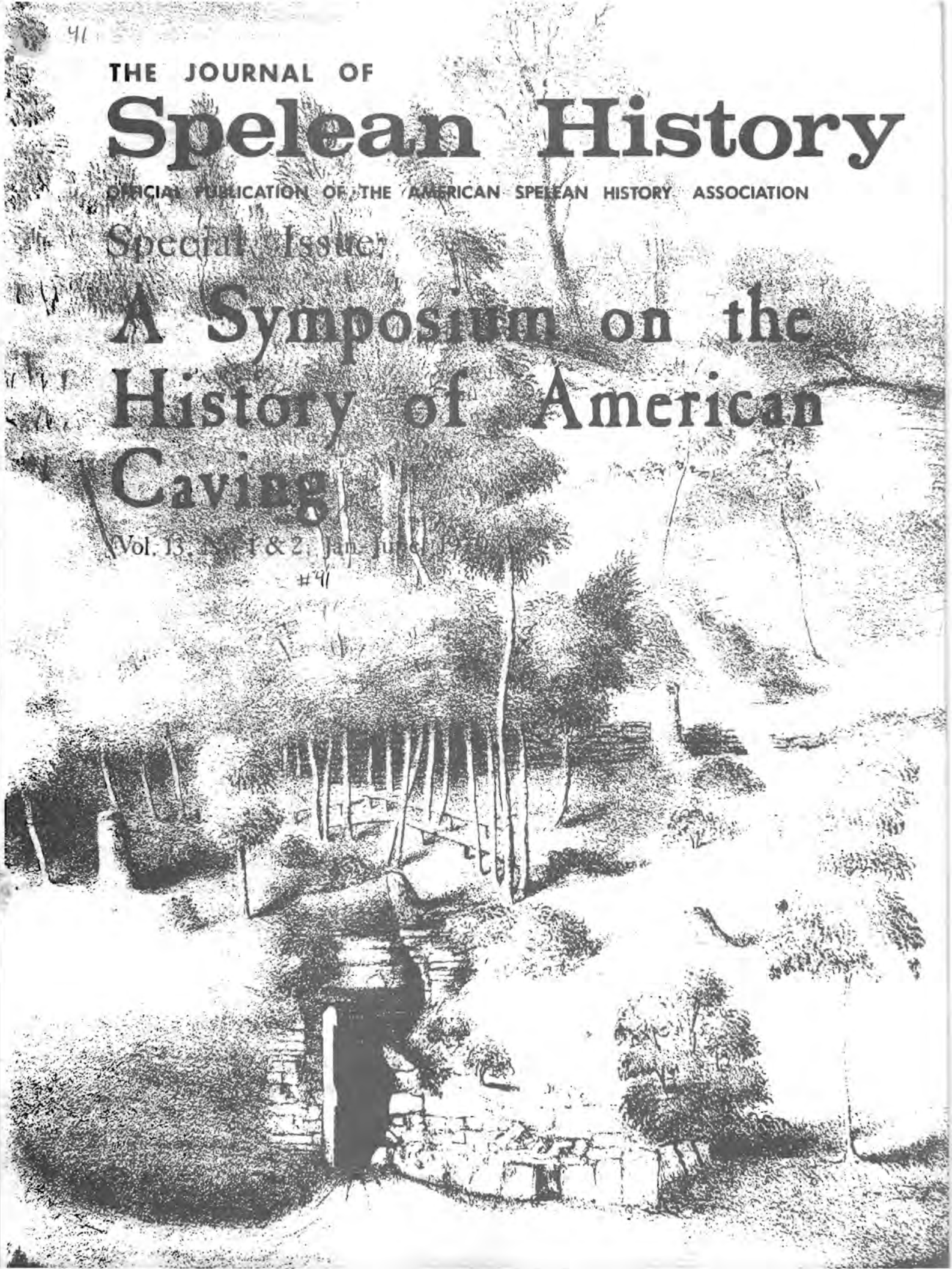

- - - THE JOURNAL OF SPELEAN HISTORY - - -

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SPECIAL CONVENTION ISSUE
"Symposium on the History of American Caving"
Pittsfield, Massachusetts
August 5-12, 1979

THE ASSOCIATION

The American Spelean History Association is chartered as a non-profit corporation for the study, dissemination and interpretation of spelean history and related purposes. All persons of high ethical and moral character who are interested in those goals are cordially invited to become members. Annual membership is $5.00; family membership is $6.00; and library subscriptions are $4.00.

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THE COVER

View of the entrance of Howe's Cave in Schoharie County, New York. Plate XLV, Geology of New York by William W. Mather, Professor of Natural History in the Ohio University; published by authority; New York, 1843.

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THE JOURNAL

The Association publishes the Journal of Spelean History on a quarterly basis. Pertinent articles or reprints are welcomed. Manuscripts should be typed and double-spaced. Submission of rough drafts for preliminary editing is encouraged. Illustrations require special handling and arrangements should be made with the editor in advance. Photos and illustrations will be returned upon request.

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BACK ISSUES

Some back issues of all volumes of the Journal are available from Jack H. Speece, 711 East Atlantic Avenue, Altoona, Pennsylvania 16602. Out-of-print issues are in the process of being republished and will be available soon. All issues of Volumes 1-7:2 are available on Microfiche from Kraus Reprint Company, Route 100, Millwood, New York 10546.

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Scull's 1770 Map of the Province of Pennsylvania showing a "cave" north of Reading.
Photo courtesy of the Library of Congress

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ASHA ANNUAL MEETING

The American Spelean History Association, the History Section of the National Speleological Society, will hold its annual meeting in connection with the NSS Convention in Pittsfield, Massachusetts, on Friday, August 10, 1979, following the luncheon at 12:00 noon at the Susan B. Anthony Cafeteria. The meeting will follow two mornings (Thursday and Friday) of history sessions where numerous papers will be presented featuring early and modern American caving. Following the meeting a speleomemorabilia fine arts auction will be held by the organization. Consignments may be made through Paul Damon, Jack Speece or Deacon Deem.

Papers contained herein will be presented during the History Sessions at the Pittsfield NSS Convention.

DRAGON CAVE

AMERICA'S OLDEST CAVE REFERENCE (BERKS COUNTY, PA.)

Jack H. Speece

Cave historians have observed on a well-known map produced by W. Scull in 1770 the location of a cave. Most now believe this cave to be Dragon Cave in Berks County, Pennsylvania. Although there is no written account or description of the cave it is the oldest known written reference to come to light of a cave in the United States. Rather than its size or beauty, the unusual legend of this cave has placed it "on the map" for future generations to study and appreciate.

On April 4, 1770, James Nevil printed a map for W. Scull of the Province of Pennsylvania. William Scull, as well as his father, Nicholas, was a surveyor for Pennsylvania. This map was for the Honorable Thomas Penn and Richard Penn, Esquires (the son and grandson of William Penn) "true and absolute proprietaries and governors of the Province of Pennsylvania and the Territories thereunto belonging and to the Honorable John Penn, Esquire (grandson of William Penn) Lieutenant-Governor of the same." On this map, about 12 miles north of Reading is a spot marked "CAVE". No name is given but it is located in an area close to what is now Virginsville, Berks County. This is believed to be the oldest known written cave reference in the United States.

There were several later maps of Pennsylvania which were based on Scull's 1770 map which more clearly locate the "CAVERN", as it was later marked, as being east of Maiden Creek in the area of Richmond. This cave must have had some significance to be included on the original survey and several later editions by the state. There was no accompanying literature to these maps to clarify what cave it was or why it was noted.

Ralph W. Stone, Pennsylvania State Geologist and leading speleologist in the state, reported in his 1930 edition of PENNSYLVANIA CAVES and his subsequent 1932 and 1953 editions that the cave shown on Scull's survey of Pennsylvania is Durham Cave. However, Durham Cave is located along the Delaware River in Bucks County, not Berks County north of Reading. The Delaware River is approximately 80 miles east of Virginsville. No one has ever challenged Stone's statement until now. Durham Cave is a rather insignificant cave except that it was the site of a rather large archaeological bone discovery. However, this discovery did not occur until 1865 when H. D. Rogers, State Geologist, and again later in 1893 when Henry C. Mercer (University of Pennsylvania) made some discoveries and recorded their finds. Therefore, in 1770 Durham Cave was only an insignificant subterranean void and located a considerable distance from where Scull located his cave. Thus it is rather unlikely that Durham Cave was the feature that was given this consideration.

In our area of interest north of Reading lies a small belt of calcareous Martinsburg shale containing some of Berks County's best known caves. These include Crystal, Dreibilbis, Onyx, Schofer and Dragon. They are all rather nice caves when considered by a caver. Crystal and Onyx are presently commercial ventures, visited by thousands each year. With their present popularity it is easy to assume that one of these is the one to which Scull was referring. Both can be disregarded, however. Crystal Cave was discovered on November 12, 1871 during quarry operations and Onyx Cave was likewise discovered the following year in 1872. Although it is not known exactly when Dreibilbis and Schofer Caves were discovered, these cavities offer little of significance, even considering that Schofer Cave is the longest in the county with a little over 1500 feet of passage.

Dragon Cave is not a spectacular feature either, but it appears to be the most likely to merit recognition as America's oldest cave reference. The cave derives its name from an ancient Indian legend. E. R. Barnsley tells of it in Stone's 1932 edition of PENNSYLVANIA CAVES as being the best known cave in the county and its history reaches back into the days of the Indian. He continues by saying, "One day at dusk the aborigines being along the bank of Sacony Creek saw a dragon, following the heels of thunder heads and surrounded by lightning, come swiftly out of Blue Mountain and descend with a roar into the cave. As proof of this, the redskins pointed out to their white brothers the large stalagmite inside, which, of course, was the petrified remains of the dragon. Presumably the settlers never asked whether the stalagmite wasn't

there before the dragon's descent." Although the dragon stalagmite is composed of ordinary travertine, its legend obviously being circulated during the early settlement of the area prior to 1770 was of enough significance to attract Scull's attention. The Indians and the Quakers at this time cooperated quite well together.

Why that great geologist and caver Ralph W. Stone felt that Durham cave was the one referred to on the map is totally unknown. Perhaps it was because he had not learned of the significance of Dragon Cave until several years later. In the first edition of his survey, Dragon Cave is listed as Dreibilbis Cave (having been on the property of Fred Dreibilbis at that time) with only a brief mention that a "Dragon Stalagmite" was located there. It seems that legends are not of much importance in today's culture because nothing is mentioned in Stone's brief description and even its significant name had been forgotten. Also in the 1930 edition, mention is given to a small cave in the bank of Maiden Creek and named after the same. Subsequent editions of the state cave survey do not mention Maiden Creek Cave. So, Stone has departed us leaving several things to ponder and study.

Dragon Cave is no longer on the farm of Fred Dreibilbis. It now belongs to George E. Lesher (1975) who lives at the south end of Virginville at the intersection of Route 143 and Gilardone Road. Mr. Lesher is very cordial to cave visitors who request permission from him to visit the cave. He asks that visitors park their cars at his barn, just across the road from his house. A walk of 2000 feet northeast across fields from the Lesher farmhouse brings one to the tree-encircled cave entrance, about halfway down the north slope of the hill. Residents living along the road just south of the cave do not wish to have cave visitors park cars on or cross their properties at this point.

The cave lies within a limestone lens in the Martinsburg shale formation of Ordovician age. This belt of limestone extends approximately five miles in nearly a straight line running N. 80°E. and contains five prominent caves: Crystal, Onyx, Dragon, Schofer and Dreibilbis. The former two caves occur within small outcrops of Beekmantown limestone and have been commercially operated for many years since their discovery during quarry operations before the turn of the century. The remaining three caves, Dreibilbis, Dragon and Schofer, have developed in the thin bedded limestones, limy shales and sandstones. The entrance to Dragon Cave is in weathered yellow shale and is located 40° 31' 21" N. and 75° 41' 45" W. at an elevation of 400 feet (USGS Hamburg 15' Quad).

The gently sloping sinkhole 20' by 15' drops to the 9' wide cave entrance. The pattern of the cave is essentially V-shaped. A passage 6' high leads into a chamber 4' to 12' high, 40' long and 15' wide. A sloping passage trends S.W., along the strike, as a rather straight tunnel 3' to 15' high and 80' long. At this point, about 60' below the entrance, is a second chamber 15' by 20' and 3' to 7' high, with a floor containing four large fallen rocks. At the west end is a crawl leading upward for 25' into an oval-shaped pocket 15' high, with greatly fractured shale walls.

From this second chamber the main passage is 4' to 12' high then descends S.E. for 60'. To the left are large tilted bedding plane pendants, under which are areas containing excellent quartz boxwork. Above is a higher passage 40' in length, terminating at a high lookout called "The Gallery". Beyond, the cave develops into a large room, "The Dragon's Den", trending N.E. then S.E. for 95', with ceiling heights up to 20' and widths as great as 38'. Huge piles of breakdown clutter much of the floor. The roof slopes 40° S.E. along the dip. The Dragon Stalagmite and smaller speleothems are along the north wall. At the northeast end of the room a passage 2' high leads north into a final chamber, 20' long, 10' wide and 5' high. The cave's entire passage length is about 460 feet.

A HISTORY OF ADIRONDACK AND NEW ENGLAND TALUS CAVING

Robert W. Carroll, Jr.

Few have engaged in the exploration of the talus caves in the wild Adirondacks of New England. The challenge of reaching these areas is greater than surveying a system. Most can be classified as find them, map them, photograph them and forget them; all of which transpires in the same day. However, these out-of-the-way places contain many secrets which the scientific world is pondering. Legends have circulated about this area for centuries. Much lies waiting for those who are willing to meet the challenge to discover. This article accounts for much of the personal efforts of Robert W. Carroll, Jr., who participated on most of the ventures described.

Nonsolution caves have been known for centuries in the Northeast. The Indians and early white settlers used these cavities as temporary shelters and storage sites. This area has generated many odd stories about wolves, bears, counterfeiters, outlaws, "The Leatherman", and "bottomless pits", but few have made serious inquiries into them. Most people do not consider these boulder piles and rifts as "true caves" and think they are dangerously unstable and of only trivial consequence to the speleological statistics of the region. Changes in this lowly status were slow in coming, but once the potential of these caves finally became apparent, a veritable revolution began.

Clay Perry was perhaps the earliest speleologist to take a careful look into these mountains. His efforts were reported in his well-known editions of 1939, 1946 and 1948 under the titles UNDERGROUND NEW ENGLAND, NEW ENGLAND'S BURIED TREASURE and UNDERGROUND EMPIRE. However, his efforts in the northeast were confined to the better-known landmarks.

It wasn't until 1956 that Robert W. Carroll, Jr. began his serious investigations among the rocks in northern New Hampshire. He had a preference for the marble and limestone caves but it didn't take long to learn that if he was to continue his speleological interests in this area he would have to accept the general definition of a cave, i.e., any natural cavity in rock large enough for a man to enter. The Vermont marble belts or the White Mountain talus areas were outlets from 1965 to 1968 which gave hope to a "key to the mountain" like some caves provide in the limestone karst areas in southern United States. Many long trips were made to thoroughly search this prospect. The abundant granite craggy terrain of Maine, although closer in distance, would be ignored for a full decade before its irony was realized.

In those days one would check out a stray talus or fissure cave report or stop at a nonsolution cave not too far out of one's way while enroute from one place to another. In 1965 the Greenwood Ice Caves in Maine were reported. In 1966 it was the Pittsford Ice Cave and the Deer Leap Caves in Vermont which proved to be of interest. 1967 brought a solo descent into Widened Fault in Vermont, an impressive 270-footer with 50-foot alley repel. In 1968 a 90-foot extension in Cow Hill Cave, an even more impressive 350-footer in Caledonia County, Vermont, and the Devil's Hill talus area close by was reported by Carroll. However, these were greatly dwarfed by the 1800-foot Morris Cave, 1000-foot Weybridge Cave, and the 900-foot Hunter Cave, the latter a most important contribution to Taconic marble caving.

Robert Carroll continued his caving efforts in 1969 but from a new base in Potsdam, New York, shifting his activity to the Jefferson County limestone belts and, later, the Adirondack Grenville marble areas. A few anorthosite talus caves were visited but none rated as more than 150 feet. By 1970 the art of seeking out wilderness Grenville marble caves was mastered and numerous discoveries were made in the Boreas-Hudson Gorge region. A few rumors of "big" nonsolution caves existed, one of which (the "W Mtn." report) was half-heartedly investigated without luck, but marble was clearly "king" in the Adirondacks as well as New England, and even a 600-foot talus or fault cave seemed unthinkable for the northeast.

Jefferson County limestone and Grenville marble dominated the 1971-73 period,

but three nonsolution caves (Eagle and "W Mtn." in the Adirondacks and Scott's in NH) entered the picture and forced a reassessment of opinion about talus and fault caves. Late in July of 1971, Roger Bartholomew and Robert Carroll made a descent into Eagle Cave. Roger, eight years earlier, was the first to make the very difficult descent to the 90-foot level and he had since descended some of the deepest pits in Mexico. The terrain at Chimney Mountain was unlike most karst areas - fragments and holes everywhere, cliffs and ridges torn asunder as if by a Richter-12 event, and at least one crevasse over 90 feet deep. After five hours of exploration, 500 feet of very impressive passage was traversed, viewing "scale-stone" formations on floor rocks that defied explanation. These trips were so demanding in climbing up and through the crevasses that most would lose interest in ever returning after only one visit.

In 1972 a determined effort was made to locate the legendary "W Mountain" Cave in Franklin County. After several unsuccessful reconnaissances of ridges in the region, a solid lead on this "huge cave" was stumbled onto that was reported in 1909. Perhaps the most striking thing about this system was the mediocrity of the surrounding terrain - no cliffs or even a good boulder within sight of its ridgetop entrance - a simple L-shaped rift with openings to four caves and small depressions. The resemblance of this to many limestone and marble cave openings inspired the term "tectonokarst". The Fall NRO meet provided people to penetrate a good 300 feet into the system and note 700 feet of passage containing hibernating bats, flowstone-cemented breakdown, and many square yards of a tar-like substance (probably a colloid of ilmenite) that formed small rimstone dams on floors and walls.

Two hundred miles to the east, Miles Drake had stumbled onto a talus cave in New Hampshire with a 1000-foot system and several others which showed promise of interconnecting. In late August of 1973 he combined the efforts of several others who were working in the area. Before going to the 1000-foot Scott's Cave, the Dixville Ice Pit in New Hampshire was examined along with the Stans-Drake and Cow Hill fault caves in Vermont. The Ice Pit in New Hampshire had a 90-foot relief (70 of it in one rappel) and walls of unstable vertically-bedded schist that is hard on equipment and is very hazardous. Stans-Drake is a curious series of linear fault caves in a hillside which offers ice beds, very tricky chimneying, and curious erosion and solution features. Eventually, linkups and a narrows-widening project by Miles in 1975 were to boost its length to 900 feet. At Cow Hill the water level was found to be over 10 feet lower than it was in June of 1968 and new leads raised its estimate to 450 feet.

Additional trips to Scott's in later months showed modest progress. The most notable accomplishments were the excavation into a new "cellar section" that consolidated the 1000 feet estimate and a linkup of The Hole and Barn Door for a 900-footer which was renamed "BDATH". West of these, Miles, Warshaw and others extended Merrill's Cave to at least 500 feet with promise of more to come.

1974 proved to be a momentous year for several reasons. In New Hampshire a granite talus cave became the first New England System to exceed the half-mile mark in aggregate passage. Preliminary studies were made in an anorthosite talus canyon called Indian Pass. Also, the largest known Adirondack speleothem, the Genesis Formation (a mass of white flowstone, eroded about the gneiss fragments that protruded from it) was found to be vandalized by "rockhounds" a mere three years after its discovery. This latter development had an effective impact on the territory in which some of the explorers of this area selected to spend their time.

By the summer of 1974 a glaring gap between New Hampshire granite and Adirondack anorthosite had become apparent. Despite huge boulder size, the best anorthosite cave then was a mere 200-footer, but perhaps the right areas were not checked. A seven-hour trip to Indian Pass revealed 45 new caves, several over 250 feet long with impressive features. These included TSOD (for "Touchy Sword of Damocles") and Strungout, each of which yielded over 600 feet of passage. It took several years, however, to map them all.

Granite talus also made incredible new gains this year. A linkup at Stans-Drake in Vermont was made and a new elevation record was set on Mt. Adams with a 30-footer at 5650 feet above sea level. At Scott's a connection between BDATH and Merrill's gave New Hampshire a 1600-foot talus system which resulted in a new name, MBDATH, and closed the gap between it and Scott's to less than 20 feet. On September 18 a controversial shallow link was made but four days later Carroll uncovered a new "basement section" and an overhang link with Barn Door to combine that entire system for some 3000 feet, yielding a New England record.

Winter passed and 1975 brought attention to other areas. The vandalism of the Genesis Formation forced a loss of interest in the marble caves and the challenge was accepted at Ice

Cave Mountain. Somewhat because of the 1965 Dolgeville incident and the bad New York liability law, the direct three-mile route to this Herkimer County fault cave was "off limits", and the alternate route from the northeast was a very grueling hike. Thus a new era of "wilderness conditioning" and search for remote caves began. The 20-mile day became a mainstay, and an Essex County 10-footer called Foot Blisters Cave became the first Adirondack system more than "ten miles out" on July 17. On July 31 an 8½ mile hike (a "Dehydration Bataan March") located the Ice Cave Mtn. fissure. It would take another year to push it to 200 feet plus 50 feet of relief.

August of 1975 saw two important developments. Upon attempting to relocate TSOD at Indian Pass, a wrong turn resulted in finding an impressive boulder-and-channel system which R. Carroll named Henodoawda Cave after the old Indian name for the canyon, Path of The Thunder. A stick-and-compass survey of 700 feet of passage, requiring five hours, would have to suffice here until a proper job could be completed a year later. Later in August the ADK Grotto had a major outing near the Boreas River which included Eagle Cave. While some were rappelling in the entrance, others were searching for an easier way in. A 40-foot drop was found which linked a nearly 400-foot talus cave with the main system. A hairy chimney over the big room found a large upper level passage which connected to an exit on the opposite side of the ridge. This route requires only a 15-foot maximum rappel and has now become the main entranceway into Eagle Cave.

A check in the state of Maine resulted in an overabundance of friable schist and mica-rich rocks and a couple of 50-footers at the base of a 1000-foot cliff. Two interesting caves on Mt. Washington came to light, a 300-footer at 4100 feet and a 150-footer at 4500 feet. Major extensions and rooms were also added to MBDATHS in September to extend its length to 4000 feet.

The annual Fall NRO meet was held in Pottersville. Major expeditions were made to Burroughs and Eagle Caves. This resulted in doubling Burroughs' earlier 700 foot estimate and extending Eagle's passages to 1600 feet, a new Adirondack record. A month later another push at Eagle would add another 200 feet and a neighbor cave of 400 feet, quite unusual for a mere "satellite" system in a tectonic area.

1976 arrived, complete with an early spring, a wet summer, and a host of talus breakthroughs, trivial and major. The push was on to search for caves in areas far from civilization. In a trackless area south of Wanakena several small caves were found as much as 14 miles "out". Another 10 mile hike revealed Mt. Marcy Cavern, a 440-footer in Panther Gorge.

On August 14 another try at Indian Pass finally relocated the lost systems TSOD and Strungout - but not before three other rather formidable caves - Henodoawda II, Henodoawda III, and TSOD II - came to light in that sector of boulders that range in height to that of a six-story building. The next weekend, a 20-mile hike in hot weather located the 200th cave for Essex County, bivouaced at one of the openings of TSOD, and raised its mapped total to 700 feet - but without getting into the main part. An overhand-overlap link with TSOD II warned that this thing was going to be "big", but further work was delayed on it until Labor Day weekend because of the Ice Cave Mtn. expedition that ironically yielded a mere 200-footer. On September 4 a good thing and a bad thing occurred, both of which were to have major impact on talus developments thereafter. The good thing was a completely unexpected linkup with Strungout that (with TSOD II) virtually guaranteed a 2700-foot total length and the Adirondack record. The bad thing was a very dangerous incident with a pair of dogs at the trailside Wallface Leanto, the start of a nightmare on the trails of the worst kind of wilderness abuse.

Other discoveries yielded a 20-footer at the 6150 foot elevation on Mt. Washington and new branches in the Scott's Sector and "Barn Door" added 1300 more feet to the 4000-footer, giving New England its first "miler". Another system to the west of this new granite miler was also beginning to grow. By the end of September the "old" TSOD and Strungout sectors more than doubled to 4300 feet, with more to explore. However, by the end of the year, more dog incidents on the trail would make traveling quite dangerous.

1977 began much as 1976 did, with numerous long hikes finally giving way to more work at TSOD - but this time with a sense of extreme urgency. The terrible truth was that the wilderness was becoming a "snakepit" of human abuse, with nobody - user or authorities - doing anything about it. A dozen years ago, many city parks became completely unsafe because of rampant crime. In the past few years, vandalism had become rampant in many cave

areas and National Parks. In the Adirondacks, trash pits overflowed in the Hudson Canyon, the Genesis Formation had been destroyed, and the popular High Peaks now became the focal point of even more sickening abuse. The gangs who vandalized leantos, kicked apart bridges, defecated in trails, and even broke into cars at trailheads had no interest in "rockpiles" (save for some littering), but a new menace entered the picture - close calls with dogs. The two "isolated" incidents of 1976 proved to be but the forerunner of an out-of-control situation that in time would leave the hiker with no choice but to go armed.

Efforts at Indian Pass resumed Memorial Day. Since TSOD still had too much ice, efforts were made on Henodoawda II, III and the new IV. Later TSOD would be slowly extended to 7550 feet by the end of July. Various sectors, TSOD 2B, TSOD II, and the western sector were still left to be mapped and would provide 10,000 feet to the system in August. Winter would cause a delay in connecting the TSOD with Cyclops and Henodoawda II. Additional trips that year to the area were made through the hazardous "wild dogs" to push the system to 12,100 feet, requiring much vertical equipment.

Legal efforts and publicity improved the dog situation along the trail in 1978. Rangers began to patrol the area and there was a ban on non-leanto camping within 150 feet of a trail.

1978 brought activity at Henodoawda IV after a late spring thaw. Due to appreciation of his deceased friend and boss, George Carroll, who did the majority of original exploration in the area, renamed the system William H. Lyman Memorial Cave. His efforts in July pushed the cave to 2500 feet and to within 30 feet of the 13,000-foot TSOD. Other discoveries in Essex County increased the number of caves from 203 to 216.

Elsewhere, the quest for coral-like formations boosted cave counts and uncovered new phenomena from the Adirondacks to Maine, thus doubling the number of known sites since 1977. The composition and origin of these things remains unknown, nobody seems to be in any hurry to find out, overuse of such places as Eagle Cave may soon wipe out vital clues to the past, and some of those clues might just possibly be of recurring events that mankind had better learn about as soon as possible. The lowly "rockpile" has come a long way in a decade, but its full significance is a long way from being known.

ORIGIN OF THE VIRGINIA REGION OF THE NSS

Anne B. Whittemore

The Virginia Region was the first to obtain Regional Status within the NSS. Ever since its start in 1950 she has been one of the most active suborganizations within the Society. The area has provided numerous challenges and has been a prime interest for the best of cavers ever since they became organized. It takes a great organization to conquer systems such as Schoolhouse, Greenbrier Caverns, Breathing, Butler, and numerous others. The potential for more is great and the quality of cavers within the Region is becoming greater.

A more complete report on the Virginia Region can be obtained from the 120-page manuscript produced by the organization in Volume 4 No. 4 of the REGION RECORD. Copies may be obtained from Anne Whittemore, 4107 Ranch Road, Johnson City, Tennessee 37601 for $8.50 each. This covers the time period from 1939 to 1975.

Early caving trips in the Virginia Region were major affairs. Cavers, primarily representing the two earliest organized caving groups, the Ohio Speleological Society operating out of Steubenville and the Speleological Society of the District of Columbia, came for the weekend, stayed in hotels and ate restaurant meals. Franklin, West Virginia, served as the headquarters for many early caving trips as cavers explored Mystic Caverns, Sinnit, Clyde Cochran Sinks, Sinks of Gandy Creek, and later Schoolhouse and Hellhole with the assistance of the PATC (Potomac Appalachian Trail Club) Alpine Club. With caving itself just beginning as an organized sport, vertical caving was naturally in its infancy. Many tales have been related about the thrill of being lowered into and out of some of the Region's deep pits. Often rigging a pit was such a tedious task that a rigging crew was sent into a cave a day in advance of the visiting party!

In the years following World War II, the NSS expanded on a national level and by 1951 had its first convention away from the D.C. area, in Charleston, WV. The far-thinking minds of Bill Stephenson, John S. Petrie, Burton Faust and G. Alexander "Robbie" Robertson decided there was a need for an intermediate level between the national and the grotto level. They invited Colonel Robert P. Carroll of VMI to start the ball rolling and to set an example by forming the Virginia Region.

The first meeting was held on March 18, 1950 at VMI, and was presided over by Colonel Carroll. Prominent attendees included Stephenson, Petrie and Faust of the Washington Grotto (formerly Speleological Society of the District of Columbia and presently the D.C. Grotto); Robertson of the Richmond Grotto; Betty and Ackie Loyd of the Lexington Grotto; Joe and Frankie Lawrence of the VPI Grotto; and Jean Lowry and Dick Sanders of the Wytheville Grotto. Only the Charlottesville Grotto (now UVA Grotto) failed to participate. The purpose of this meeting was to make a concerted effort to organize all Virginia speleologists into a state-wide regional unit. At this first session talks were given by Carroll and Stephenson and activity reports were made by the various grotto representatives. Then a committee of four, chaired by Joe Lawrence, was appointed to draw up a list of recommendations concerning the formation of the new regional unit. In the evening after a banquet in the VMI dining hall, Dr. Stow, of the Washington & Lee Geology Dept. and Burton Faust spoke on various aspects of Virginia caving. The group was then treated to a fantastic slide show by Robbie Robertson who kindly ended his oration when two of the cavers were obviously sound asleep.

VMI was also the site of the second meeting on April 29, 1950 of the Virginia Region formation committee; Colonel Carroll again presided over the events. At this meeting a constitution was executed and adopted. Colonel Carroll was elected to serve as Chairman of the region until the VAR Council held its first meeting. At this time it was suggested that the first meeting be held in the fall; grotto chairmen were charged with deciding the time and place.

Among the other record-making events which occurred in 1950 was the first recorded

caving fatality in Schoolhouse Cave when an 18 year old Dayton, OH, youth fell 85 feet while climbing hand-over-hand down Cascade Pit. VPI cavers reported that after exploring a number of caves in the Natural Bridge area, fourteen very muddy cavers were invited by the Bridge management to a free meal each in the cafeteria! And also in 1950, the first Old Timers Reunion was held during the Labor Day weekend at Davis, WV. Worden Hotel was the headquarters for all activities; Robbie Robertson is credited with the founding of the venerable Reunion.

The first Virginia Region council meeting was held at VPI on February 24-25, 1951. The six Virginia NSS grottos all had representatives attending: Richmond, Lexington, Wytheville, VPI, Charlottesville and Lynchberg. It should be pointed out that after the initial push to form the VAR, the D.C. Grotto members stayed out of the actual governing body since they did not consider themselves as being part of Virginia and thusly the Region. In fact, from this period, and off and on until the early 1970's, D.C. Grotto members were not frequent attendants to Virginia Region functions.

This first council meeting consisted primarily of scientific talks given by speleologists from the Region. These presentations were followed by a report of activities of the past year from each of the grottos. Then the Council, made up of two representatives from each grotto and two delegates-at-large, met Saturday afternoon to elect officers and to adopt a set of By-Laws. Jim Comer, VMI, was elected Chairman; Robbie, Vice-Chairman; and Ed Bleicher, VPI, Secretary. On Sunday, 38 cavers went to New River Cave while smaller groups visited other area caves.

VAR meetings have basically followed the format of this forerunner, holding a meeting in April and October each year to discuss business. Officers are elected in the fall.

Many persons were instrumental in exploring Virginia Region (WV and VA) caves. Bob Handley and members of the Charleston Grotto first discovered and explored many entrances in the Organ-Hedricks system which they later dubbed Greenbrier Caverns; in 1949 Charleston Grotto members made the first descent of the deepest pit in the eastern U.S. (sic), Mott Hole at 304 feet; Earl Thierry and Wytheville Grotto members did much discovery and exploratory work in southwestern Virginia; VPI Grotto members did the same in their area and joined Charleston Grotto members at Grapevine, Head-of-Mill-Pond Cave and other WV adventures. Bob Lutz and the Elkins Grotto had a large list of known caves in West Virginia, many of which were, for some reason, not included in Davies' famous book. Many, many names are responsible for this history and there is only time to discuss the adventures of a few here in a cave that is well known within the Region as well as within the entire caving community, Newberry-Banes Cave in Bland County, VA.

In the summer of 1952, Bill Cuddington, Earl Thierry and Larry and Betty Sabatinos began working on Big Walker Mountain in Bland County, VA. They first found Bane's Cave, Bane's Spring Cave and then Penley's Cave. They were told about Newberry's Cave at this time, although area farmers didn't think it would be very extensive since the entrance was such a small crack. Three months later, during a joint grotto effort between VPI, Wytheville and D.C., Eddie Barton, Cuddington and Thierry decided to check the cave to see how far it went. Bill relates: "We got down there in that passage below the 59-foot entrance drop, and followed the passage that steps down in those little cascade plunge pools. I kept telling the party: 'We're going to come to a big drop! We're going to come to a big drop!' Well, as you know, we did come to a big drop, the sixty-six-foot drop, the Straddle Pit, as it's called now. I remember Eddie Barton and I chimneyed over the sixty-six-foot drop and went on down that passage and came to a huge pit, which turned out to be the 175-foot Rappel Well. We dropped rocks down that and we could actually hear a whistling sound. We were pretty impressed!"

In the fall of 1952, Earl, Bill, Larry and Betty came back to try to get to the bottom of the big pit. They rigged the Straddle Pit first, and went down it. At this point the pit divides; Betty and Larry checked one of the leads which headed back toward the entrance. When they returned, the party climbed back up to get into the other pit. Bill was allowed to go down this pit, which turned out to be a nicely sculptured well of ninety-two feet. At the bottom was another drop. The group was running out of rope, so Larry lowered a ladder part way down, enabling Bill to climb down sixty more feet. Bill then followed a narrow, sinuous, muddy passage at the bottom of the drop and after about 100 yards came to a room

now known as the Vault Room. To quote: "I just nearly blew my mind when I walked out into that room, 'cause you know you can see leads going everywhere. It was one of the biggest thrills in caving that I've ever had! I'll never forget that day!"

Bill turned around and went back to where he could talk to the others to tell them it looked really good. They told him to go back, check it out, and really make sure the passages went. There was no way any of them could get down without pulling up all the ladders and rope. Bill returned to the Vault Room and picked out the most obvious lead to follow; it was later named the Subway Passage. Bill felt that he was gone an hour at the most, but to the waiting group it was an actual, cold six hours!

A month later Earl, Bill and Tom McDaniels and Bob Sayre of VPI Grotto returned to begin mapping. They got to the bottom of the cave in the manner which Bill had used on the previous trip - ladders. They headed to the Vault Room and mapped the subway passage as they explored it. Bill, in his enthusiasm, had said that the Subway went about a mile; they all had hee-hawed about it. It turned out to be about a half-mile and the group was surprised that it was that big; Bill's enthusiasm spread.

A few weeks later the group came back to try to find a way to get down the real big drop. They found it from the bottom of the 92-foot pit. Looking up, Bill realized it would be a nice rappel, but the others said it would be impossible. A person just couldn't rappel that far . . .

Before the next trip, Bill went to Sears & Roebuck to buy a 250-foot piece of half-inch manilla so that he could start doing big drops. He made a set of rappel pads from an old pocketbook. On the next trip, Bill had to carry all the rope into the top of the Rappel Well: "If you're going to do it, you're going to carry the rope." Bill didn't mind a bit. By this time the Staircase had been discovered from the top, and the others went down to the bottom of the cave by this passage. Bill was cautioned not to look down as he rappelled. Ed desRochers and Tom McDaniel said: "Be sure you don't look down. If you do look down and see us, you'll die of a heart attack." So Bill went down, so shook up that he just inched down the rope, staring straight at the wall, and not looking down until, to his surprise, he touched the floor.

Trip after trip was taken into Newberry's. Just before Earl moved up to Charleston from Roanoke, he, Bill, Roy Charlton, Joe Lawrence and Ed desRochers made a trip to the cave and camped inside for four days. During this trip the connection with Bane's Cave was found and the Triple Wells were explored. Roy tells about this trip: "It was in the middle of the winter - COLD - great day, IT WAS COLD! We camped in the cave; down the entrance drop of Newberry's. I had a small turkey from our own flock which had been through our dressing plant and I planned to give it to an acquaintance in Blacksburg, but he wasn't home. Somehow it wound up in the bottom of the cave, and we decided to eat it. I didn't have the proper utensils for cutting it up, so I had to hack it to pieces. There was no way to bake it, so we wound up frying it in a pan that wasn't even greased good. Bill was grabbing pieces up. Other people were grabbing pieces up, saying, 'That's good! That's good; give me some more!' And I was about to be overcome by the smoke!" And he continues, "Another day Earl, Joe and Ed were cooking breakfast. I said 'Bill, let's try some of these side leads here.' Well, Bill followed me. We got into a long crawl hole. Bill was complaining: 'Let's go back. Maybe they've finished breakfast. I just can't stand this place.' All of a sudden I came to the top of a well and threw in a rock. Bill was still back there, complaining and crawling over rocks. I yelled: 'Bill!!! Bill!!! I gotta 250 foot drop here.' I had to block the passage or Bill would've run right into it."

On subsequent trips Bill usually went down the Rappel Well while everyone else took the Staircase. Most of the time he used a body rappel or an over-the-shoulder carabiner rappel. Sometimes he'd prusik out.

Jean Lowry relates an exploration story about Bill: "Once when we were mapping a section called the Zig Zag Passage on our map, I came across a rather strange phenomenon. There was a room off one side of the passage which had mounds of clay about eight to ten feet high. Some of the clay had a coating of wet clay on the surface, and there was a skid mark starting right at the top of one of the mounds and going right on down to the bottom. From the bottom, the footsteps led out into the passage where we were. What was unusual was that there were no footsteps leading into the room. Just the skid marks and the footsteps coming out. Bill Cuddington was there while a bunch of us were talking about it later, and he confessed that he was the maker of the mysterious marks. It seems that he'd been going along in

an upper passage, by himself, and stepped through a hole in the passage. He fell approximately forty feet and lucked out by hitting on the side of this slick slope, sliding all the way to the bottom. He found himself in the bottom level of the cave where fortunately others were exploring at the time. Without a word, he just joined the group as if he'd been with them all along.

Many others were important in the development of Virginia Region caving; the REGION RECORD, Volume 4, No. 4, can enlighten the reader about the adventurous exploits of Don Anderson, Bob Barnes, Ed Bauer, Lew Bicking, Aloysius I. Cartwright, John Cooper, Don Cournoyer, Ed Day, Easter Pig, Bob Flack, Linda Hixson, John Holsinger, Bill Biggers, Jay Houck, Kaptain Karst, Ackie Loyd, Janet McCormick, Barbara MacLeod, the Nicholsons, Earl Geil, Dale Parrott, Bill Poppins, Nancy Rogers, Mason Sproul, Terry Tarkington, George Titcomb, Roger Baroody, Tom Vigour, Tommy Watts and R. E. Whittemore. The area has provided a challenge to the best within the caving world and the end has not been reached.

A HISTORY OF ALABAMA CAVES AND CAVING

William W. Varnedoe, Jr.

The history of Alabama caving can be traced back to the files of the Niter Mining Bureau of the Confederate Army when the valuable cavern soil was used to produce gun powder. Earlier records could possibly extend back to 1540 when Hernando DeSoto traveled through the state. The first written record is dated 1796 but real efforts to systematically study the speleological aspects of the state did not begin until 1930 when Doctor Walter B. Jones studied the ground waters of North Alabama. Since then the Alabama Cave Survey has flourished with the efforts of men like Bill Torode and William Varnedoe. These efforts have produced many publications and will soon contain 2,000 caves.

The first recorded mention of a cave in Alabama is in a report to the U. S. Government filed by Col. Benjamin Hawkins, an Indian Agent. In 1796 he mentions Kymulga Cave as a gathering place for the Creek Indians. There is no evidence that he entered or even saw the cave. However, the signature of I. M. Wright, an Indian trader, and a date of 1723 is in the cave. Therefore, to Mr.Wright goes honors as Alabama's first caver, known by name. Of course the Indians knew of the caves long, long before, as many of their burials and many of their remains have been found, but the later Cherokees considered caves the abode of evil spirits and stayed strictly out.

Although Hernando DeSoto camped in the immediate vicinity of Kymulga Cave for about five weeks in 1540, he did not write of it. He did speak of the nearby Creek Indian capital, Coosa, and the Creek gathering place. This cave is now commercialized and named DeSoto Caverns after him.

Big Spring was first mentioned when John Hunt built his cabin by the spring in 1805, founding Huntsville. The accompanying cave, which, as we now know, runs some 900 feet under the courthouse square, was not mentioned, however.

The Alabama Cave Survey has in its files an ozalid copy of an old map entitled "Aboriginal Map of Tennessee". The map covers a portion of North Alabama. At approximately the location of Russell Cave a cave called Tecallasee Cave is shown. The map is undated, but a political division shown on it is called "1806 Congressional Reservation", making the map later than that. Alabama is not shown on it as a state, which makes the map earlier than 1819. Incidentally, the Tennessee River is called the Kallamuchee River on this map.

A very early positive reference is in the minutes of the Inferior Court of the newly formed Madison County in 1812. It seems Argyle Taylor, a foreman at the Sauta Cave saltpeter mine, was fired by his boss, William Robinson. Argyle thought he was due back wages and so he loaded up a wagonload of saltpeter and left. Mr. Robinson sued for his saltpeter. The case dragged on for two or three years because at no one time could all the witnesses be assembled. Deputations were finally taken which reveal interesting production figures and processes for the cave. Pat Jones read these old records and wrote a full page feature in the Huntsville Times of September 1, 1935. Since then the old minute books have disappeared but Pat's article is still available and gives many of the details; no exploration is mentioned.

It was not until the Civil War that Alabama caves again broke into print. The Nashville Daily Times of October 22, 1863 carries a story of a company of soldiers at Cave Springs, Alabama, exploring a saltpeter cave, becoming lost, discovering another lost gentleman inside, and eventually finding their way out. The story is of a sensational nature and lacks enough cave description to identify the cave. The only saltpeter cave in Alabama complex enough to get lost in is probably Long Island Cave. It is true that General Rosecrans did take a small company into this cave near Bridgeport. Long Island Cave is an extensive maze cave, yet the General's signature and a date of August 5, 1863 are still visible scratched on the cave wall deep into the maze. A photo of his signature and a map of the cave is in the October 1973 NSS News. According to an account of this incident, recorded in the diary of one of the accompanying soldiers, the rotund General got stuck at one crawl and required considerable assistance to make it through.

The late 1800's seem to have brought caves to people's attention for there are several references in this era.

A Huntsville newspaper, The Independent of April 22, 1876, tells us that Ittachooma Cave was visited by many tourists. Ittachooma is better known today as Talucah Cave. No exploration account is given. On May 23, 1888, the Weekly Mercury tells of Mr. Lippincott and Mr. Hicks exploring Bird's Spring Cave and finding some archaelogical remains. No description of the cave itself is given, but it has been mapped and it is a relatively small and unimpressive one.

The American Chemist of March 1874 relates that bat guano from Mastodon Cave in Lauderdale County was being tested. Subsequent newspaper ads show the cave was mined and the guano sold, but the cave remained undescribed.

The Weekly Mercury of July 3, 1889 records that the Alabama Press Association descended en masse to Shelta Caverns. Henry M. Fuller had bought some land from Bolen James on February 11, 1888 which contained James' Cave. Fuller renamed it Shelta after his daughter and opened it as a tourist attraction. It was the gala opening to which the press had been invited. Later articles in the local press grossly overstated the charms and dimensions of Shelta Cave with such exaggerations as ". . . prior to the fixing of this vast . . . the Mammouth Cave of Kentucky was considered the largest." Very soon afterwards, Mr. Fuller lost the cave for back taxes owed. The NSS now owns Shelta Cave and it is an important cave, but not in the way Mr. Fuller thought.

Most of these late 1800 accounts seem commercially oriented with few motives of pure curiosity or scientific interest mentioned. But it was also in 1889 that Major Schrimshaw decided to plumb the depths of a natural well on nearby Monte Sano Mountain. Although he rigged an "A" frame, pulley and tackle and a bucket, all patterned after mine shaft gear of the day, he prudently "allowed" a colored gentleman the honor of the first descent. Since he survived, a whole party of men went down to view Cathedral Hall, but went no further. For the day, this was quite a feat, as the Natural Well is now measured at 185 feet and must have been even deeper then. It is fortunate that the Weekly Mercury of April 17, 1889 named the first daring descendant. Jackson Lines will be remembered as the first explorer of the Natural Well and as Alabama's first vertical caver.

The next cave references are more formal and exact, as the century began to turn. In Bulletin No. 12, dated 1891, of the Bureau of American Ethnology, Cyrus Thomas describes two Alabama Caves, Crump Cave and Hampton Cave. Then Henry McCalley of the Alabama Geological Survey published two reports in 1896. Parts I and II of the Valley Regions of Alabama, Special Reports 8 and 9, mention no less than twenty-six caves. He gave their names, locations with respect to local landmarks (now mostly gone) and their coordinates. In a few cases he describes the caves well enough to suggest he actually entered them. Unfortunately names change and his coordinates were often quite inaccurate. Twenty-two of these caves have been identified, but four remain "lost". In another bulletin of the Bureau of American Ethnology, Number 76, dated 1922, Gerard Fowke describes thirty Alabama caves, but strictly from an archaelogical viewpoint. He never went beyond daylight.

Our famous Natural Well was again entered in 1927. A party consisting of Dr. W. L. Williams, Julius Williams, Phil Bloom and S. W. Judd entered by block and tackle. As a result, the CCC (Civilian Conservation Corps) built an elaborate elevator into the well and cleaned out the debris and trash thrown or fallen in through the years. There is a picture of the large wooden elevator house over the entrance in the New York Times of March 7, 1937. A short time later this house caught fire and burned down, dumping all its remains down the well!

In 1936 the TVA was planning Guntersville Dam. Hales Bar Dam in nearby Tennessee had leaked through a cave so TVA wanted to avoid a similar leak in Alabama. As a result they made a detailed survey of Honeycomb Cave above the dam site. Fearing this bypass they installed two bulkheads in Honeycomb Cave's lower passage. Although most of the cave is now flooded by Guntersville Lake, the report and photographs are on file with the Alabama Cave Survey.

None of the explorers mentioned up to now seem to have continued cave exploration; all were one-time adventures or incidental to some other interest. But now a new type explorer came upon the scene, a man interested in caves themselves, a true caver. Dr. Walter B. Jones, a young geologist, took a personal interest in caves. When W. D. Johnston wrote Special Report 16, Ground Waters of North Alabama, in 1930, Dr. Jones wrote the chapter on caves. He described twenty-two caves and included sketch maps which indicates he explored these systems. Among these was our friend the Natural Well. To enter, Dr. Jones had a sailor make a rope

ladder in 60- and 30-foot sections. It was made of 1-inch manila with wooden rungs. Parts were used by later explorers right up through 1955. A section of this ladder is now in the NSS Museum. An account of one of Jones' descents reads like a modern trip report. One full account can be found in the Montgomery Advertiser of January 26, 1939. As a project growing out of Ground Water 16, Dr. Jones began to systematically gather data on the caves of Alabama. He advertised in newspapers for information on caves, but only catalogued a cave after he had personally visited and mapped it, at least partially. He had forms printed up and assigned each cave an identifying number. The ACS (Alabama Cave Survey) still uses Dr. Jones' system and the numbers he assigned, starting with Ground Water 16. Dr. Jones promptly joined the newly founded NSS as NSS Number 108. By 1946 he had catalogued 127 caves; this number had grown to 170 by 1955. He was a life NSS member and an active caver up to his death.

A group of local cavers in Huntsville organized a club and applied for NSS membership, and by 1955 The Huntsville Grotto was chartered. J. D. McClung, an Auburn University professor, also had a going caving club which became the Auburn Student Grotto.

The Huntsville Grotto began to collect data on more caves and add them to the ACS. Dr. Jones was the State Geologist in 1955 and also ran the survey. T. W. "Bo" Daniels and E. L. Hastings of the Alabama Geological Survey also assisted Dr. Jones with his cave survey.

To make more efficient use of the NSS grottos (there were now four: Auburn, Birmingham, Huntsville and Tuscaloosa) a block of numbers was assigned to each so that caves could be added to the survey at once. This was usually handled by the grotto secretary, of which Huntsville's was the most active. Cavers from outside the state also made contributions. Eventually Dr. Jones retired as State Geologist. Bo Daniels received other duties and assignments and was unable to devote time to the ACS even though he had a keen personal interest in it. Therefore, by degrees, the center of the ACS activity shifted from Tuscaloosa to Huntsville. Bo gave complete control of the numbers to William Varnedoe as an independent agent for the Alabama Geological Survey. Thus the official sanction of the Alabama Geological Survey, although still in effect on paper, withered away and ceased to function. The block assignments were withdrawn and shortly the gaps in the numbers were filled with new caves. By 1965, 617 caves were catalogued, yet the 1930 report was still the latest thing in print. Therefore, Alabama Caves was published that year. Although only 250 copies were printed, copies are on file in the Library of Congress and the NSS Library. In 1973 another ACS book describing 1421 caves was published, Alabama Caves and Caverns, by Bill Varnedoe. By then the small vestage of Alabama Geological Survey backing had slipped away and Bill was left running the ACS by himself as a personal project. He once threw out a challenge to organize, but it went without takers. The ACS stands at 1911 caves now. The growth rate has not slowed down recently and 2000 caves are anticipated by 1980. A new book is planned for that event, which will have to be printed in volumes.

William W. Varnedoe, Jr. started caving with Dr. Jones on old rope ladders. The grotto obtained some cable ladders while a few daredevils like Cord Ling and Dan Bloxom entered Alabama's deep pits with only one rope. However, Bill Cuddington moved to Huntsville in 1964 and spread the gospel of rappel and prusick. This, together with his enthusiasm and Alabama's geography, made North Alabama renowned for its deep free fall pits, and Alabama cavers foremost in vertical techniques. The ascender box was invented by Dick Mitchell when he was Chairman of the Huntsville Grotto. The rack was invented by John Cole of Huntsville and the present Chief of the Cave Rescue Unit of Huntsville. The discovery and exploration of the 437-foot free-fall pit in Fern Cave was told in the June 1963 National Geographic Magazine. The full story of Fern Cave was later the subject of a book by Donald Myrick.

No history of Alabama Caving would be complete without mentioning Bill Torode. Bill has put his life into Alabama caving. By far, most maps in the ACS are his. He has probably visited more caves within the state than any other man. A friend to all, his efforts were also necessary to start the National Speleological Society headquarters in Huntsville, over top of Shelta Cave, which he also worked hard to save from destruction.

The various grottos in the state have done much to expand the knowledge of speleology and their individual histories have been published elsewhere from time to time and so need not be repeated here. Numerous individuals who endeavored to make remarkable discoveries should also be remembered. However, in most cases their efforts were never recorded and are now lost.

As the wealth of speleological knowledge increases, the quality of the explorations and discoveries continues to grow. The possibility of another Surprise Pit is great. New caves continue to be added and old caves grow longer, both horizontally and vertically.

NURTURING THE NSS
A STORY OF THE INITIAL STRUGGLES TO START A NATIONAL CAVING ORGANIZATION IN THE UNITED STATES

Paul Damon

Four people were most instrumental in establishing the course and shape the NSS took during its most formative period. To Bill Stephenson, Clay Perry, Jack Preble and Ned Anderson goes much of the credit for the Society as it exists today. This is the story of how these four developed and nurtured the Society during a period from four months prior to its founding to a major turning point six months after its founding. By the time the story is completed, the NSS is a full and established reality, enveloping much of the American caving scene within its protective umbrella.

To Bill Stephenson goes much of the credit for the success of the National Speleological Society (NSS) as a truly national caving organization. But, it took more than one person to make the idea of a national society a reality. The society was founded in January 1941, but the period between August 1940 and July 1941 was most crucial to the success of the idea. This is the story of some of the drama that unfolded during that twelve-month period.

The stage was set, and the cavers were ready. They didn't realize that fate set their mutual interest in cave exploration on a collision course. There are four stars in this story, supported by a cast of hundreds. By the time this story is completed, the NSS will be a full reality, enveloping much of the American caving scene within its protective umbrella. This is the story of how four people dictated the course and shape of the society from conception through reality.

First and foremost there is Bill Stephenson, the caver who conceived the idea. He envisioned a national caving organization that would further the goals of his favorite avocation. He had read about such an organization in other countries. His local caving club, in the nation's capital, could form the nucleus of the new organization. Bill had always liked the outdoors, and was a long-time swimmer and hiker. Once, while leading a hiking group from the All Souls Unitarian Church, he chanced upon his first cave. The story that then unfolded has been repeated many times; it culminated in his forming the Speleological Society of the District of Columbia (SSDC) on May 6, 1939. By the next summer, the time was ripe for a change.

But, without close support of another lead caver, there was no national scene. Enter Clay Perry, the author-promoter from Pittsfield, Massachusetts. His cave club in New England was ripe for support from others. So was the promotion of caving to the public. Clay was a free-lance outdoors writer who, even though more interested at the time in log-rolling, had discovered cave exploring and was doing something about it in his area. His caves weren't big, but they had a lot of history; his club was very small. He thoroughly enjoyed the activity, and wrote a lot of material about it.

In Steubenville, Ohio, there was Jack Preble, another journalist who loved the outdoors, had his own cave club, and was a distant friend of Clay's. He was outdoors editor for a local newspaper and, along with Clay, active in the Outdoors Writers Association of America. He also discovered caving, and his local group came from his surrounding tri-state area.

In all activities, there perhaps must be a lead player cast in an opposing role. Enter the fourth caver, Ned Anderson, who unwittingly found himself as the caver-antagonist who could not see the advantages of a national organization. Ned was from Connecticut, leader of an outdoors group which took up cave exploring and was loosely associated with Clay and his group.

This is the story of how these four men shaped the future of the NSS in its most critical formative period through patient pursuit of a common goal. To Bill and Clay, supported by Jack and Ned, goes the credit for the nurturing that developed the Society as it is today.

The story unfolds in the summer of 1940. Bill is dreaming of the day his small caving club could truly become a national organization, representing his country in much the same way other groups did in other countries. Of course, his local club had members in other states, but they all belonged to a single local organization. He knew of Clay's and Jack's groups. There were others who had also developed their own small cave clubs in other parts of the country. If Bill could get these groups together, he would have the restructuring he needed to make the organization fulfill the essence of his dream.

In an article in Bulletin #1 of the SSDC (June 1940), they say their cave survey work "will of necessity be confined more or less to the local area adjacent to the District of Columbia". The article further states that they "hope other groups in other sections of the country will also engage in this work and make available their results for either this or similar publications." At this point it is uncertain whether the SSDC was entertaining the idea that they could form the nucleus of a NSS.

After lengthy consideration of the idea of a national organization Bill wrote to Clay on September 5, 1940, announcing his tentative plans for reorganizing the SSDC as a "national society". He felt that the type of organization he was looking for would be along the lines of the Explorers Club (New York). Bill inquired if Clay and his group would care to join in the effort. After all, two local chapters would be the start needed. Clay was very interested. On September 11 he responded, agreeing with the general concept, and making some suggestions from his viewpoint. The principal idea in his letter, with later apparent agreement by Bill, was the following request by Clay: "I should like the privilege of becoming the first charter member of the first new chapter". The net result would be that Clay's group became Grotto No. 1, while Bill and others in his group took the initial set of membership numbers in the Society. Clay also felt that financing of the local group versus the national group might be a major stumbling block, which later turned out to be true.

Somewhat later that fall the officers of the SSDC drafted a proposed constitution for the NSS, stating that all members of clubs other than the SSDC would also be considered charter members of the NSS if they notified the SSDC before January 1, 1941. In November, a draft of the constitution was sent to Clay.

In response, Clay contacted potential members of his group and they met on Sunday, December 1, at the railroad station in Pittsfield, Massachusetts. They then went to nearby Pettibone Falls Cave where they formalized their Grotto. The group accepted the proposed constitution (mislabeled bylaws in the published minutes of the meeting, per Clay letter of January 13, 1941). Clay was elected Grotto president and soon-to-be arch-nemisis Ned Anderson was elected vice-president. Of interest is the fact that of the 24 people present, 15 were from Ned's Connecticut group and only 6 were from Clay's Massachusetts group.

Finally, on January 24, 1941, Bill sent a letter to all members of the SSDC announcing that "on January 1st the Society was reorganized as a national organization".

In a January 7 letter, Bill informed Clay that their club would indeed be considered Grotto No. 1. In response, Clay again brought up the question of membership fees, but promised to "support the work of the Society, when all is set to go ahead under the new set-up". Also, Clay suggested that continuing the Bulletin the SSDC had started would be the "best booster for the work" that could be produced. He did, however, feel that there must be a cheaper way to print it! Clay recommended $4 annual membership dues, $3 to national and $1 to grotto.

At this same time, Clay was embroiled in an effort to produce a well-illustrated general caving article for the Saturday Evening Post magazine. The Post was "eager to have a good color spread". Bill and his group had for several months been getting photos for the article submitted by Clay.

Somewhere at this point (date uncertain), Jack Preble and his Ohio group also ratified the NSS constitution and became "Ohio Grotto No. 3". It was after January 1, since this group does not appear in the records as a charter Grotto.

In the middle of January (between the 15th and the 24th), the SSDC Board of Governors

met and formally adopted the proposed constitution and bylaws. However, "care was taken that the organization was flexible enough so that improvements and changes could be made from time to time as conditions warrant". The group accepted Clay's suggestion on membership fees, was getting ready to issue another bulletin, and was printing "national stationery".

At the same time, Clay scheduled a meeting for February 1 at Bonnie Brae Farm (Sherman, CN, home of Ned Anderson) to complete the organization of their grotto. Ned was president of the Housatonic Trail Club, the group from which the Connecticut cavers came. It was primarily an outdoors and hiking group, from the northwestern part of the state.

All is well. Mere formalities left. The NSS is on its way.

Or, is it?

The six-week period between late January and early March became crucial.

Bill promised to send Clay a copy of the minutes, constitution and bylaws of the last Board Meeting in D.C. so that at Clay's February 1 meeting they could formally accept the exact wording. They did not arrive in time.

It didn't matter. Clay's February 1 meeting was cancelled due to "illness and bad weather" and was never re-scheduled. In fact, in a letter on February 10, Clay mentioned that cancelling the meeting may have been a good idea as "too many difficult questions were being asked in my area". He would not "bash his head against any cave walls on account of those who cavil and complain about dues and photos and etc." (photos referred to the pictures being obtained for the Post article). He felt that a let-alone policy might work better rather than dictating solutions.

Their problems, however, were suddenly becoming serious. Among other things, Ned didn't like the red tape involved in the new organization. For example, he felt the national membership blank (the old SSDC one) Bill was using was too complicated, and that a simpler form could be used.

Clay, in a letter of February 3, noted he was getting questions from the Connecticut people as to why they should support the Society. However, Clay remained optimistic. He wrote to others such as Virgil Clymer at Howe Caverns, suggesting he form a New York Grotto, headquartered at Howe Caverns.

The seeds of discontent were sown, but, for their part, Bill and Clay forged ahead. In late January Bill did send all New England members a copy of the Bulletin and other Society information.

Both Clay and Bill realized that the forthcoming Post article could put the NSS "on the map", and that it would be a "boost beyond price". In spite of the troubles they were starting to encounter, this article might turn the tide. Clay didn't stop here, though. He prepared a number of other cave articles during this period, many of which were published. He and Jack Preble co-authored a fictional article about the famous Sinks of Gandy, in West Virginia.

Shortly after Clay's disparaging remarks of the state of affairs of the Society in New England, he received another letter from Ned. In Clay's letter of February 18 to Bill, Clay quotes parts of Ned's letter. Basically, Ned had proceeded to form the Housatonic Cave Explorers as a formal local group, not associated with the national organization. Their dues were 25¢ per year (the amount their group had previously felt a cave society was worth). Finances appeared to be the crux of the matter. Ned further stated their view against paying the NSS any money, or indeed very much even to their own group. To quote, "when it comes to controlling the cave activities as to pictures and general procedure, I must remind you, Clay, that you and I both have crawled through caves for the thrill of it and with the freedom of a free lance and now we should be shackled?" He formed his group "until the NSS could give them something definite and within reason".

Admittedly, the NSS at this point didn't have a lot to offer, except the potential of a stronger unified national organization. Ned's feelings were a major blow. Clay wrote Ned an

answer, trying somewhat to sidestep the issue but reflecting the position of the national society.

Bill Stephenson had a slightly different viewpoint. He felt the Society was not organized as a "hiking club" whose sole purpose was to furnish recreation for the members. He viewed it more as a "bona fide scientific society" which was unique in that recreation in some measure "flowed from the pursuit of this science". Therefore, they were looking for people who were dedicated to the pursuits and goals of the society, not those who "are only interested in two-bits' worth". Bill did agree, however, that the Society would take money to operate and that members might not receive their money's worth for the first few years. In this sense, they needed members who did not worry about "what they at present will get out of it", but rather those whose "sole interest is what they can put into the Society".

At this point (February) the society was only two months old but already had 105 members. Outside Washington D.C., members were primarily those who worked alone except for the two other grottos. Bill felt that there were not many "real cave addicts in the country", but that the society should not expand just to satisfy the needs of those "who would join only for a temporary thrill". Clay agreed, and stated they should go after "big game" and "forget the squirrels".

Ned had stirred emotions.

All this left Clay and his Grotto in a very weak position. He concluded that his group would have to be a "good little group" to survive, rather than worry about groups of "hikers" such as Ned's group.

However, Ned still vacillated. In late February he sent Clay a letter stating he and his group would join the Society, and that he was "out-voted" at their last meeting. With Ned's new-found enthusiasm, Clay hoped they could locate sufficient members to have enough for an "official" grotto (10 people required). New England calmed down.

By the end of March, things started going better for the Society. They finally printed their own application blanks and stationery.

Clay received word that the Saturday Evening Post had accepted his cave article and would use a number of color pictures. Even though the Post editors materially changed Clay's text, he felt they still gave the NSS "a very prominent part in it".

The Society had a major field trip to Luray Caverns, attended by 55 members. On this trip, the "first colored movies ever taken underground" were shown the group. They were also planning a major field trip to Howe Caverns, as a Society-wide field trip. Jack Preble was also more than active in Ohio and West Virginia, and was cooperating in every way.

Business and procedural matters were now being looked at by the leaders. In early April Clay and his group started a specific campaign for new members. They were now busier with promoting for new members than going caving.

Bill suggested that all trips for all Grottos be scheduled from the national office, for best coordination. The local groups would plan the trips, Bill would publish a list and promote them. A 25¢ "visitor's" fee would be charged non-members who attended field trips, to mollify the feelings of people who had paid the entire national membership fee. Also, it was hoped that a visitor charge would help assure that those whom they hosted on trips would more likely be those really interested in the activity. Bill would send the trip notices to all members and prospective members around the country.

Clay, being a journalist, was able to attract media attention. He was guest on several New England radio shows, talked to a number of groups, and constantly promoted caving. Several newspapers sent reporters and photographers with them on trips. Publicity came easy, although no ground-swell of new members.

Meanwhile, the big "expedition" to Howe Caverns was being planned for May 31. Clay had a number of people from his area going, Bill had "two cars from Washington", and Jack had up to "three cars from Steubenville". They were also to visit Balls Cave. Virgil Clymer, from Howe, and a new society member, would be the host. The biggest hitch on the whole trip, as

it turned out, was filling out a fancy "cave-report form" that Bill had brought.

This form became the next question to be discussed in the Society. Clay felt it was too complicated and would discourage cavers from recording any information on the caves. Their not being scientifically versed in speleology was one problem. Bill felt the concept of a form was for the benefit of the cavers, not as a hindrance. It helped guide one through the miriad of possibilities in studying a cave.

However, Bill soon found that cavers in his own local group questioned the reason to take any data at all in a cave. Bill dismissed this as a sign that some members "regard the Society solely as a means for conducting free sight-seeing trips through various farmers' caves". He felt this was the wrong attitude and had no place in the Society. Bill further stated "I believe that the Society will make a sad mistake if it and its members do not foster the scientific study of caves at every opportunity". Members should study the basic cave sciences sufficiently so they could do this.

By early summer, Bill and Jack and their groups were taking many more trips. Things were going much better, and enthusiasm was high even if membership wasn't.

Finally, the long-awaited Saturday Evening Post article appeared in the July 12th issue. This was a fitting climax to the story of the early struggles to nurture the Society through its initial trying period of formation. Less than a week after the issue appeared, numerous letters and cards were being received by Clay. One writer questioned one of the pictures: "Who put a boulder in the Kentucky Cave, where there are no rocks"! However, most writers were more constructive. Many asked for names of other cavers in their areas. Others sent in reports of caves in their areas.

The NSS was on the map!

Bill and his friends had what they wanted. A truly national society.

No turning back!

ORGANIZED CAVING IN CALIFORNIA: AN OVERVIEW

Dell G. Quick

Thirty-two years of organized caving in California has greatly increased the activity in this state. The interest was created mainly by eastern NSS members who moved to California. They established grottos and spread the interest. This organization allowed for publishing of surveys and reports, making an accurate record of their history and accomplishments. Prior to this only scattered efforts by individuals for specific interests were achieved.

The University of California Archaeology Department's 1901-1908 cave survey was the earliest organized effort in California speleology.[1] The survey's purpose was to study bone deposits and to determine what chronological association human remains had with extinct animal species. Caves were important to the survey because the deposits occurred in caves. Work centered on Shasta County caves (Baird--now Lake Shasta Caverns,--Potter Creek, and Samwel) and Mother Lode caves (Hawver and Mercer's). The deposits yielded much information but no definite Early Man date was established. By 1908 University of California interest shifted to the La Brea tar pits without an ongoing California cave research program having been developed.

The next organized speleological effort in California, that of the National Speleological Society (NSS), has continued to the present time. The history of organized caving in California is largely the history of the NSS, which has maintained and expanded cave interest and has accumulated cave data.

The NSS was started in Washington, D. C. in 1939 by sportsmen who enjoyed caving. Scientists with an interest in the underground soon joined the group and news of the new society spread across the country. Erwin Bischoff, who heard of the NSS shortly after he graduated from San Francisco State College in 1940, became one of the first California NSS members. Bischoff's greatest achievement was "The Caves of the Pacific Coast Area," popularly called the "Bischoff Report," a list that included all California's caves known to him and the NSS through 1946.[2] Because of this list and his other reports he has been hailed as "the originator of the systematic study of caves in California."[3]

California's first NSS chapter was started by Charles F. Erftenbeck, a U. S. Forest Service employee. "Caving by oneself lacked something," Charlie wrote.[4] Since he didn't like caving alone he started the Northern California Grotto in June 1947. A new caving era had begun, because from that time onward California has always had at least one NSS grotto. Erftenbeck's cave-finding method was to talk with old-timers. His cave explorations were often linked with legends of hidden gold, murders, massacres, or mystery. His group, or ones that directly succeeded it, was also known as the San Leandro Grotto and the Sierra Grotto and existed until 1952.

In September 1948 the Southern California Grotto (SCG) was organized under the leadership of Dr. William R. Halliday, an intern at Huntington Memorial Hospital in Pasadena, and Dr. Richard F. Logan, geography professor at the University of California, Los Angeles. Bill Halliday had started caving when he was a counselor at a boys' camp in Virginia. Dick Logan, a native New Englander, had been Chairman of the New England Grotto of the NSS. A trend began because this was the first of several California grottos to be established by NSS cavers who had moved from the Eastern U. S.

SCG has been the longest continuously active grotto in California and is still going strong. Its first publication, the California Caver, was begun in 1949 and was turned over to the California Region in 1958. SCG's other publications have included its Newsletter, Pacific Caver, and the Explorer. SCG conducted the first exploration to the bottom of Cave of the Winding Stair; extensive explorations in Church, Crystal 67, and Soldiers caves; detailed scientific examination and mapping of Titus Canyon Cave; diving in water-filled Devil's Hole, Nevada; filming and mapping of Cave of the Winding Stair; exploration, mapping and scientific investigations in

Lilburn Cave; and discovery and mapping of Hummel's Cave.

The Stanford Grotto was started in November 1948 by John W. Funkhouser and Robert J. Hackman, former Virginia cavers who were attending Stanford University. Stanford Grotto accumulated much data about caves throughout California, especially in the Sierras, the Mother Lode, and the Shasta region. The grotto rediscovered Soldiers Cave and Palmer's Cave. Many of their findings were published in the Monthly Report of the Stanford Grotto. They specialized in historical research, interviews, and scientific documentation. The grotto was active until about 1952 although it was not formally dissolved by the NSS until 1954.

The San Joaquin Valley Grotto, like Erftenbeck's Northern California Grotto, was established by native California cavers. Its origins went back to Tom Chamlee, "a high school student on vacation" who "met a group of cavers from Southern California"[5] in 1952. He persuaded his high school physics teacher, Darrel Tomer, to go cave exploring.[6] There was soon an active group, which organized in 1954 under the name Hanford Cavers and emphasized scientific and conservation aspects of caving. They published the Hanford Caver News in 1955 and 1956. In applying for an NSS charter, which they received in May 1956, they chose a new name, San Joaquin Valley Grotto (SJVG), to attract members from a larger area. SJVG investigated and mapped Church, Soldiers, White Chief, Cirque, and many other Sierra caves, as well as making explorations further afield. They were strong supporters of grotto intercommunication and cooperation from the start, and were active in the California Region. The grotto existed through 1975, but it has disappeared recently.

In January 1956 Jim and Marilyn Gossett from Pennsylvania hosted a meeting at their new California home in Ridgecrest to organize the Sierra-Mojave Grotto (SMG). That same year Jim spurred establishment of the first formal California Region by inviting all NSS members to a Labor Day weekend meeting at Boyden Cave. SMG became inactive in 1960, but with the arrival of veteran Eastern U. S. caver George "Wyandotte" Jackson in 1963 the grotto was revived and has continued to the present. SMG has published the Limestone Ledger since 1966. Among their major studies have been Titus Canyon Cave, Defense Cave, Poleta Cave, Lake Isabella area caves, and Greenhorn Caves.

In 1958 the San Francisco Bay Chapter (SFBC) was organized. Former Boston Grotto Chairman Rane Curl became Chairman and former SCG Chairman Howard Shugart became Secretary-Treasurer. During SFBC's first ten years its involvement in the California Region was unexcelled, including leadership in exploration, publication, and conservation. SFBC made major efforts in diving at Hall City Cave and Black Chasm and it has provided some major contributors to the work at Lilburn Cave right up to the present.

Tom Gliebe of Stockton, who had unsuccessfully tried to organize a caving club, contacted Paul Damon, a caver who had moved to Sacramento from the East.[7] With Paul's help a club was begun in January 1962 and after some name changes was chartered May 1, 1963 as the Mother Lode Grotto (MLG). The Valley Caver has been published by them since 1962. MLG has visited and discovered numerous caves in the Mother Lode region. Cave protection legislation and anthropology study have been major projects of MLG.

The Oregon Grotto was organized by Portland-area cavers in 1964 following steps initiated by Steve Knutsen.[8] Although not centered in California, this group, like the Great Basin, Southern Nevada, and Willamette Valley grottos, encompasses much of California in its caving area. Oregon Grotto has been one of the strongest grottos in the West from its beginning, despite some members leaving in 1974 to help form the Willamette Valley Grotto. In contrast with the caving done by other groups in and around California, the Oregon Grotto mainly visits lava tubes, which are the grotto's closest caves. Oregon Grotto's publication, the Speleograph, infrequently mentions California caves. However, Oregon Grotto was involved for several years with intensive investigation of Scorpion Cave in northern California.

Alvin R. McLane, a native of West Virginia, came to Nevada in 1958. He became a hydrologic and geologic assistant in the Center for Water Resources Research, Desert Research Institute, of the University of Nevada, Reno. After having been a member of the nearest NSS grotto, the MLG, he founded the Great Basin Grotto (GBG), centered in Reno, in 1965. Since Al had been a member of an already-existing California grotto, the grotto he started could be considered a "second generation" grotto. (The other second generation California grottos are the following: Stanislaus Speleological Association, Diablo Grotto, Willamette Valley Grotto,

San Diego Grotto, Noana Grotto, and Columbia Grotto). GBG concentrates on Nevada cave study but often visits California caves, such as Church Cave.

Marshall Bryden of MLG founded the Stanislaus Speleological Association (SSA) in the Modesto area in 1966. As in the case of GBG, forming a new grotto was the logical alternative to not being able to get to many meetings because of long driving distance. So Marshall, a part-time almond grower in addition to his custodial job with the Modesto school district, started an active group that has published the Stanislaus Cave Examiner since 1969, has found many caves in the Mother Lode, and has parented both the New Melones Conservation Task Force (about 1971) and the Columbia Grotto (1979).

The Diablo Grotto was formed in 1966 by Ernie Coffman and other members of SFBC who lived in the vicinity of Mt. Diablo, east of San Francisco Bay, because of transportation problems to SFBC meetings. Diablo Grotto has made its most notable contribution to speleology by reopening and managing long-buried Windeler Cave.

The Merced Cavers was organized about September 1968 by Norm Herman, whose cave interest resulted from a visit to commercial Moaning Cave and a newspaper article about Kings Caverns.[9] Merced Cavers is the only first-generation local-origin California grotto still in existence. It has been the Region's strongest supporter during the past ten years, having hosted three annual Labor Day meetings and a Cave-In NSS seminar.

In recent years, a new type of NSS internal organization--the Conservation Task Force (CTF)--has come about. A CTF's purpose is to accomplish particular goals; thus by design it may last for a short time depending on the limits of its goal(s). Three CTFs concerned with California caves were set up in the early 1970s. They are the following: New Melones CTF, Mineral King CTF, and Klamath Mountains CTF. The New Melones CTF, organized under the leadership of Ralph Squires of SSA, planned a cave management program in Stanislaus Canyon to mitigate the negative results of an enlarged New Melones Reservoir. The Mineral King CTF worked successfully to prevent establishment of a ski resort at Mineral King Valley by helping to add the area to Sequoia National Park. The Klamath Mountains CTF is continuing its comprehensive inventory and management project that centers on the Marble Mountains Wilderness.

David Irving, veteran caver from Tennessee, moved to San Diego and joined SCG. In 1973 he organized the San Diego Grotto. After exploring a territory infrequently visited by cavers, San Deigo Grotto discovered Alpine Cave in the mountains east of San Diego. This grotto is very small at the present time.

In Las Vegas in 1974 several NSS members from the East with other local cavers formed the Southern Nevada Grotto (SNG). Some of their members showed up at the 1974 annual meeting of the Western Region in the Spring Mountains. SNG has emphasized study of Nevada caves. Little news has been heard from them the last couple years.

A special type of second-generation grotto is the Willamette Valley Grotto (WVG), which formed partly from a split in the Oregon Grotto in late 1974. WVG's Underground Express has emphasized the Marble Mountains Wilderness caves, where most of the grotto's activity has been.

Another variation on the second-generation grotto idea is Noana Grotto, which was formed by cavers who had been introduced to caving by Rich LaDuke, a Marine who was formerly a member of SCG and SMG. While he was in Japan his followers set up the grotto, expecting him to return to Orange County to assume leadership, which he soon did. Noana's activity has been mainly in Pinnacle Cave, Nevada, Cave of the Winding Stair, and Mitchell Caverns. After Noana's first year (1976), little news has come.

The Calaveras Speleological Survey, an NSS study group organized for long-term study, was started in 1976 to encourage and coordinate cave research in the Calaveras limestone formation.

The Columbia Grotto was founded in 1979 by Ralph Squires, co-owner of the Yankee Hill Campground and former orchardist. Since he was a member of SSA, which is a second-generation grotto, the Columbia Grotto could be classified as a third-generation grotto.

Many other groups, of which some are or have been affiliated with the NSS, have come and gone over the years. Any listing would certainly be incomplete since many groups have

been informal associations, entirely local in interest, and of short duration. But others have had great significance and knowledge of them is necessary to an understanding of organized caving in California.

The Sacramento Speleological Society was active for about ten years, from the early 1950s to the early 1960s. Its leader, Leigh Reddy, cooperated with the young California Region and the just-begun MLG. About the same time as Reddy's group began, the Stanford Grotto was dissolving (1952) and some members, including Ray de Saussure and Art Lange, continued their cave study outside NSS auspices and formed the Western Speleological Institute, an organization that produced some scientific reports. Its Director in 1956 was Phil Orr[10] of the Santa Barbara Museum of Natural History, who had worked with the NSS in the Sefton Speleological Expedition to the Channel Islands.[11] By 1959 the group, still including de Saussure and Lange, had transformed into the Cave Research Associates, which also emphasized scientific study and published Cave Studies, Cave Notes, Caves and Karst, and other reports. Cave Research Associates appears to have lasted until about 1973.

The California Speleological Survey, chartered in 1955 as a branch of the Western Speleological Survey, had its informal origin in the early Southern California Grotto,[12] which published revised Bischoff cave lists in 1949 and 1950 in the California Caver. In 1950 the NSS welcomed the idea of an NSS bulletin on the caves of California but results of the research outgrew the NSS's ability to publish so the State of California Division of Mines and Geology was invited to publish the data. After years of holding the manuscript the State decided in 1960 to not publish the material.[13] The California Speleological Survey (CSS) and Western Speleological Survey (WSS) took over the project and in 1962 published Caves of California by Dr. Halliday. After a twelve-year period of relative calm in activity, CSS members in SCG recently have published CSS bulletins about Mojave Desert caves.

In 1960 a University of California Hiking Club Cave Section existed, as evidenced by a Tom Aley article published in the California Caver that year. Also in 1960 the obscure Southwestern Speleological Society--a financial gimmick apparently--created by Dick Reardon, Tom Rohrer, and others from SCT surfaced again. Spelunking Unlimited, active for years at Lava Beds National Monument, and a Merced Cavers (prior to Norm Herman's group) are mentioned in Caves of California (1962). A Redding-based Northern California Grotto was listed as "now forming" in 1964-1965 California Cavers and its members found new caves in Trinity County.

Canadian speleologist Dr. Derek Ford, who years later in 1975 was made an Honorary Member of the NSS, was a visiting professor of geography at Los Angeles State College in 1963. He became the faculty advisor for a new rockclimbing/outdoor activity club, the Alpiners. After Dr. Ford introduced them to caving, several members became highly involved in it and though the club remained a general-interest group, cave interest ran high for over ten years. The Alpiner was published 1969-1974 and includes a large number of cave items. The UCLA Bruin Mountaineers joined the Alpiners on caving trips 1966-1968. In 1969 a couple Pasadena City College Highlanders club members led the Alpiners to caves near Lake Isabella. Both the UCLA and PCC clubs had previous histories of caving, with the UCLA group having had ties with the NSS and SCT over the years. The "Westwood Grotto" section of SCG in 1950 is possibly an early edition of that club.

Howard Hurtt and other Simi Valley youngsters found Clear Springs Cave in 1965 and soon organized the Simi Valley Caving Club and the Ventura County Cave Survey, which lasted until about 1969. VCCS published the Boxwork Bee and VCCS News and broadened knowledge of Ventura County caves through their investigations. Like the cavers in the Alpiners, several of the VCCS members joined the SCG and NSS.

Around 1966 some Barstow area cavers met with SCG's Dick Reardon with the idea of forming an NSS grotto, but no organization developed, although they gave SCG information about some desert caves previously unknown to SCG.

Following extensive new discoveries in Lilburn Cave during the 1966 NSS Convention, an NSS project began that was titled "Lilburn Cave and the Karst of Redwood Canyon". The original investigator was Ellis Hedlund but the project was soon taken over by Stanley Ulfeldt, then Chairman of the Southern California Grotto, who retained the same project title but listed the researcher/director as "Stanley Ulfeldt--Project Director, Lilburn Cave Research Project Committee of the Institute for Special Ecological Studies; co-sponsor National Speleological

Society."[15] The project gradually became less and less NSS-centered and in 1977 it was placed under Cave Research Foundation auspices in order to expand scientific research and publication about the cave.[16]

In 1969 SCG expelled a member, Alan Keith Dunn, due to his using unsafe caving practices and his trying to establish a caving section in the Sierra Club. Dunn did help to start a small group, the Lawndale Spelunkers, in the Los Angeles area around this same time, and although it lasted only a short time it produced a couple future SCG members.

Several groups have surfaced in the 1970s. In 1971 or 1972 a group of San Luis Obispo college students associated with SJVG planned forming an NSS grotto but never did. Around 1973 a small independent caver group was well-established in Visalia. Their leader, John Slaven, was in charge of arrangements for the NSS's Visalia Cave-In in March 1973. In 1973 the Shasta Speleological Society led by Galen Wooden existed in the Redding area. They associated with the Cave Research Associates and GBG but did not participate in the Western Region's annual Labor Day meeting at Mount Shasta in 1974. In 1974 the Napa Valley Cavers were expected to be forming an NSS grotto but did not. In 1975 the California Cave Diving Group, which published the Phreatic Diver, was a short-lived experiment by NSS member Bill Cate. Student members in the MLG in 1975 called themselves the Speleological Exploration Team and took a partially independent course from the grotto. In 1978 an informal Amador County Cave Survey headed by two MLG members was announced in the California Caver.

The first California Regional Meeting was held on the weekend of June 25, 1950 at Clough Cave Campground, Sequoia National Park. No official organization was established, but an informal Regional Committee consisting of grotto chairmen working with NSS Board members was encouraged to correlate field work, publicity, and records.[17] The second annual California Regional Meeting was held at Boyden Cave the weekend of July 16-17, 1951, and was attended by SCT and Stanford Grotto.[18] After the demise of the Stanford Grotto, SCG was the only NSS grotto in California, 1952-1955, and no Regional Meetings took place. 1956 saw the chartering of SMG and SJVG. In August 1956 Jim Gossett of SMG invited all California cavers to attend a Labor Day weekend Regional Meeting, which was duly held in Kings Canyon, where a formal organization was established.[19] The California Region received its charter on September 29, 1956. Annual Regional Meetings have been held each year since then on Labor Day weekend. The Region has changed its name twice: in 1971 it became the California-Nevada Regional Association; in 1973 it was re-named the Western Region.

In February 1971 the NSS Program and Activities Committee in cooperation with the California Region presented the first annual Western Area Seminar "Cave-In" on practical caving techniques and basic speleology. In nearly every year since then a Cave-In or other caving seminar has been held. These presentations have reached out to the general caving populace to provide knowledge about and to increase interest in scientific, technical, historical, conservation, and other areas of speleology. The Cave-Ins have functioned somewhat as miniature national conventions concentrating upon information sharing, whereas the Regional Meetings have emphasized field trips. Fellowship and political discussion are important in both.

NSS national caving conventions have been held twice in California. In 1966 the Convention was centered at Giant Forest in Sequoia National Park. 1975's NSS Convention took place at the Frogtown fairgrounds outside Angels Camp in the Mother Lode. Both conventions were organized primarily by SFBC with the support of other California grottos.

Thirty-two years of organized caving in California has greatly increased caving activity. This increase began mainly because Eastern U. S. NSS cavers moved to California and established grottos that spread caving interest further, throughout the state. Due to association in the NSS, grottos and individual members have shared a great deal of information over the years through publications and personal contact. Due to organization, the California Cave Experience in terms of completeness of knowledge, variety of activities, number of clubs, and possibility of exploration is much richer now than ever before.

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OUTLINE OF MAMMOTH CAVE HISTORY

Harold Meloy

1770 James Knox and his "long hunters" came to Kentucky.

1790 John Houchin (17??-1838) and his wife, Patty, move from Bath County, Virginia, and settle on south bank of Green River downstream from the cave.

1792 English author Gilbert Imlay writes that many Kentucky settlers manufacture their own gunpowder, that nitre is made from earth collected from caves, including caves along Green River.

1795 Kentucky legislature passes Act for relief of settlers on south side of Green River.

1796 Warren County, Kentucky (including the cave) established from part of Logan County.

1797 American Gazetteer reports that vast quantities of nitre are found in caves on the banks of Green River; and that many of the settlers manufacture their own gunpowder.

1798 Kentucky legislature passes Act for benefit of purchasers of land south of Green River.

September 14, 1798: Land Certificate to Valentine Simons for 200 acres south of Green River "including two peter caves" (later known as Mammoth and Dixon Caves). Total price $80.00; on January 4, 1812 Simons paid $70.93, balance and interest, on the 200 acres.

1799 Entry by Valentine Simons August 18, 1799 of 200 acres in Warren County Survey Book.

September 3, 1799: First land survey of the 200 acres.

1802 Designated "Big Cave" in Jonothan Clark diary.

Shortly after August 18, 1799, Simons sold the 200 acres and both caves by contract (not deed) to John Flatt. The larger cave became known as Flatt's Cave.

Thereafter, and prior to 1808, Flatt sold by contract (not deed) the 200 acres and both caves to John McLean and his two brothers.

The McLeans divide the 200 acres into two tracts: 44 acres with Dixon Cave, and 156 acres with Flatt's (Mammoth) Cave.

1808 The McLean brothers sold the 44 acres with Dixon Cave, by contract (not deed) to Charles S. Morton for $600.00 on January 22, 1808.

Archibald Miller comes to cave area to superintend the mining and processing of saltpeter.

Sometime prior to 1810, the McLean brothers sold the 156 acres including Flatt's Cave (Mammoth) to Fleming Gatewood and Charles Wilkins for $3000.00, by contract (not deed).

It is believed that either Gatewood or Wilkins brought Archibald Miller and his brothers to the cave. Hence the sale to Gatewood and Wilkins may have been circa 1808.

1810 First published use of name "Mammoth Cave" in Richmond, Virginia, newspaper on January 21, 1810. Interior of cave described by a visitor prior to that date.

1811 Map of Mammoth Cave was copied in Lexington and the copy sent to Philadelphia on March 15, 1811. The original of the map made prior to 1811.

Prior to September 4, 1811, the "baby mummy" was discovered in Short Cave and destroyed by saltpeter miners.

December 16, 1811: First shock of New Madrid earthquake; other shocks followed. Earthquake felt in cave and later described by saltpeter miner.

1812 July 9, 1812: To clear title (prior to purchase by Gratz) Simons signed deed for 200 acres to Flatt; Flatt signed deed for 200 acres to the McLean brothers, who signed deed for 156 acres to Fleming Gatewood and Charles Wilkins. These deeds all signed the same day in Hardin County to clear title.

Declaration of War with England signed by President Madison on June 18, 1812.

August 25, 1812: Gatewood deeded his 1/2 interest in the 156 acres and Mammoth Cave to Hyman Gratz of Philadelphia for $10,000. Gratz leaves his name in the cave.

Circa October 1812, larger vats constructed in cave to replace the smaller vats at entrance, and wooden pipe lines placed between the entrance and the new vats.

1813 Sometime after September 1811 and before Autumn of 1813, the "Fawn Hoof" mummy found in Short Cave and taken to Mammoth Cave for display to visitors.

1813-1814 During the War of 1812, the British blockaded the American seaports and our imports of gunpowder and the nitrates to make it were cut off. To continue the war we were forced to rely upon domestic resources. Vast amounts of saltpeter were mined and processed at Mammoth Cave and sent to the gunpowder factories in the east. Without the nitrates from Mammoth Cave, America would have lost the War of 1812.

1815 Saltpeter manufacture ceased in Mammoth Cave circa March 1815.

Circa October 1815, Nahum Ward takes trip in Mammoth Cave, makes new map of the cave, writes long description of the cave and of the mummy. He takes the mummy with him.

1816 Ward's cave map, description of the cave, and description of the mummy published many times in newspapers, broadsides, magazines and books.

These publications and the mummy made Mammoth Cave famous (not the saltpeter activity).

1823 English Capt. William N. Blane visits Mammoth Cave and describes it in his book published in England. Archibald Miller still the agent of Wilkins and Gratz and showing cave to visitors.

1825 Edmondson County established. Now the cave in Edmondson County.

1827 Charles Wilkins dies. Archibald Miller moves from the cave house to home nearby. Fleming Gatewood and family return to Cave House as agent for Gratz.

1828 Hyman Gratz buys the 1/2 interest formerly owned by Wilkins.

1829 Hyman Gratz sells part interest to his brother, Simon Gratz.

1831 London Attorney Gadfrey T. Vinge visits Mammoth Cave and describes it in his book published in London 1832 and in America in 1833.

1833 Dr. Robert M. Bird first visits Mammoth Cave. After another visit in 1836, writes description of cave which has become one of the classics of Mammoth Cave literature.

1834 First published reference to religious services held in cave at site later known as Methodist Church. Principal guide at time was George S. Gatewood, son of Fleming Gatewood, who became a Methodist preacher. He was first licensed to preach in 1833.

1835 Edmund F. Lee makes instrument survey and map of Mammoth Cave. His guidebook to Mammoth Cave published. The Gatewoods leave Mammoth Cave October 1835.

1836 Robinson Shackelford and Archibald Miller, Jr. lease the cave 1836-1837.

1838 Franklin Gorin and A. A. Harvey contract on April 17, 1838, to purchase Mammoth Cave from Hyman and Simon Gratz for $5,000, to be paid in installments over five years. Since 1812, Gratz and Wilkins had purchased adjoining lands and by 1838 the Mammoth Cave tract had 1610 acres. (Gorin never received deed).

1838 Gorin enlarges and improves the Mammoth Cave Inn and other visitor facilities.

1838 Franklin Gorin places his slave Stephen Bishop in cave as guide. Archibald Miller, Jr. is manager.

1838 Wandering Willie walks from Cincinnati to Cave, spends night in cave, and enters Mammoth Cave folklore.

1838 Charles F. Harvey lost in Cave for 39 hours.

1838 Gorin's Dome discovered.

1838 Bottomless Pit first crossed October 20, 1838, by Stephen Bishop and visitor from Georgetown, Ky., on ladders.

1839 Franklin Gorin sells cave October 8, 1939, to Dr. John Croghan for $10,000.

1840 Echo River crossed.

1840 Mammoth Dome discovered November 1840.

1841 Dr. Croghan builds two huts in Audubon Ave. for possible use of invalids.

1841 Cleaveland's Ave. discovered July 1841.

1842 Stephen Bishop with help of Col. George Croghan prepares new map of cave in January 1842. Map published in 1845.

1842 On May 23, 1842, Dr. William J. Mitchell enters Mammoth Cave as the first T.B. patient. Ten other T.B. patients followed. Some died in cave. Last patient left the cave March 1843; and the experiment failed.

1843 Croghan continues to enlarge and improve Mammoth Cave Hotel.

1844 Alexander C. Bullitt visits Mammoth Cave and writes book, Rambles in Mammoth Cave, published in 1845. A classic in M. C. literature.

1845 World famous Norwegian violinist Ole Bull visits Mammoth Cave and plays his violin at place in cave since known as Ole Bull's concert hall.

1849 Dr. John Croghan died. Mammoth Cave placed in trust for certain heirs. It was owned and managed until the 1920s by this trust, commonly known as "The Mammoth Cave Estate".

1850 Ralph Waldo Emerson visited Mammoth Cave in June 1850 and wrote about the cave.

1851 World famous Jenny Lind visited Mammoth Cave April 5, 1851. Contrary to many reports, she did not sing in the cave.

1851 Rev. Harace Martin writes new book on Mammoth Cave.

1852 Author and editor Nathaniel Parker Willis visited Mammoth Cave in June 1852. His article describing the cave remains another classic in Mammoth Cave literature.

1855 World traveler and author Bayard Taylor visits the cave in 1855. His articles about the cave widely read for many years.

1857 Stephen Bishop died in July 1857 (not 1859 as inscribed on his grave marker). Mat and Nick Bransford are the principal guides after Stephen's death.

1858 Dr. Charles W. Wright authors guidebook to Mammoth Cave. Later editions published in following years.

1858 Maelstrom first descended by William Courtland Prentice.

1860 Author G. S. Bailey visited the cave and reported that a couple were married in the Gothic Chapel a few years before.

1863 In August 1863, Mr. F. J. Stevenson of England visited Mammoth Cave, explored the river at bottom of Gorin's Dome; also Roaring River; also descended the Maelstrom.

1866 First photographs taken in Mammoth Cave by Charles Waldack.

1867 Dr. William Stump Forward visits cave in May 1867 and writes book published in 1870, 4th ed. 1875.

1868 Dr. Adam D. Binkerd visits the cave and writes books about it.

1868 Mystic River discovered by Charles DeMonbrum and A. Merideth.

1870 Guide William Garvin discovered the Corkscrew.

1872 Grand Duke Alexis of Russia visited the cave February 1, 1872.

1875 The "Little Alice" mummy discovered March 8, 1875, in Salts Cave by Bill Cutliff and Tom Lee. It was taken to Long Cave, then Procter's Cave, and later to Mammoth Cave for display to visitors, where it was called "The Mammoth Cave Mummy." (1925).

1876 Actor Edwin Booth visited the cave in March 1876 and recited Hamlet's soliloquy at place since known as Booth's ampitheatre.

1876 Emperor of Brazil, Dom Pedro, visited the cave in May 1876.

1878 Rev. Horace C. Hovey makes first of many visits to the cave. His published works about the cave from 1878 through 1912 made him the best known Mammoth Cave author.

1879 Ganter's Ave. to beyond the rivers discovered.

1880 Jesse James robs the Mammoth Cave stagecoach, September 3, 1880.

1881 Mushroom farm in Mammoth Cave.

1882 William Garvin discovers "Martha Washington's Statute".

1883 Christmas Tree placed in cave and remained until NPS removed it.

1886 Mammoth Cave railroad completed.

1893 Beautiful gypsum flowers stripped from Specimen Ave. (hence its name) for exhibition at World's Columbian Exposition in Chicago.

1893 Dr. Richard Ellsworth Call writes book about cave. This and later books place him at the top among the cave authors.

1896 Darnall's Way cut through to Gorin's Dome.

1900 Charles G. Lloyd of Cincinnati was lost in the corkscrew for 12 hours. Guides Bob McDaniel and John Nelson found him.

1904 First auto at Mammoth Cave. (driven from Indianapolis).

1906 Locks and dams built on Green River. This raised the level of waters in the cave, including Echo River. Also it raised the water level in Gorin's dome, cutting off access to that river. Also it permitted excursion steamboats to bring visitors to the cave by Green River.

1907 Stone plaque placed in Vanderbilt University Hall.

1907 Cathedral Domes discovered May 15, 1907 by Benj. F. Einbigler, Edward Hawkins and William Bransford. Rev. Hovey later named it Hovey's Cathedral Domes.

1908 Max Kaemper makes secret map of Mammoth Cave for the management. In doing so, he and guide Edward Bishop discover Violet City, Saratoga Springs, Alice's Grotto, and other places.

1912 Congressional committee holds hearings to establish Mammoth Cave National Park.

1916 George D. Morrison forces the "Cox Entrance" to the cave from land outside the cave property.

1916 World famous Mammoth Cave Hotel destroyed by fire December 9, 1916.

1917 First electric lights in Mammoth Cave.

1921 George D. Morrison opens the "New Entrance to Mammoth Cave". Many passages between Grand Central Station and Mary's Vineyard discovered and explored.

1923 Frozen Niagara discovered by Roy Jaggers, Earl Lee and L. L. Lee on March 12, 1923.

1924 Frozen Niagara Entrance opened.

1924 The Mammoth Cave National Park Association formed by private individuals to promote Mammoth Cave as a National Park. U. S. Secretary of the Interior Albert Fall had notified Kentucky that if the cave was to become a National Park, it must be as a gift to the U. S. During the next 17 years this Association took the leadership in making the cave a National Park.

1925 Floyd Collins dies in Sand Cave February 1925.

1929 The Mammoth Cave National Park Association purchased 2/3 interest in the Mammoth Cave Estate, from heirs owning 2/3 interest, on January 1, 1929.

1930 Skeleton of female found at Natural Entrance.

1930 Cathedral Domes Entrance opened.

1930 The remaining 1/3 interest of the Mammoth Cave Estate condemned and purchased.

1931 George Morrison's New Entrance holdings, east of the Mammoth Cave Estate lands, purchased January 5, 1931 for $290,000 by the Kentucky National Park Commission.

1931 Carmichael Entrance opened; Violet City Entrance opened.

1931 Mammoth Cave Railway line discontinued.

1933 The Mammoth Cave National Park Association which operated the Old Entrance sections, and the Kentucky National Park Commission which operated the New Entrance sections, joined into a Joint Operating Committee to operate the whole cave until it was accepted as a National Park in 1941.

1935 First all-day trip May 11, 1935 from Natural Entrance to Frozen Niagara Entrance. Snowball dining room opened.

1935 "Lost John" mummy discovered June 7, 1935 by guides Lyman Cutliff and Grover Campbell.

1936 Mammoth Cave accepted by U. S. with status of National Park for administration and protection. Joint Operating Committee continued to operate the cave and all visitor facilities until July 1, 1941 when the Cave was declared a National Park.

1936 Upside down well drilled.

1936 U.S.G.C. Survey made under direction of H. D. Walker.

1937 Organized exploration trip made in lower levels of cave by ten men, including Leo Hunt, Carl Hanson, Paul McG. Miller, and others. They explored Echo River, Roaring River, and Hanson's Lost River. 17 Avenues from the rivers were noted. They did not find Mystic River. They found a fossil embedded in the rock at 360 ft. level identified by Prof. J. Harlan Bretz as part of a spine of a shark which lived in inland sea 300 million years ago.

1938 Dr. Nathaniel Kleitman of University of Chicago Psychology Dept. and Bruce Richardson, a post graduate student, lived in Mammoth Cave for 32 days from June 4 to July 6, 1938 to study body processes, removed from day and night.

1938 Cave guides Leo Hunt, Carl Hanson, Pete Hanson and Calude Hunt find "New Discovery" section of cave.

1940 New Discovery Entrance opened.

1941 Mammoth Cave becomes National Park July 1, 1941.

1946 Mammoth Cave National Park dedicated as National Park September 18, 1946.

1956 NPS begins "Mission 66", a development project to be completed by 1966 including: New Visitor Center, New brick hotel, new park driveways, new parking areas, and many improvements of visitor trails in cave.

195_ "Little Alice" mummy withdrawn from public display at Mammoth Cave.

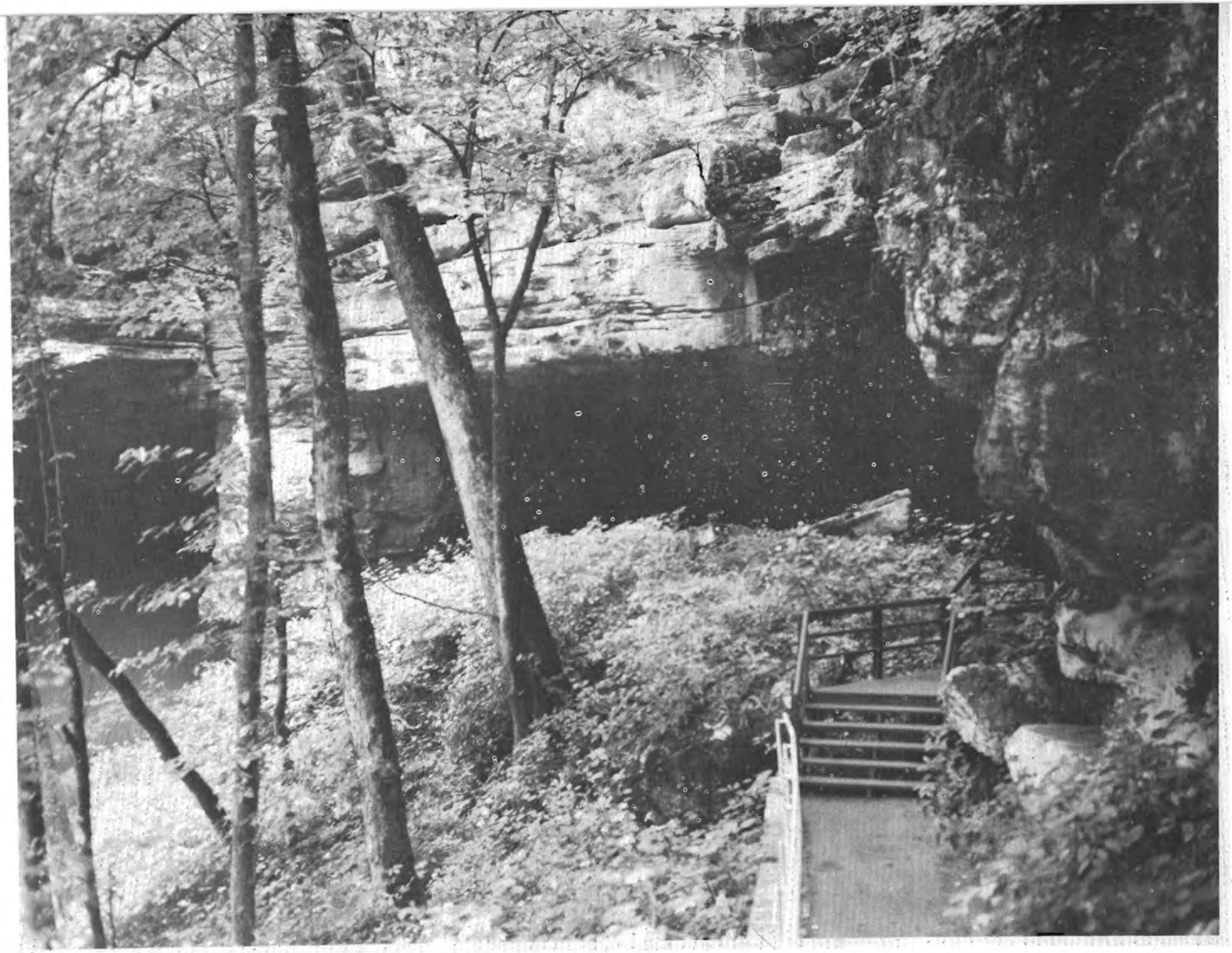
1961 Great Onyx Cave and Collins' Crystal Cave sold to U. S. and become a part of National Park.

1967 "New Entrance" closed to public November 1967.

1972 Connection discovered between Mammoth Cave and Flint Ridge Cave system by CRF on September 9, 1972.

1976 "Lost John" mummy removed from public display in the cave April 1976.

prepared as a part of a
historical research project
on Mammoth Cave, Kentucky



Entrance to Russell Cave. Photo courtesy of Russell Cave National Monument

RUSSELL CAVE (AL 169)
MAN'S HOME FOR 8000 YEARS

Jack H. Speece
Edited by Michael D. Cullinan

Russell Cave is the site of one of the most significant archaeological discoveries in America. The deposits were originally discovered by amateurs in 1953 and referred to the Smithsonian Institution. The Smithsonian, in cooperation with the National Geographic Society, made a thorough investigation, purchased the property and later donated it to the American people. Today it is a National Monument supervised by the National Park Service. This in-place exhibit attracts thousands of visitors each year. Man's ancestors have been traced here in a continuous sequence for 8,000 years and it is one of the best archaeological sites in the country.

The basic essentials of man include food, clothing and shelter. Therefore it is only natural that ancient man would seek refuge in the sheltered entrance of a large cave, especially during inclement weather. If the countryside surrounding the shelter had plentiful food and fresh water he would likely be content to stay there for a period of time. And how much more enjoyable would be an eastern exposure which would face the first warming rays of the morning sun? A large entrance with a good flow of air so the smoke from a fire would readily escape could also add to man's desire to dwell in such a natural cavity. Here the first Americans could live with some degree of comfort and put forth little effort to maintain an existence. Man's remains have been found in numerous rockshelters and caves all over the world. However, one of the most significant sites ever found in North America is at Russell Cave, Alabama. The remains discovered here reach 23 feet into the floor and trace mankind back 9,000 years. Today this site can be visited by all and is maintained by the National Park Service.

In the northeast corner of Alabama just 3/4 mile south of the Tennessee border in Jackson County lies this national landmark. It is tucked away in the steep hillside of Montague Mountain in a large double-chambered shelter separated by a rock pillar. The limestone valley which lies at its entrance is known as Doran Cove. The eastern portion of this narrow, six-mile long cove opens into the broad Sequatchie Valley which contains the Tennessee River. The western end extends into the Cumberland Plateau which rises over 1,000 feet above the valley floor. Along the valley floor flows Dry Creek and it is spotted with many sinkholes. Russell Cave is situated 23 feet above the creek at an elevation of 625 feet on the Doran 7½ minute USGS Quadrangle map. It is approximately 5 miles WNW of Bridgeport, Alabama.

The area's prominent limestones are the Gasper and St. Genevieve (Monteagle) of Mississippian age. The rock has a wide range of textures and is highly cavernous. At the top of the Cumberland Plateau, 1,000 feet above the cave is a 20- to 40-foot thick sandstone cap of the Pottsville Formation of Pennsylvanian age. Layers of shale, sandstone and coal lie between the caprock and the limestone.

The cave is typical of those found in Mississippian age limestone. It is basically a long narrow conduit containing a stream which diverts the surface drainage. The system is part of the underground tubular drainage system in oolitic limestone beds that locally are at or just below the level of the alluvial valley flat.

A large 200-foot wide sinkhole at the base of Montague Mountain receives Dry Creek and serves as the main entrance to the Russell Cave System. Within this sink is a perennial spring which admits water into the subterranean passageway, 100 feet wide and 50 feet high. Separated by a rock pillar, a shelter cave 100 feet wide, 25 feet high and 150 feet deep lies just to the right of the stream and 24 feet above it. This shelter extends for 270 feet back through breakdown and into the main stream passage.

During the rainy season (spring) Dry Creek carries a large run-off into the subterranean water channel. The constricted passage will cause the water to back up, overflow the stream bed and take a surface course down the valley. The water that does enter the cavern flows for approximately 3/4 mile, past Pig Entrance (behind the home of Marie Ridley) before it submerges in

"Methane Alley". It is believed that the stream continues for another mile and emerges as the source of Widows Creek. Less than 100 yards east of Pig Entrance is Cow Pen Cave (Montague Cave), AL 379, named after a nearby "cultural" feature. Some believe that it also connects with Methane Alley even though the entrance is 30 to 40 feet lower in elevation. Cow Pen Cave continues for a mile into the mountain before the watery passage siphons.

Total passage in Russell Cave has been found to exceed 23,000 feet and it contains several thrust faults. The system was mapped by Don Black, Leonard Munson and the Chattanooga Grotto from 1957 to 1960 by special request of Dr. Miller of the National Geographic Society.

Until recently, Russell Cave was known to only a handful of cavers who frequented the local area. Today this cave is a National Monument known to many as one of the most significant archaeological sites in America. Its fame began when two amateur archaeologists, Paul H. Brown and Charles H. Peacock, dug into the rich treasures of the rock shelter in 1954. They knew that projectile points had been found in the area and decided that the cave might have served as a shelter for early native Americans and contain additional evidence. Permission was obtained from the owner, Oscar Ridley, to dig a small trench. The results from this effort were so rewarding that it soon involved the entire Chattanooga chapter of the Tennessee Archaeological Society. These eager excavators soon realized after six feet of digging that the site was too significant for their inexperienced efforts so they notified Dr. Matthew W. Sterling, director of the Smithsonian's Bureau of American Ethnology.

Realizing that the cave was indeed an ideal place for ancient man to live and that the artifacts here were quite numerous, the Smithsonian requested a grant from the National Geographic Society and together they made a major investigation beginning in April, 1956, under the direction of Carl F. Miller. This resulted in a most significant find of the continuous existence of man to 6,000 B.C.

As the workers carefully removed each inch of dirt in a 30-foot square located 60 feet back from the entrance near the north wall, they found pieces of broken pottery, bones, and small arrowheads. As they excavated deeper, the pottery disappeared and the stone points became larger. Other unique items came to light such as fishhooks, polished shell ornaments, bone awls and a grass fiber basket filled with small seeds.

A concerted effort was made to extend the occupied age of the cave to 8,000 B.C. by the finding of Folsom points. At a level of 14 feet they reached a very sticky mud. Pushing on to 16 feet the finds became fewer. Even deeper there was evidence that man did live here at the beginning of the Archaic Culture and points were similar to the famous Folsom point but not quite enough to place man here 10,000 years ago. At a level of 23 feet a small bed of charcoal was collected and radio-carbon-dated at 8,000 years. Further digging resulted in water at a depth of 32 feet.

During the early research efforts arrangements were made by the National Geographic Society to purchase the entire farm owned by Oscar Ridley. This would assure the protection of the site. After the study was completed, on January 7, 1961, the Society donated the several hundred acres to the American people. The U. S. government accepted and the U. S. Department of the Interior has preserved it for future generations by creating the Russell Cave National Monument.

This site is one of the finest examples of continuous human occupancy yet discovered in this country. The treasures found here, including several human burials, have helped science to form an insight of man's culture over the past 8,000 years. Some of the tools found have not been equalled anywhere else in the Southeast and actually resemble those used in the far North.

Those ancient people were probably short, naked men who hunted with stone-pointed projectiles for deer, bear, turkeys, and other small game. Their diet was supplemented with wild berries, nuts, and various grain seeds. Later generations became skilled in weaving and pottery making. Housekeeping was accomplished by spreading a layer of dirt over the assorted "trash" which had accumulated. Other cultures would dig pits in which to throw their litter. Pieces of polished bone are believed to have been used as hair pins, keeping the hair back out of their faces. Dead relatives were buried beneath them without any accompanying artifacts, indicating that either tools were community property or that they were scarce and valuable.

Archaic Man used a spear-throwing device which we know today as an athatl. These weapons were also used by the Aztecs of Mexico. A unique type of fishhook was also uncovered in the lower levels. This two-pieced "V" shaped hook is similar to that used by the Indians and Eskimos who reside in the far Northern lands. Even crude bone lamps utilizing bear fat were uncovered, proving that man was intelligent and creative as early as 5,000 B.C.

Sixty species of vertebrates have also been unearthed in Russell Cave. The most numerous were those of deer, turkey, raccoon, squirrel and bear. These were probably an important part of man's diet. Several extinct species were also present: passenger pigeon and peccary. However, nothing unusual was noted to indicate ecological or climatic changes in the area.

Since the stream portion of the cave siphons and traps organic debris, it is a refuge for some types of biological life. This was studied by Tom Barr and Bert Denton in 1954 about the same time that all the excitement was beginning in the sheltered portion. The annual floods provide a vast food supply for such creatures as the cave salamander. The back sections of the cave are a paradise for the biologist.

An interesting legend is associated with the cave. It contends that two train robbers with a bag of gold from nearby Bridgeport were chased into the cave. The bandits were later killed and the gold never recovered. Some feel that the gold was hidden somewhere in the cave. Similar legends are attached to other famous caves, such as Meremac in Missouri.

Although the evidence of man uncovered in Russell Cave is not the oldest in the country, it is the oldest in the Southeast. The clearly-marked strata here gives a definite continuous look at how man has progressed for the past 9,000 years. Several objects found there have remained as mysteries to science but apparently the cave served as a site for wandering travelers to rest for a season and share their talents and ideas with others who were also there.

I recommend you take the opportunity to visit the area and obtain a better understanding of how early man in America lived. The rangers of the National Park Service will be glad to assist you and answer any additional questions.

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EDWIN SWIFT BALCH -- ALMOST AN AMERICAN MARTEL

William R. Halliday, M.D.

Edwin Swift Balch today is largely remembered for his monumental book Glacieres, or Freezing Caverns. Yet he was much more. Within a year or two of its publication in 1900, the stage was set for Balch to play a role similar to that of Martel in Europe. Unfortunately, fate intervened. The majority of Balch's work in American speleology occurred in the northeast. Today the Balch Institute in Philadelphia is being funded by a trust established by him.

No definitive biography of Balch has ever been published, and intimate details of his life are largely lost. The precision, clarity and singlemindedness of his writings may lead the reader to picture him as the prototype of the legendary "Philadelphia lawyer". Yet Balch was a man of remarkably varied interests. He combined mountaineering with art, as well as with caving. Nothing is known about his artistic training, but from 1887 to 1891 he exhibited yearly at the Philadelphia Academy of Fine Arts, and at the Philadelphia Art Club in 1887 and 1890. Thereafter he apparently abandoned any personal artistic ambition, but wrote as an informed patron and critic. Late in life he produced several sizable works on art, with particular emphasis on its ethnological aspects. As an early advocate of the submarine (Balch, 1909), he also was ahead of his times in marine engineering. He was probably America'a leading authority on the history of Antarctic exploration, and his writings included other historical, biographical, linquistic and cultural subjects. The American Geographical Review summarized his career as follows:

> "Mr. Balch's interest lay primarily in exploratory fields, especially mountaineering and polar exploration. . . He also sought to make geographical application of his studies of fine arts, publishing several volumes on the distribution of art and its bearing on comparative ethnology. He contributed numerous papers to scientific periodicals. . . His last contribution . . . was in continuation of his efforts to promote a knowledge of the important share that Americans, notably Wilkes and Palmer, have had in the exploration of the Antarctic."

Notably absent from that eulogy is mention of his speleological accomplishments, a quarter-century in the past at the time of his death.

Throughout his life a noted member of a wealthy, socially prominent Philadelphia family, Edwin Swift Balch was born in that city in 1856. A paternal grandfather was the first president of the Bank of the United States; his maternal line included two early mayors of Philadelphia, both prominent in colonial affairs.

When Balch was three, the family moved to Paris, where his father increasingly was hailed in international law and economics. In 1861 he served as acting U.S. Consul to France. Young Balch grew up attuned to French aristocrat thought and accustomed to casual conversation about meetings with Ferdinand deLesseps of Suez Canal fame, or dining with the Emporer Napoleon III. The family traveled widely in continental Europe, and he was familiar with the Alps and Pyrenees almost from his earliest memories. His early education was entirely in France and Germany.

In 1873, the Balchs returned to Philadelphia. Edwin spent a year assimilating the environment, then entered Princeton as a sophomore in 1875. Soon, however, he was detected snickering in Chapel at an ill-judged remark by the college president about elephant or mammoth fossils "and other products of the earth" (T. W. Balch, 1907). The times were stormy, with geology not yet accepted as more than an atheist conspiracy. The hot-tempered theist speaker unwisely reacted by reprimanding young Balch for blasphemy; the student body hissed as one, and the incident seemed likely to grow out of all proportion. Calm heads prevailed, however. The president of Princeton apologized to Balch and his father, and Balch transferred to Harvard. Harvard apparently was duller than Princeton; he graduated with a B.A. in June, 1878, without recorded incident.

At that time, would-be lawyers studied under preceptors, and Balch entered the office of William Henry Rawle of Philadelphia. In 1881 he was admitted to the Philadelphia Bar. Unlike his brother, Thomas Willing Balch, who became a noted Philadelphia lawyer, Edwin never practiced his profession, living instead as a wealthy gentleman of affairs and traveling widely.

Prior to the 1970 Johnson Reprint Company reprint, Glacieres, or Freezing Caverns was perhaps the rarest of major American Twentieth Century speleological books. Those in the forefront of speleology and meteorology quickly recognized it for what it is: a set of lucid scientific deductions based on analytical observations of underground ice prefaced by a scholarly review of earlier writings on the subject. Balch's conclusions clarified, correlated and systematized earlier ideas rather than initiating original concepts. Nevertheless, it was his original reasoning in this book that caused American science to recognize the basic principles of spelean meteorology. So well did Balch delineate the cause of occurrence and persistence of ice in caves that despite the overwhelming discoveries of the subsequent decades and the notable discoveries of the intervening generations of cavers who had forgotten Balch's very name, his theory of glacieres remains essentially unmodified today.

No complete list of his cave and glaciere explorations is known to exist, and nearly all of his caves were in Europe, because he left speleology just as he began to broaden out from glacieres in the United States. From his published writings has been compiled the following list of the American caves and spelean glacieres which he visited:

VERMONT

Skinner's Hollow Cave (Freezing Marble Cave, near Manchester)
Ice bed in talus, near Wallingford
Tallow Cave, North Dorset

MASSACHUSETTS

Snow Hole, near Williamstown
Two other caves near Williamstown
Marble Natural Bridge, North Adams

NEW HAMPSHIRE

Ice Gulch, near Randolph
Freezing talus, Rumney

NEW YORK

Watertown caves
Ice Cave, Ellenville
Freezing talus, Lower Ausable Pond
Freezing talus, Giant of the Valley

PENNSYLVANIA

Freezing cave, Farrandsville
Freezing talus, Spruce Creek

IOWA

Decorah caves

In studying ice-containing caves, Balch's original interest lay with the ice rather than with the caves, an appropriate attitude for a mountaineer. Two of his 1901 publications, however, indicate an increasing speleological orientation, with repeated references to current studies by Martel. He mentioned that he had "visited perhaps a hundred caves" and noted that Kimball's article and other recent interest by the staff of the U. S. Weather Bureau "is a welcome help to speleologists" (Balch, 1901 a & b). He corresponded with Hovey and Martel. The stage was set

for him to assume a major role in American and world speleology.

But it was not to be. During the next dozen years, he became increasingly embroiled in controversies of polar and alpine exploration and geopolitics related thereto. Some of his extensive writings on these subjects were constructive, but his criticisms of British savants soon became controversial. Further he was somewhat uncritical in championing American explorers. It is of some present interest that as a speleologist he chose the early tribulations of the Reverend J. McEnery, de Perthes and de Sautuola of Altimira fame in supporting the dubious claims of Frederick Cook (Balch, 1913).

Despite two marriages, Balch died childless on March 15, 1927. His brother, also childless, survived him by only a few months. His will and those of his brother and mother each left large estates eventually to form the Balch Institute centered around "a good library and an auxiliary museum". After a long stay in the Philadelphia courts, the Balch Institute was finally organized in 1971. It serves as a center for ethnic studies specializing in immigration records. The present building, located at 18 South Seventh Street, Philadelphia, was completed in 1976.

Perhaps the most revealing tribute to Balch lies in the acclaim his book is accorded today. Shortly after its publication, Balch's overinvolvement caused his influence to wane. A mere sixteen years later, Balch had to reassert the principles he had delineated in Glaciers, or Freezing Caverns; the august Scientific American published an article (Vandermuelen, 1916) forgetfully reasserting pre-1900 thought. With his book again hailed as a speleological landmark through republication by Johnson Reprint Corporation, today's cavers increasingly rue Balch's diversion from what he might have been: the American Martel.

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JAMES PARRISH STELLE AND WYANDOTTE CAVE

George F. Jackson

Wyandotte Cave, Indiana, attracted much attention by early speleologists. Descriptions of the cave appeared in numerous magazines and journals by such well-known authors as Horace Hovey. It wasn't until 1864 that James Parrish Stelle wrote the first book on the natural wonder. Although he lacked somewhat in scientific accuracy in cave formation, his description and remarks on Wyandotte are hard to equal.

The first book published on Wyandotte Cave was James Parrish Stelle's The Wyandotte Cave of Crawford County, Indiana, printed in 1864. A delightful tale of "a vacation spent far underground among giant cliffs, crystal springs, white crickets and eyeless fish in a cool bracing atmosphere", it is an excellent example of how tourists traveled through commercial caves well over one hundred years ago. Today the book is a rarity and the few copies still extant are much sought after by collectors. It is the only book I have seen that has the Table of Contents, mislabeled "Index" in the back of the book.

James Parrish Stelle was an extremely versatile man. Born about 1828 in Illinois, he was educated as a physician, later became a reporter for the Louisville (Ky.) Journal, an entomologist of note, agriculture editor of an Atlanta paper, published articles on Indian mounds, watchmaking and jewelry, was the editor of two editions of the American Watchmaker and Jeweler, all the while making important contributions to agriculture. He was sent to Mexico by the United States Government with an entomological commission and even wrote books on firearms and watchmaking! A more complete biography of his life appears in The Southwestern Historical Quarterly, V. 49, No. 4, April, 1946, p. 597.

While living in Louisville he visited Wyandotte and wrote a series of articles about the cave for the Waverly Magazine of Boston. Later he edited the articles for publication as a book. In those days there were frequent excursions by steamboat down the Ohio River from Louisville to Leavenworth, Indiana. From here trips were made by carriage to Wyandotte, a distance of about six miles. Undoubtedly Stelle started his underground vacation in this manner.

The huge rooms, immense formations, the lovely, delicate and colorful stalactites and stalagmites had not been vandalized and were in almost their natural state. It must have been an exciting journey for those early visitors.

Yet to be discovered were the third largest room in the cave, the full extent of the upper level, or so-called "Unexplored Regions", the magnificent "New Discovery of 1941" and many smaller rooms and passageways.

Although Stelle says "little note had been taken of the cave until 1812" it was actually known to white men as early as 1798 and to aboriginal explorers at least 3,000 years earlier. The Old Cave Route was explored in 1801 by a man named F. L. Bentley, a rather mysterious figure who is known to history only by his many signatures in this portion of the cavern. In 1812 Dr. Samuel Adams preempted the cave from the Government for the purpose of making saltpeter--an essential ingredient of gunpowder--from the nitrous dirt in it and nearby Saltpeter Cave. He gave up his claim on the property about 1818 and the following year 4,000 acres of the surrounding heavily timbered land were purchased from the government by a German emigrant family from New York state named Rothrock. The Rothrocks were not interested in the cave but in the great stands of virgin timber in the surrounding high hills and nearby Blue River, a fine source of water power. Building several sawmills and dams they went into the lumbering business. Although scientists and curious travelers came to visit the cave the Rothrocks considered it a nuisance. They continued to run their sawmills until 1850. That year exciting discoveries in the cave and the resulting publicity concerning them practically forced them from lumbering into commercial cave operation. The Rothrock family owned and continued to manage the cavern until 1966 when it was purchased by the State of Indiana and is now part of the large and scenic Harrison-Crawford State Forest. For a more detailed history of the cave and its Indian and white explorers and their adventures see George Jackson's The Story of Wyandotte Cave.

Throughout his book Stelle frequently quoted from other writers about the scenic wonders

of the cave and among them specifically mentions Rev. Horace C. Hovey--now known as "the father of American Speleology"--who first visited Wyandotte in 1854. When these quotations were called to Hovey's attention he was perturbed and in a letter to his father wrote "my attention has been called to a book on Wyandotte Cave by J. P. Stelle, in which he quotes from my articles on the cave, crediting them to Judge Hovey. Some he does not credit at all . . . I had a great deal of amusement and some indignation in looking over the volume".

Stelle was not well versed in speleology but he was an alert reporter and noted, as had Hovey before him, that Pillared Palace in the Short Route was not actually a portion of that part of the cave . . . but rather a different branch, crossing it at right angles . . . and everything about it goes to show that it is the upper portion of a high apartment in a strange branch of Wyandotte . . . whose passages have long since been filled with mud".

Seventy-seven years later those particular sentences of Stelle's were the prime factor in the discovery of one of the major scenic and most unusual areas in Wyandotte Cave!

In January 1941 Charles J. Rothrock was casually thumbing through his copy of Stelle's book when the above sentences seemed to attract him more than on previous readings. So much so, in fact, that within a few hours he and two of the guides were digging avidly in the mud-filled passage just north of Pillared Palace. The rest is history. Within a few days they had reached a passage and room of great beauty, full of colorful stalactites, stalagmites and fantastically twisted and convoluted helictites, the most unusual type of cave formation. Later a connection was made between this colorful area and Monument Mountain.

Stelle's theory of the formation of the cave, given in the appendix, is quite at variance with today's accepted speleological knowledge, even suggesting that the stream that formed it passed directly under Blue River, quite a sizable stream one-half mile from the cave! However, he mentions one point which may be worth more than passing interest: The entrance to Wyandotte Cave is near the edge of a deep transverse valley. Opposite is a hill as high as the one in which the cave lies. Stelle thought that across from the cave mouth, on the other hillside, the ". . . old cave channel still exists. . ." As far as I am aware no one ever considered this theory until Charles J. Rothrock carefully checked it sometime in the 1920's. Some distance away but directly opposite Wyandotte's entrance he said he found the remains of old cave formations, cave channels and other evidence indicating that this part of Stelle's theory may have been correct. So, despite his incorrect theories about the formation of Wyandotte Cave, Stelle may have given a lead to future explorers of many more miles of cave passages.

An interesting observation on page 16 of the book well illustrates the extreme dryness of some portions of the cave. Passing through "Counterfeiter's Trench", Stelle notes "on our left hand side a defunct oppossum--dried up--completely kerked--a perfect mummy". It seems incredible but the remains of what is undoubtedly the same oppossum were still there in the same spot as late as 1950! The remains are well to one side of the present tourist path and partly hidden by a rock outcrop and cannot be seen unless one looks for them. Stelle concludes his remarks by writing "I have no doubt but it will still be 'playing possum' just the same five hundred years hence". I believe him.

Stelle's description of the main cave itself is much more accurate then most of the early articles about it, but he is incorrect when he refers to "crickets without eyes that die soon after being taken from the cave" and in his reference to eyeless fish. The crickets living in Wyandotte do have eyes and although they are unable to use them in the total darkness underground they make periodic visits to the outer world for food. There are no eyeless fish in any known portion of the cave, but there are blind crayfish in "Crawfish Spring" in the Long Route.

Of interest to archeologists is his description of the Indian footprints in the Long Route. Stelle saw them only 14 years after their discovery and, considering the relatively few visitors in those days, the prints probably were in the same condition as when discovered in 1850.

In 1864 it was the custom to take all willing visitors through most of the known portions of the lowers of Wyandotte. If such a journey was too lengthy or too strenuous, shorter trips were arranged. In Chapter III, "Conclusions of First Day's Journey", Stelle tells of visiting what is now called the Long Route, then going through the upper level, the section still known as "The Unexplored Regions", which had been discovered only a few years before. It is not believed that the party went through this portion of the cave for several reasons: (1) it would have meant constant traveling over the Long Route, then going into a long series of dangerous,

rough passageways with considerable climbing and crawling. Having reached "The End", a return trip over the same route was inevitable. When one considers the type of lighting then used and the length of time necessary to conquer the many obstacles in the "Unexplored" it seems an impossible task for inexperienced cavers.* (2) Stelle was an observant reporter and his narrative of the upper level is the only part of the book where his place names are not in proper order. He mentions formations, springs, rooms, passageways, obstacles and pits by--mostly the same names used today but not in their correct relationship to each other. (3) For many years after the finding of the upper level the Rothrocks refused to permit casual tourists to visit that portion of the cave. Despite the friendship between the family and the Rev. Horace C. Hovey and the great regard they seemingly had for each other, this great American speleologist was never permitted to go into the "Unexplored Regions". Whether this was because of possible violation of property rights or simply because it would be extremely difficult to get an injured explorer out of this partly-explored part of the cave no one knows today.

James Parrish Stelle's book helped publicize Wyandotte Cave and it was widely read. Thousands of newspaper and magazine articles were written about the cave but it was eighty-nine years before another factual book about it appeared. Yet present day visitors could well use Stelle's 1864 book as a guide to the scenic wonders of this underground marvel. The rough and dangerous paths are now smooth walkways and the beautiful and colorful formations and great rooms with their high and massive ledges are lighted by a splendid indirect electrical system that shows them at their very best, but the same sense of adventure, excitement and mystery that Stelle experienced are still there. It is an underground land of enchantment.

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* A connection between the "far end" of the "Unexplored Regions" and the Long Route was made in 1904, making the trip somewhat easier by eliminating many hazardous spots.

SALTPETER MINING IN WEST VIRGINIA

Peter M. Hauer

Saltpeter mining in the Virginias became an important industry during the war between the states due to the scarcity of imported nitrates. The early settlers used the cave soils to produce their private supplies prior to the War of 1812. Gun powder became a valuable trading commodity for the early settlers. Much of the art of producing potassium nitrate has been lost but this study has recorded many of the basic principles.

When the earliest West Virginia settlers homesteaded in the mountain wilderness, life depended on a variety of skills and arts that had been handed down for centuries. The 18th Century pioneers who struggled and worked their way up the Greenbrier and Potomac River systems into the rugged highland regions encountered an isolation that made self-sufficiency a matter of survival.

Perhaps the most vital element of that self-sufficient life style was the chemical potassium nitrate, or saltpeter. Used for many things, from meat preservation to dyeing, the water soluble nitrate salt was most important as the major ingredient of gunpowder.

Without the black powder to fire their long barreled flintlock rifles, the pioneers would have fallen prey to Indian or beast, or worse yet, the slow pain of starvation. The black powder was home-made by blending a small quantity of sulphur and charcoal with the saltpeter, which itself constituted up to 85% of the gunpowder.

Unlike most other pioneer arts, which have been preserved and carried into this century, saltpeter making became extinct at the close of the Civil War, when new manufacturing methods replaced the need for home production. Our current knowledge of this skill must, therefore, be gleaned from the study of early documents, relics and ruins of saltpeter making operations, and our own experimentation with this knowledge.

The first coastal settlements had obtained saltpeter by importation from Europe, and home manufacture. Now believed to be microbial in origin, the saltpeter crystals were known to grow in accumulated organic matter and dry dirt, wherever protected from the rain. Human and animal wastes were aged for years under rain-proof nitriary sheds, and this material with dry dirt from under houses, tobacco sheds and slaughterhouses, was mixed with limestone and old mortar. When aged and leached the unsavory liquor was put in large kettles and ash lye, such as was used to make soap, was added to convert the various nitrate salts into a solution of potassium nitrate. This was boiled down and purified by recrystalization, after which it was ready for use. As early as 1624 the Massachusetts Colony had a law prohibiting paving cellars or dove houses "in order that the growth of saltpeter might not be obstructed".

But the isolated mountain settlers couldn't wait until large amounts of organic matter had been aged. They needed their black powder from the start of their isolated living. And so, necessity mothered invention. A source of saltpeter was found to exist in the dry, dusty dirt of the numerous limestone caves and sandstone overhangs or shelters found throughout the mountain wilderness.

Nobody knows when or where this source was first utilized. Our forefathers were too busy surviving to record the details of their earliest activities.

Thus it wasn't until the demands of War had turned saltpeter into an economic product that we find any written accounts of its production. With the outbreak of the American Revolution, an interest in the mountain saltpeter resources was cultivated by the coastal gentlemen who had organized themselves into a Continental Congress made up of local Committees of Safety.

Doctor Weisenthal of Baltimore, a member of Maryland's Saltpeter Committee, was ordered to examine the deposits along the headwaters of the Potomac, and on October 1, 1776 he made his report to the Council of Safety. On the plantation of Colonel Hight, on Pattersons Creek (Mineral

County), Dr. Weisenthal was shown a cavern where "there is sometimes a good quantity of real saltpeter in its white colour found. . ." Dr. Weisenthal "had reason to suppose that the mountains must contain a great many sub-caverns. . . full of saltpeter as to furnish the Colonies with that desirable article to the fullest extent, at reasonable rate."

The good doctor also noted that the local inhabitants "make use of it partly in gunpowder, and partly for salting meat, that being a scarce article there. . ."

There is no record of whether or not any action was taken concerning Dr. Weisenthal's find, but we do know of a successful operation along Rich Creek in lower Monroe County during the Revolution. Here Col. Charles Lynch, who also ran the lead mines at Fincastle County, Virginia, found a cave a quarter or half mile long with saltpeter-impregnated earth "to the depth of seven feet . . . every bushel yielding on the average three pounds of nitre." Col. Lynch consigned the operation to others, and this cave alone produced over 11,000 pounds during the Revolution.

Lynch's cave was just one of many. Thomas Jefferson took a great deal of interest in saltpeter caves, and in his 1784 Notes on the State of Virginia he mentioned 50 saltpeter caves on the Greenbrier waters alone. In the same year, a Monroe County trading post took saltpeter, as well as the usual furs and ginsant, in trade, and it can be said that this was the first of all chemical manufacturing industries.

The new wave of Western advancement and settlement that followed the Revolution kept the saltpeter manufacturers in business. A Methodist circuit rider, John Smith, visited Singing Cave near Greenville in 1787 and "A mile from where we entered in ransacking this Dark Valt I saw the manner of making of Salt Peter which is made there in great quantities."

By 1799 saltpeter from West Virginia had become a major item, not just for survival, but for trade and export as well. A travel book from that year noted the number of western caves and their quantities of saltpeter, and recorded that "The gunpowder made with it, in the back country, forms a principal article of commerce, and is sent to Philadelphia in exchange for European manufactures." A back yard survival craft had grown into West Virginia's first manufacturing or chemical industry!

It is believed that this level of production continued through the War of 1812. That War was followed by a delayed depression called the Panic of 1819, which halted, not just saltpeter production, but American manufactures in general. Once again, this ancient craft reverted to a back yard level of production for home and local use.

Much later, in 1861, the Civil War broke out, and the Confederate Army, starved for gunpowder by the Union blockade, formed a Nitre and Mining Bureau, and began the final and largest scale use of saltpeter caves in history.

West Virginia was known as Nitre and Mining District No. 3, and Capt. R. C. Morton, headquartered in Fincastle, Virginia, was put in charge. Over 40 sites have been located in West Virginia where these operations were carried on, often in an underground secrecy reminiscent of moonshining operations. This writer found one such hidden saltpeter room in a cave in his backyard, unentered since Confederate days, with tools and torches lying undisturbed for a century, as if the miners had only gone out for lunch!

The Confederates certainly had good reason for caution. Union raids took their toll. Major Isaac St. John, chief of the Nitre Bureau, expressed his concern in an 1862 letter to CSA Secretary of War Seddon:

> "In the Pendleton district several of our establishments have been broken up, kettles smashed, some of our workmen taken prisoners, and all dispersed. The yield for November in this and the adjoining Greenbrier District will be reduced from this cause at least 10,000 pounds. . . On the army movements of Tennessee and Virginia during the present month depend at least 40 per cent of our home nitre production."

Now the course of the War is history, and as the last cannon's roar used up the nitre of the caves, America's oldest continuous chemical industry ground to a halt. The technological age that had surged into reality as a by-product of the War brought new kinds of guns and powder, and the skill of the saltpeter maker faded into oblivion.

With generations of history in mind, last summer I determined to reproduce the saltpeter making process at the Civil War saltpeter cave in my back yard. Joined by a chemist, Dr. Gary Eller (a native West Virginian), we used this opportunity as a "dry-run" experiment, preliminary to a long-term project now being conducted at Mammoth Cave National Park in Kentucky. Here a saltpeter research team, aided by National Geographic funds and Cave Research Foundation facilities, has assembled a group of scientists with the goal of learning the origin and nature of cave saltpeter deposits in full technical detail. Dr. Eller and I had a copy of a Confederate instruction book, sent to patriotic farmers, as well as the knowledge gained from studies of mining ruins in caves throughout the State.

I had already used the previous winter's wood ashes and made lye from them for our project by building a V-shaped leaching vat or hopper. In this device I stirred rain water into the ashes, and let it drain into a wooden collecting trough. This liquid was boiled down and evaporated to a proper strength in an antique iron kettle.

We then entered the cave and dug up a quantity of the nitrous earth. This was removed in sacks and put into the hopper, and it too was thoroughly leached overnight, and the "Mother liquor" or grau put in a kettle. The ash lye was then added to the cave nitrate solution (primarily the chemical nitrocalcite). The potassium in the lye combined with the nitrates from the cave earth, leaving a solution of potassium nitrate, the saltpeter. The impurities left over formed a white precipitate which settled to the bottom. A foam and grease of organic impurities, which formed on the surface, was absorbed by adding chunks of turnips, an old saltpeter maker's trick. The saltpeter solution was then ladled off into a smaller kettle, and slowly evaporated until our saltpeter crystals had formed. Later, Dr. Eller's chemical analysis of our crystals verified the success of our results.

Basically, the whole process seems very simple. However, a good deal of skill must have been involved to procure the maximum quantity and highest quality in the end product. The wood ashes had to be certain hardwoods such as oak and hickory. The resultant lye had to be the proper strength, and the amount added to the leach water from the cave earth had to be precise, as well as varied to meet the concentration of nitrate in the grau. Too much lye leaves the saltpeter "in the lye", and too much nitrate solution reduces the quantity produced, which is called "in the grease". Time and experience were the most important tools of saltpeter making.

The construction of the mining equipment is of particular interest. Isolation and wartime scarcities made it necessary for the saltpeter maker to manufacture his equipment from the abundant wood products of the forest. Except for an occasional mattock or pick head, nearly all of the tools found in early saltpeter mines have been wooden. Even the scraping paddles and pry-bars for digging the dirt were carved of wood. Pine faggots (torches) lit the underground rooms instead of metal lanterms. I've found several discarded shoes of saltpeter miners, and even these had tiny wooden pegs instead of nails!

Finely woven cloth sacks and wooden stave buckets were used for carrying the nitre dirt to the leaching area. A variety of hand-made wooden ladders, bark-tied bridges, and peg-held winches were also used in the mining operation.

The troughs were hewn out of solid logs with broad axe and foot adze, and varied in size according to need. Their design was the same as the tiny wooden troughs used in the earliest maple-sugar operations.

The V-vats, or hoppers, were a pole framework held together by wooden pegs or trunnels, with side boards riven by froe and mallet. They were sealed and lined with straw and the sides conducted the leach water to a long, thin drain trough which fed into a larger collecting trough. The iron kettles used for the conversion process were as large as the operation and available resources would allow.

Although a folk revival of saltpeter making is unlikely to catch on real soon, a great deal of the history, technology and lore of this fascinating subject needs to be studied and documented. There are probably many other early pioneer skills that could also be reconstructed in this way. These lost or extinct skills are an important goal towards understanding our origins, place in history, and our own selves.

CONFEDERATE NITRE PRODUCTION

John R. Powers

The use of caves played an important role in the Confederacy's bid for independence. The Confederate Ordnance Department (later the Nitre & Mining Bureau) successfully utilized the south's numerous, scattered caves to produce an adequate supply of gunpowder despite military, political and logistic disadvantages. Nitrates, an essential ingredient in gunpowder, was leached from the earth mined from saltpeter caves. An indepth study of numerous official war department records, ordnance department publications and other writings is included in this report.

The success of the Confederate munitions industry stands out in glaring contrast to the general inadequacy of the Confederate supply system. Time and space have confined this study to one small but essential part: domestic nitre production in the Eastern theater of the Civil War. Potassium nitre, commonly called saltpeter or nitre, yielded potassium nitrate after leaching; this product was the main ingredient in gunpowder. Without this essential product, the South would have been defenseless.

Exhausting research revealed that only scattered information exists. To my knowledge, no history of the nitre industry has been published. The records of the Ordnance Department and Nitre Bureau were destroyed by fire in the closing days of the war. Their chiefs, Generals Gorgas and St. John, died before they could write histories of their operations. In collecting bits and pieces from various sources, obvious factors emerged. Confederate nitre production was successful because of geographic, historic and economic advantages, government assistance and capable administration.

Soon after hostilities commenced, the Confederacy was blockaded by the Union Navy. It had to turn to domestic production of saltpeter to make gunpowder.[1] Geographic advantages aided Confederate nitre production. The great abundance of nitre and its widely spread locations rendered it less vulnerable to enemy destruction. By not being concentrated in one area (like lead, salt or copper) it never suffered total destruction.[2]

Nitre was extracted from two sources: caves and under old buildings. Microorganisms are believed by some to play a part in creating deposits of saltpeter in cave earth. Possibly nitrogen fixation by bacterial process. Even bat urine may have helped.[3] Both of these sources are abundant and widely dispersed. Most of America's caves are in the South.[4] The vast number of caves (eighteen hundred in Virginia alone) hindered enemy discovery and destruction.[5] The twenty-five caves mined for saltpeter there were scattered along its western counties (present). Much was also done in West Virginia. See Map #2.[6] Most of the southwestern caves were still in operation in October, 1864.[7]

Nitrous earth deposits from non-cave sources were even more abundant and scattered.[8] Large quantities were mined from underneath old dwellings, slave quarters, cattle sheds, barns; almost any old building held a potential deposit of nitrous earth under its floors.[9] Every southern state utilized these resources (see map #3). By 1864, as cave areas were increasingly lost to the Union, production from deposits exceeded that from caves.[10] Despite military reverses and gradual loss of territory, nitre production didn't decline until 1865.[11]

Over one hundred years of experience aided the South in saltpeter production. By 1860, most of the saltpeter caves had already been located, explored and developed. In addition, the pattern of government encouragement had been established since the earliest settlements. The historic development of the industry illustrates the basic factors which later would stimulate confederate production; it was needed, it was available, and it was encouraged.

The struggle for survival in the American wilderness coupled with the vast distance with the mother counties demanded self-sufficiency on the part of the colonialists. An abundant powder supply was essential for hunting and protection against hostile Indians. As early as

1630, the colonial government of Virginia passed an act for collecting materials necessary for creating artificial nitre beds. In the same year, Royal Governor John Harvey expressed his hopes for discovering a saltpeter cave.[12] (At this time, few white men had ventured beyond the Blue Ridge Mountains). The earliest account of saltpeter manufacture was in 1639 in Massachusetts by Edward Rawson. His actions prompted the colonial legislature to pass an act on June 14, 1642, which urged all families and towns to promote its manufacture.[13] When settlers began exploring the fertile valleys west of the Blue Ridge, they soon realized a potential source of domestic nitre in the numerous limestone caves there. This was around 1740. In 1745, the Virginia Assembly passed an act to encourage production by offering a bounty on saltpeter.[14] Surveying and mapping of saltpeter caves was essential to the fledgling industry. In 1770, Thomas Jefferson produced the first cave map in the United States (Madison Cave, Va.).[15]

The War for Independence stimulated production. In view of the impending conflict, the Continental Congress in 1775 advised the colonies to collect saltpeter for making gunpowder. They also established a saltpeter committee to facilitate production; its members included Franklin, Paine and Jefferson.[16]

To better facilitate administration, Congress in November, 1775, divided the colonies into four districts, each overseen by a saltpeter committee. The resolutions further authorized the committees to pay forty cents a pound. By 1783, over fifty caves in one Virginia county alone were being mined for nitre.[18] One famous cave is Cave Mountain Cave, near Franklin, West Virginia (then Virginia). It has a set of initials bearing the date 1769.[19]

In the period following independence production lagged, due to the cheaper price of nitre imported from England. The back country continued to keep local production alive to supply powder necessary for hunting, mining and protection. The census of 1810 shows that 447,144 lbs. of gunpowder were produced in the colonies.[20] The War of 1812 again terminated importation of English gunpowder. Production soared and expanded into new states. Frontier settlement had greatly expanded the base area from which to locate saltpeter caves. Mammouth Cave, Kentucky, supplied much of this fledgling nation's new military needs.[21] Nitre from Santa Cave, Alabama, provided gunpowder for the famous warship, USS CONSTITUTION. This cave continued production for over fifty years. It was to become one of the Confederacy's most important caves. Even railway tracks were installed to speed mining.[22] Another important southern cave, Nickajack Cave, near Chattanooga, Tennessee, began production during the Mexican War.[23] This development over a century provided the Confederacy with a broad base of experience, locations, and an established market system to rely on when they seceded.

The South's saltpeter production was successful because of many economic advantages. It was easy to locate, extract and refine; it was cheaper and superior than imported saltpeter; and the geographical dispersal of the sites lent itself to the character of the war and the decentralized supply system.

Locating nitre was easy. Nitrous earth existed in caves and under old buildings. If the earth was dry and loose and not subject to flooding, it necessitated further investigation. Simple tests could determine the presence of saltpeter. If the earth contained whitish, needle-like crystals which tasted cool and bitter, it was further tested. One simply scratched a furrow into the smooth surface of the earth and reexamined it after several days. If the earth again appeared smooth and even, it contained saltpeter. This test was unexplainably accurate.[24] If, after sprinkling some of the crystals into some hot coals, they burned quietly with no sparkling or crackling, the earth definitely contained saltpeter.[25] These tests made no demands on the limited education of the average worker of that period.

Nitre production could be done on a small scale with ordinary farm implements; an iron pot, three or four tubs, several small water troughs, several coarse bags, a wheelbarrow, four barrels, and several shovels.[26] Once everything was set up, it could actually be run by one man.[27] Refining was usually done at the powder factory, but could be done on site also. The only additional equipment included several large kettles, a rake, additional troughs, barrels and buckets.[28]

Once nitrous earth was located, extraction was easy. Nitre mining didn't require extensive tunneling or quarrying. It was readily accessible. Of the twelve Virginia caves still being mined in 1863, ten had natural passages large enough to walk through. Many, such as

Clarks, Buchanan, and Burnsville (Breathing) saltpeter caves were large enough for donkeys and oxcarts.[29] Sauta Cave in Alabama had over one-half mile of oxcart tracks.[30] The majority of saltpeter caves in West Virginia had large, easily traversible passages; Sinnet, Trout, Trout (New) are among a few.[31]

Confederate miners may have reused equipment left from earlier days. The unusual dryness and stable temperatures in saltpeter caves preserve objects for great lengths of time.[32] Since locating the leaching equipment in the cave was advantageous (less distance to carry the unprocessed earth) and many caves had been mined for saltpeter since the Revolution, it seems probable that nitre workers found much old equipment left there still usable. Old water troughs, small bridges, ladders and other equipment can still be found in caves today, even though much has been carried off by overzealous collectors. Modern explorers of Breathing Cave, Va. first used an old ladder still intact from saltpeter days.[34] In Sauta Cave the leaching pots and scaffolding are unbelievably intact. The wooden rails and metal railway cars are so well preserved that they could be used today.[35]

Once the earth was extracted, the miners dumped it into three barrels.[36] Water leached from the first barrel was poured into the second, and then into the third. This nitrous water was poured into a trough in which lye was added. This removed undesirable magnesium and calcium and added potassium ions. It was strained through cheesecloth and then boiled in open kettles.[37] This evaporated the water, causing saltpeter crystals to form, which were captured by straining.[38] The used water was returned to the first barrel for the repeat cycle. Three men could produce 100-200 lbs. of saltpeter in three days.[39] The 25-30 workers in Sauta Cave, Alabama produced over a thousand lbs. a day.[40]

The difficulties of importing saltpeter encouraged domestic production. In 1861, the Union initiated a naval blockade of southern ports to prevent importation of war goods and exportation of cotton.[41] Its increasing effectiveness stimulated increased efforts toward self-sufficiency by the domestic munitions industry.[42] Freight charges rose one-hundred per cent.[43] As the blockade grew, domestic production increased, making this saltpeter much cheaper than imported nitre. Gunpowder consists of 75% saltpeter, the rest sulfur and charcoal.[44] Domestic gunpowder cost only one-third that of imported gunpowder because of the dangers of blockade running and the long transportation distance.[45] Gunpowder produced at the Augusta, Georgia powder factory cost only $1.08/lb., while imported gunpowder cost $3.00/lb.[46]

In addition to being cheaper, domestic nitre was of equal or superior quality. The May 3, 1863 London Times stated:

> "Powder made in Augusta, Georgia is very nearly up to the standards of the finest English powder and costs only four cents to make."[47]

Colonel Rains, head of the Augusta powder factory, stated that double refining of saltpeter produced a quality as pure as that from the famous Watham Abbey powder works in England.[48] Colonel St. John, CSA Nitre & Mining Bureau Chief, reported that nitre from caves in southwestern Virginia was of superior quality and could be quickly refined.[49] The unused Augusta powder was used by the U. S. Army after the war at Ft. Monroe School of Artillery Practice "on account of its superiority".[50]

President Davis urged decreased dependence on foreign supplies and more on developing domestic production.[51] In 1862, the Ordnance Department started its highly successful importation system, but by 1864 sinkings, captures and reduction of ports had wrecked it.[52] Domestic production became essential as the stranglehold tightened. By August, 1864, the South was reduced to only two ports, Wilmington and Charleston.[53] The capture of Charleston in late 1864 all but ended importation, but domestic nitre production increased. The Confederate nitre industry produced twice as much in 1863 as in 1862.[54]

Despite the industry's early development, the Confederacy suffered a serious shortage of nitre in 1861. Years of peace, emphasis on agriculture, and northern predominance of industry hindered industrial development in the South.[55] In 1961, only two small powder mills existed in the South. Combined, they produced less than 30,000 pounds a year.[56] Saltpeter remained an essential for war as both nitroglycerin and gun cotton were still in the experimental

stage.[57] One of President Davis's first acts authorized the buying of northern nitre processing equipment and machinery.[58] The outbreak of hostilities closed off the North as a market and revealed even further the urgency for developing nitre production.[59] In 1861, the Union initiated a naval blockade of southern ports to prevent importation of war goods and exportation of cotton.[60] Its increasing effectiveness stimulated increased efforts toward self-sufficiency by the domestic munitions industry.[61] The blockade caused freight charges for imported goods to rise over 100 per cent the first year.[62] Truly, self-sufficiency became necessary for the South's economic survival. The Confederacy quickly distributed and utilized all captured munitions from federal arsenals and forts siezed at the time of secession. Even so, the new nation possessed barely a month's supply of gunpowder.[63]

The urgent need compelled the Confederate government to accelerate domestic nitre production. The economic and administrative assistance given to the industry illustrates its high priority.[64]

In the war's first year, the Confederate government worked indirectly through state contracts and private firms to develop nitre production. Economic aids included loans, subsidies and high prices for saltpeter. It allowed private firms a generous 75 per cent profit ceiling.[65] Congress passed an act authorizing the advancement of one-half the necessary capital for starting new nitre works and enlarging existing ones.[66] By the end of 1861, the Ordnance Department, which then administered nitre production, authorized its agents to pay 35 cents a pound, nearly triple the price in the North.[67] Despite economic encouragement, private production lagged, producing only 10 per cent of the year's total nitre supply. The rest was imported.[68]

The Confederate government used its administrative power to accelerate nitre production. By 1862, the growing needs of mass warfare proved too burdensome for the Ordnance Department. It was unable to handle all the work of extracting and processing nitre and other minerals in addition to its major responsibility, making arms and ammunition.[70] Accelerating prices, inability of securing slave labor, and difficulty in transportation also contributed towards the creation of a separate, independent bureau.[71] On April 22, 1863, following General Gorgas's urging, the Confederate Congress established the Nitre and Mining Bureau as a separate agency within the War Department.[72] The Act was implicit of the Bureau's purpose:

". . . the organization of a corps of officers for the working of nitre beds"[73]

Lt. Col. Isaac St. John was appointed superintendent over the three majors, six captains and ten lieutenants who shared the same pay and allowances of similar grades in the cavalry.[74] By August the Bureau had 400 men working 16 caves. It produced 100,000 pounds of saltpeter by October.[75]

Economic aid reflected the industry's high priority. The $1,000,000 nitre appropriation in August, 1862, equaled almost one-third the total Ordnance Department budget.[76] By 1864 the stranglehold of the Union blockade made domestic production essential. The Nitre Bureau's appropriation for January-June, 1864 was $9,500,000, nearly half the Ordnance Department appropriation.[77] For the same period in 1865 it rose to $12,500,000.[78] Nitre production soared 300% in 1862 and an additional 300% in 1863.[79]

Labor requirements became increasingly acute because of the growing production and the growing demand for soldiers. To alleviate the labor problem, especially in the remote mountainous areas (WVa) where apathy and unionist sympathies hindered hiring, the Secretary of War in May, 1862 ordered all army commands to detach details of men at the request of the Nitre Bureau's local officers to work nitre caves and deposits in their respective areas.[80] In addition, they were to impress the men, equipment, and caves of ineffecient private producers.[81]

The government further eased the nitre industry's labor problem by giving it the highest priority in impressing Negro slave labor. Private industry had been hindered by the reluctance of slave owners to have their slaves work far from home. Furthermore, they felt that the needs of agricultural production required them. Nitre mining became one of the three largest employers of Negro labor in industry; yet it was one of the smallest agencies.[82] In one Virginia county alone (Smith), 75% of all slaves were producing saltpeter.[83]

The government also aided the nitre industry in surmounting the transportation difficulties. Historical evidence on this subject is meager, but the government control of all railroads and

prohibition of transport of non-essentials (to the war) certainly helped. In 1862 the Secretary of War directed all branches to give saltpeter and powder the highest priority in transportation.[84]

Conscription remained a thorn in the side of the Confederate supply system throughout the war; yet the Nitre Bureau was barely touched. Its workers received the highest priority in exemptions from conscription. The first Conscription Act of 1862 exempted miners.[85] In 1864, due to urgent manpower needs of the decaying military picture, General Order #77 was issued. It revoked exemptions of all men age 18-45 except those classified as experts.[86] The Nitre Bureau up until then had been struggling along with a minimal 30,000 men. Col. St. John threatened to resign over charges that his bureau harbored draft evaders. General Gorgas refused to accept it.[87] Due to his and General Gorgas's (Chief of Ordnance Dept.) protests, Jefferson Davis granted the two agencies a "concession". They only suffered a 20% cut in personnel instead of 30%. No other Confederate agency was so favored.[88] By 1865, 70% of all able-bodied men engaged in supply who weren't artisans or mechanics were in the Nitre and Mining Bureau.[89]

Had the nitre industry been forced to rely on disabled veterans and old men for the strenuous work of mining, its operations would have been seriously hampered.

In conjunction with assistance from the central government, the nitre industry was capably administered by competent leaders. Until 1862, the Ordnance Department struggled to develop the industry along with its other duties. Its chief, General Josiah Gorgas, created the Nitre Corps to begin surveying the South's nitre resources. He persuaded the states to relinquish their supplies to the Confederacy. A West Point graduate and ordnance officer, he gained much practical experience during the Mexican War,[92] and at various arsenals throughout the United States. He experimented with new cartridge designs, designed new artillery, and familiarized himself with the making of gunpowder.[93] Robert Kean, head of the Bureau of War, praised Gorgas as a "talented administrator".[94] In addition to centralizing the Confederacy's nitre supply, he pushed the bill which created the Nitre and Mining Bureau.[95]

Up until then, the Ordnance Department's Nitre Corps administered nitre production.[96] Its chief, Colonel George W. Rains, was also a talented and experienced leader. He was a graduate of West Point, first in Scientific Studies. His career included military service in Mexico, teaching chemistry at West Point, and serving in the Army Engineers and Artillery.[97] Under General Gorgas's direction, he enlisted agents to survey nitre caves in Alabama, Tennessee, Georgia, West Virginia (Virginia) and Texas. Many of these he visited himself.[98] He built a large nitre refinery and powder factory at Nashville which shortly was producing 3000 lbs/day.[99] In addition, he started construction of artifical nitre beds and published a pamphlet to encourage local production (Notes on Making Saltpeter).[100]

Major (later General) Isaac M. St. John was selected to head the newly created Nitre and Mining Bureau. He was probably one of the most talented administrators in the Confederate Army. A Yale graduate, the youngest in his class, he tried medicine and journalism before becoming a civil engineer.[101] Upon his selection to head the Nitre Bureau, his superior, General McGruder, regretted losing him:

". . . has energy and talent beyond any that I have witnessed."[102]

His psychological insight to problems aided him greatly. Where others saw the hole, he saw the donut. He concentrated on what he controlled, not on what he didn't--transportation, funds, etc.[103] By the war's end, his talents were nationally recognized. Robert Kean praised his great energy, organizing talent and ingenuity:

"St. John created resources where none previously existed."[104]

Recognition of his accomplishments was illustrated by his promotion to General and selection to take over the floundering Commissary Department.[105]

Colonel St. John seized the reins of the new agency at a low point in the war. Many caves had been lost in the Union's Spring Campaign through the Shennendoah Valley. Production was struggling along. Through him, the Nitre Bureau reacted successfully to the changing needs of war. His first action decentralized command while unifying control over the entire industry. He divided the Confederacy into fourteen districts, each supervised by

an experienced ordnance officer who enlisted labor from those subject to military duty.[106,107] Over these districts were three supervisory divisions: First Div.-Va., N.C. and Tenn.; Second Div.-Ala., Ga. and S.C.; Third Div.-Trans-Mississippi Area.[108] This lent itself to the geographical diversity of the South's nitre resources. It also reduced red tape. Officers didn't have to go through elaborate channels to impress a cave for production.[109] The Bureau became an efficiently running machine. Its central headquarters in Richmond was noted for its small number of officers.[110] Within six months, the Bureau had increased production to 2000 lbs of powder a day, which almost met present military needs.[111]

The Nitre Bureau expanded its labor force despite the losing war. By July, 1862, 2772 whites and 115 blacks were developing bureau-controlled nitre works. This does not include private works.[112] Although the bureau's high priority in impressing Negro labor greatly aided its operation, it also hired a large number of free blacks.[113] It established a training program from which a small nucleus of skilled workers trained the unskilled.[114] St. John stated that better training offset the losses of nitre works.[115] Despite conscription and the Army's reluctance to relinquish skilled workers, the bureau contained almost 4000 nitre workers by 1863.[116] By September, 1864, due to Army impressment, desertion, conscription, capture, casualties and other losses, it numbered only 3,292 nitre workers. Yet they provided 55% of the Confederacy's total nitre supply. The Union required over 80,000 men for its nitre production.[117]

Diversification of production greatly aided the success of the Confederate Nitre Bureau. It lent itself to the geographical distribution of the South's natural resources. (See Sub Sun, Sept. 77, Pt. 1 of series). Diversifying also made production less vulnerable to Union destruction.

In the limestone areas, known caves were mined for saltpeter, 27 in Alabama[117], 25 in Virginia [118], and numerous caves in Tennessee[119]. As territory was increasingly lost to Union forces, Nitre Bureau Commandant Col. St. John concentrated more on developing nitre production in the interior.[120] North Carolina had no known caves, yet became the one district with the most constant supply of nitre. In North Carolina and in other coastal states, nitre workers extracted nitrous earth from under old houses, etc.[121] Enemy action had less effect on these states. From June-Sept., 1864, Virginia caves only supplied 24,133 lbs. of saltpeter while North and South Carolina and Tidewater Virginia supplied 93,558 lbs.[122] Interior production of saltpeter wasn't much hampered until Sherman's march through Georgia in late 1864.[123] As caves were increasingly lost, St. John countered with the establishment of artificial nitre beds at Columbia, Charleston, Augusta, Savannah, Selma, Mobile, and elsewhere. They would have supplied 3-4,000,000 lbs. of saltpeter, enough to arm the South's cannon for several years, but the Confederacy collapsed before the beds became ripe.[124]

The smallness and seclusion of nitre operations in scattered locations rendered it seemingly impervious to the Union advance. Despite Union conquest and major raids in Tennessee, Kentucky, West Virginia and the Shennendoah Valley, many caves there continued to supply nitre to the powder factories through 1864.[125] In Virginia, 12 caves were still operating in September, 1864. Buchanan Cave, one of the largest saltpeter producing caves in the state, located near Saltville, was never captured.[126] Fifteen caves were still being mined in the Greensboro-Chattanooga area of Tennessee in 1863 despite constant harrassment by Union forces.[127] Even in Unionist West Virginia, caves in Pendleton and Greenbriar counties were repeatedly raided but reopened. Col. St. John reported the raiding by the 12th N.Y. Cavalry of a cave near Franklin in March, 1864.[128] Herndon Wagge, a resident of Franklin (and owner of Floyd Wagge's Cave), reported that his father worked in caves as a petre monkey (sort of a laborer/assistant). He was captured by marauding Union cavalry and taken to a prisoner camp at Old High Town. He was released upon his pledge not to engage in any more saltpeter production.[129]

Despite the weaknesses of the Confederacy, the Nitre Bureau expanded and increased production. Through the use of diversifying production, maximizing the output of its workers, efficient administration, and government assistance, the Confederate Army (or at least the powder factories) seldom lacked the main ingredient for gunpowder, namely, saltpeter.[130] The Augusta, Ga. powder factory had 70,000 lbs. on hand at war's end.[131] Col. St. John had developed production of saltpeter to the point where it would have been independent of importation had territory been held.[132]

The use of caves played a major role in supporting the Confederacy's bid for independence.

It certainly was not a cause; most Southern leaders believed if war did come, it would be a short, victorious one. When it did, and grew like some malignant tumor, capable soldiers and engineers like Gen. Gorgas, Major Rains and Col. St. John utilized the South's natural resources to the utmost, given the difficulties of transportation and communication at that period. Had more of this country's caves been north of the Mason-Dixon Line than south of it, the war would certainly have ended sooner.

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